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TURNING IDEAS INTO ACTION: ENSURING EFFECTIVE CLEAN UP AND RESTORATION IN THE GULF

HEARING

BEFORE THE

SUBCOMMITTEE ON OCEANS, ATMOSPHERE, FISHERIES, AND COAST GUARD

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

JULY 21, 2010

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TURNING IDEAS INTO ACTION: ENSURING EFFECTIVE CLEAN UP AND RESTORATION IN THE GULF

WEDNESDAY, JULY 21, 2010

U.S. SENATE,
SUBCOMMITTEE ON OCEANS, ATMOSPHERE, FISHERIES, AND COAST GUARD,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:05 a.m., in room 253 of the Senate Russell Office Building, Hon. Maria Cantwell, Chairman of the Committee, presiding.

OPENING STATEMENT OF HON. MARIA CANTWELL, U.S. SENATOR FROM WASHINGTON

Senator CANTWELL. The Senate Oceans, Atmosphere, Fisheries, and Coast Guard Subcommittee of the Commerce Committee will come to order.

I thank the witnesses for being here today. We are going to have two panels. First panel will be Captain Matthew Sisson—Sisson?

Captain SISSON. Sisson.

Senator CANTWELL.—Sisson, who is the Commanding Officer of Research and Development Center for the United States Coast Guard; and Mr. Doug Helton from the Office of Response and Restoration, National Oceanic and Atmospheric Administration.

And then we'll have a second panel of people who have been involved in ocean research.

As the single-largest marine oil spill in our Nation's history, the BP oil spill in the Gulf of Mexico is both an environmental and human tragedy of monumental proportions. Virtually no part of the Gulf region's economy has gone unscathed, and the devastation facing the environment is unprecedented.

In 1989, the *Exxon Valdez* showed us just how unprepared we were for the massive oil tanker that ran aground in Prince William Sound spilling over 11 million gallons of crude oil, and, today, the BP oil spill is showing us just how unprepared we still are in 2010.

Since the *Exxon Valdez* oil spill, there has been very little investment in the research and development of cleanup technologies by industry, academia and government agencies.

Private companies, in their pollution-response plans, must cite the technology and equipment that they will use to respond to a spill, but to save time on research, however, they are often outsourced to non-profit groups such as the oil-spill recovery orga-

nizations that provide contract services during an oil spill, and simply the list that the contract is in place as a response plan is a way of compliance.

Our primary response technology of today—skimmers, in-situ burns, boom and chemical dispersants—were all developed decades ago.

Meanwhile, exploration and drilling technology has advanced at a meteoric pace due to heavy investment by oil and gas industry and the drive to drill in deeper waters with extremely sophisticated equipment.

The *Deepwater Horizon* oil spill has revealed a huge disparity between our nation's ability to extract oil versus our ability to respond to an oil spill.

There are several promising technologies and techniques—such as solidifiers, remediation techniques, absorbent-fiber membranes—but these innovations have not yet been fully developed or assessed or made operational as part of oil-spill response.

For example, today, we will hear from Dr. Fritz Stahr of the University of Washington, who has worked to develop sea-glider technology for sophisticated underwater scientific monitoring, a tool that could easily be used to detect underwater plumes in the Gulf of Mexico.

And we will also be hearing from Dennis Yellowhorse Jones, a geologist and entrepreneur, who has developed an organic remediation method for breaking down oil using a unique mineral compound, a method that could be used to clean up the Gulf's shorelines.

Thousands of ideas and proposals have been submitted to the government and BP. The Coast Guard has received over 3,500 technology proposals so far, I think something like 77 of which have been approved or forwarded to the incident command for use in the Gulf.

And BP has received over 100,000 submissions, which the company has only, I think, been able to process through about 12,000.

We need to do everything possible to assure that oil-spill response is the best response that we can make it. Recognizing BP's inability to respond to the many proposals and the Coast Guard's Research and Development Center, established the Interagency Alternative Technology Assessment Program, and I'm sure we're going to hear, Captain Sisson, about that today.

But while the alternative technology and assessment program process is in place, I think it shows that we are still struggling to face, in the midst of an emergency, the desperately needed solution to a permanent process for vetting and evaluating oil-spill technology.

This process is only a temporary fix, and we need a permanent process so that we are in the same place now in the future in case of another big spill.

So we are going to hear today about what needs to be done to help jumpstart oil-spill-technology research and development, provide further incentives and structure. We need to turn new technologies into reality and to develop protocols and standards that will provide us a 21st century oil-spill safety net.

I have introduced legislation, the Oil Spill Technology and Research Act. Many of these pieces we have proposed in the past and have been parts of various pieces of legislation, and we will be proposing them again as legislation moves through the legislative process.

Twenty-one years ago, we saw the devastating cost of complacency, and now we are living that nightmare again.

This oil spill is not a Louisiana tragedy. It's not a Florida tragedy or a Mississippi tragedy or Alabama. It is an American tragedy, and it's up to us to ensure that America's waters and shores are protected in the most rigor that we can muster.

So we have to ask ourselves, when this history is written, will we say that we rose to the occasion and made sure that we had a better response plan in place for the future? I know that we are going to do our part here on the Subcommittee and on the full Committee.

So I thank my colleague for being here today, the Ranking Member, Senator Snowe, for having this hearing and bringing attention to the fact that we need to upgrade our technology.

Senator Snowe.

STATEMENT OF HON. OLYMPIA J. SNOWE,
U.S. SENATOR FROM MAINE

Senator SNOWE. Thank you, Chair Cantwell, and thank you, most importantly, for holding this hearing today on, without a doubt, the worst oil spill in the history of our country.

Last week, nearly 3 months after the explosion that destroyed the *Deepwater Horizon* rig—claiming, tragically, the lives of 11 men—and left as much as 60,000 barrels of oil pouring into the Gulf every day, responders finally have managed to affix a temporary cap and hopefully halt the flow.

In hindsight, we can look back and see, without a doubt, that the industry and the Nation were simply unprepared for a disaster of this magnitude.

As the Ranking Member of the Subcommittee, I see it as our primary responsibility to ensure we close the loopholes that allowed this travesty to occur in the first place and that we dedicate all appropriate available resources to restoring the devastated ecosystems and the economy of the Gulf Coast.

Just over a month ago, as Ranking Member of the Senate Committee on Small Business, I and Chair Landrieu held a hearing as well to address the approval process for the new technologies that could assist with the clean up and response effort.

During that discussion, it became clear to me that inefficiencies remained in the process, notably that the Federal Government and BP had set up a duplicative track for individuals and businesses to apply for approval of their technology.

Today, I hope to hear from our panel how that procedure has been streamlined, how it has contributed to the response effort and what steps the administration is already taking to vet new technologies and methods that can contribute to a restoration of the marshes, the beaches, the shorelines, in the face of more than 100 million gallons of oil spilled from this ruptured well.

I am pleased as well to welcome our two panels of witnesses here today.

Captain Sisson and Mr. Helton, your agencies are on the front lines of this battle and must work proactively and aggressively to transition from first response to long-term restoration, an effort likely to take years, if not decades.

On our second panel, we'll hear from three representatives of the academic community, Drs. Pegau, Kinner and Stahr, who will speak from their years of experience responding to spills, developing response partnerships and defining the importance of baseline research in response efforts such as this one.

We'll also hear from Mr. Dennis Yellowhorse Jones who has developed a new organic response methodology, and Ms. Cynthia Sarthou, who has in-depth, first-hand perspective on the efforts undertaken to date to respond to this crisis.

From the first days of this spill, I was particularly concerned with the pace and tenor of the response. In a letter to the president last month, I urged him to seize control from BP and establish a single point of accountability for approving new technologies.

Since that time, we've seen some improvement, and I know there have been a number of proposals that have been submitted—more than 3,600 to the Coast Guard—but none is now in use at this point.

Yet the fact is the first of these were not even tested until more than 2 months had elapsed. So we've had very few proposals that have even begun to be implemented. I will appreciate hearing from the Coast Guard today exactly what is the status of all those proposals that have been submitted and where we stand today on any of them having been implemented.

We must act now to ensure that a similar process for vetting suggestions that may expedite the restoration of critically damaged ecosystems does not experience the same delay we experienced in the response process. Carving out a more substantive role for NOAA will be integral to that effort.

In May, after learning from Dr. Lubchenco at a hearing before the full Commerce Committee that NOAA's comments on the Department of Interior's latest 5-year drilling program garnered no formal response, I filed an amendment to the defense supplemental appropriation bill that would have given both NOAA and the Coast Guard a voice in the permitting process.

This amendment, along with numerous other provisions enhancing NOAA and the Coast Guard's role, will be considered by this committee during executive session tomorrow, and it doesn't come a moment too soon.

Relegating our Nation's preeminent ocean-related agencies to the back bench is part of what has gotten us where we are today in the wake of this catastrophe with problems we don't know how to solve and consequences no one ever anticipated.

The use of chemical dispersants is a prime example of an area in which NOAA's involvement has been tragically lacking. These compounds, designed to break down oil into minute particles, certainly have value in preventing large clots of oil from forming and ultimately impacting sensitive areas like the marshes that comprise the majority of the Louisiana coastline.

As part of the response to this bill, nearly two-million gallons of dispersants have been applied. Much of that is in an unprecedented fashion, at the source of this leak, nearly a mile below the surface.

While the dispersants have been used in close consultation with the Environmental Protection Agency, which is tasked with clearing the products for inclusion on the National Contingency Plan's list, even the EPA admits they know next to nothing about the short- or long-term impacts on the marine environment or the safety of the seafood harvested from areas in which they have been used.

NOAA's scientific expertise must be brought to bear on this issue and across the board NOAA should assist in preparing response plans and activities that more accurately reflect the threats posed by the activities being carried out in our oceans.

This past Monday, BP announced it has spent more than $4 billion responding to this catastrophe. Over a third of the Gulf of Mexico remains closed to fishing. An entire tourist season has been lost to businesses and homeowners on the beaches along the coast.

The tragedy here is that for all of our vast expertise, we have still allowed this event to occur that has had such a dramatic impact on our culture, our environment and our economy.

It is vital that we take the lessons learned over the course of the last 3 months and apply them not just to future response efforts, but to the work that remains to set the Gulf Coast right back on a path toward recovery, and as soon as possible.

So I thank you, Madam Chair, for holding this hearing today, because it is critical to give attention to these vital issues so we can expedite this process because of the profound effect that it's having on the Gulf Coast. Thank you.

Senator CANTWELL. Thank you, Senator Snowe, and thank you for your leadership on the Small Business Committee on similar hearings that were held on this and related subjects to small businesses being impacted from the Gulf, and for your voice in making sure that NOAA's voice is actually heard as a scientific agency giving concern to various project proposals and yet not getting a response.

The fact that you are helping to lead the charge on that or leading the charge on that, I think, will really make NOAA's scientific concerns heard in the process. Very, very important. So I thank you for that leadership.

Captain Sisson, we're going to start with you. Thank you for being here. I am sure your job has been very taxing, but we appreciate you coming to help us think through this process of how we can improve on getting better technology for the future on oil-spill cleanup. So thank you.

STATEMENT OF CAPTAIN MATTHEW J. SISSON, COMMANDING OFFICER, COAST GUARD RESEARCH AND DEVELOPMENT CENTER

Captain SISSON. Madam Chair, Senator, good morning. I am Captain Matt Sisson. I am Commanding Officer of the Coast Guard's Research and Development Center in New London, Connecticut.

I appreciate the opportunity to appear before you today to discuss how the public can propose their ideas for oil-spill response on the Gulf Coast, the R&D center's role in that process and how to turn ideas into action.

From the initial days of the *Deepwater Horizon* spill, the Coast Guard and other Federal agencies were receiving thousands of ideas. We owed it to the public to create a fair, equitable and transparent system to track, evaluate and respond to them.

On May 17, the R&D center, at the request of the Federal on-scene coordinator and the national incident commander, stood up the Interagency Alternative Technology Assessment Program, or IATAP, with six Federal agency partners.

We issued a broad agency announcement, or BAA, on June 4, which calls for a three-page white paper describing proposed ideas in five categories—oil sensing, wellhead control and submerged oil response, traditional oil-spill response technologies, alternative oil-spill response technologies and oil-spill damage and restoration.

Following feedback from Congress last month, we are simplifying and clarifying the *deepwaterhorizonresponse.com* webpage and to explain how to submit your idea to the Federal Government.

This process is open to all sources, not just large companies, but also small businesses, academia, nonprofits, individuals. It is not a competition. Our criteria are simple: Technical merit, effectiveness and deployability.

Once a white paper is received, the submitter is sent an e-mail receipt and a tracking number and they continue to receive automated notifications throughout each stage of the process.

IATAP performs an initial triage to see whether the idea shows immediate promise, merits further investigation or is not applicable to the spill.

If an idea has potential, immediate benefit, we recommend it to the Federal on-scene coordinator, who determines whether to procure the technology based upon his operational need. Ideas that appear to have merit but need more information undergo a more detailed evaluation.

Now, we have received nearly 3,600 submissions through the BAA, and we have performed initial triage on nearly all of them; 1,400 have received an official notification of our determination. Of those 1,400, 87 were forwarded to the Federal on-scene coordinator, 28 are undergoing further evaluation and more than 1,100 were informed that their idea did not support this incident.

Recommendations the FOSC is currently evaluating including a holographic laser system for deep-ocean oil-droplet detection; an automatic information system, or AIS; transmit capability for vessels of opportunity, or VOOs; a small, self-propelled beach-sand cleaning machine; and as you may have seen on television, a large airship or blimp to gauge its effectiveness as a reconnaissance vehicle, a command-and-control platform and to detect distressed wildlife.

This is not the total of our interagency efforts. With the U.S. Navy supervisor of salvage, we assess the capabilities of A Whale, a 1,100-foot-long supertanker reconfigured as an oil skimmer.

We have tested whether our radars that we recently purchased for the Deepwater program and our Coast Guard aircraft can properly detect and map oil in the Gulf.

Through the national incident commander's flow-rate technical group, we have partnered with Woods Hole Oceanographic Institute and MIT Experimental Hydrodynamics Laboratory to conduct sonar and Doppler readings, collect samples from the leak source and measure riser openings to accurately estimate the total amount of oil spill to date.

Funding from the Oil Spill Pollution Act led to the development of in-situ burning by the R&D center in the early 1990s, a technique which has already consumed as much oil in the Gulf as the *Exxon Valdez* spilled in 1989.

Eighty of the R&D center's 94 personnel are now working *Deepwater Horizon* response exclusively, including occupying positions at the Unified Area Command.

The spill requires the largest environmental disaster response in our history, and we need good ideas from all sources. We continue to refine the IATAP process, but it has performed its mission to provide the Federal on-scene coordinator with response ideas that have been systematically evaluated from the widest possible pool of human ingenuity.

Thank you for your opportunity to testify today. I look forward to answering any questions and ask that my full written statement be submitted for the record.

[The prepared statement of Mr. Sisson follows:]

PREPARED STATEMENT OF CAPTAIN MATTHEW J. SISSON, COMMANDING OFFICER, COAST GUARD RESEARCH AND DEVELOPMENT CENTER

Good morning, Madam Chair and distinguished members of the Committee. Thank you for the opportunity to testify before you on the process for submitting Gulf Coast cleanup proposals to the Federal Government.

The Oil Pollution Act of 1990 (OPA 90) and applicable Federal legislation and regulations provide the United States Coast Guard with broad responsibilities and authorities regarding oil spill response oversight on U.S. navigable waters. These responsibilities and authorities include conducting, in coordination with other Federal agencies, research on innovative oil spill-related technology. In order to best leverage the numerous offers of innovative technology assistance to the *Deepwater Horizon* spill response, the Coast Guard, at the request of the Federal On-Scene Coordinator (FOSC) and the National Incident Commander (NIC), established the Interagency Alternative Technology Assessment Program (IATAP).

The IATAP is a documented, systematic, government-managed process to solicit, screen and evaluate alternative or new technologies in support of ongoing *Deepwater Horizon* spill response activities. This government interagency process provides for fair and consistent evaluation of each and every idea. The system is designed to provide submitters with timely acknowledgement notifications upon receipt of their proposal, as well as determination notifications as their proposal progresses through the evaluation process.

The IATAP workgroup is comprised of subject matter experts from the Coast Guard, the U.S. Environmental Protection Agency (EPA), Minerals Management Service (MMS), National Oceanic and Atmospheric Administration (NOAA), Fish and Wildlife Service, Maritime Administration, U.S. Department of Agriculture, and U.S. Army Corps of Engineers. Other agencies or entities may be added to the workgroup as required depending upon the technology under evaluation. The IATAP objectively evaluates proposals with technical rigor, and provides potentially effective solutions to frontline responders.

On May 21, 2010, the Coast Guard R&D Center initiated an interim system prior to the formal stand-up of the IATAP to handle ad hoc submissions received via phone and e-mail.

On June 4, 2010, a formal IATAP process began with the issuance of a Broad Agency Announcement (BAA) on the Federal Business Opportunities (FedBizOpps) website soliciting requests for oil spill response technology. The BAA calls for the submission of white papers describing proposed technology solutions with applicability in five distinct problem areas:

- Oil sensing improvements to response and detection;
- Oil wellhead control and submerged oil response;
- Traditional oil spill response technologies;
- Alternative oil spill response technologies; and
- Oil spill damage assessment and restoration.

This BAA is open to all sources and is available from the front page of FedBizOpps. Through this process, the Coast Guard recognizes the potential for novel, highly innovative solutions from small businesses, individuals and non-traditional sources. Submissions may include those from single or team entities such as academia, private sector organizations, government laboratories and federally funded research and development centers. The government also encourages non-profit organizations, educational/academic institutions, small businesses, small disadvantaged businesses, historically black colleges and universities/minority institutions, women-owned businesses, service-disabled veteran-owned small businesses and historically underutilized business zone enterprises to submit concepts for consideration and/or to join others in a submission.

BAA Process

The BAA white paper submissions are screened based upon overall scientific and technical merit, feasibility, the availability of proposed solution and submitted cost information.

The IATAP workgroup, as managed by the USCG R&D Program, and in consultation with other interagency partners, is screening and sorting submissions based on technical feasibility, efficacy and deployability. The initial screening of the BAA responses will result in a determination that either the concept:

- Has a discernible benefit to the spill response effort;
- Needs more detailed investigation or evaluation and will be forwarded to the appropriate government agency overseeing that portion of the *Deepwater Horizon* response (EPA, MMS, NOAA, USCG, etc.); or
- Does not have immediate applicability to support this event.

All submissions will be provided with a response and tracking number identifying the initial screening determination. All submissions are managed in the order they are received regardless of origin to ensure fairness in evaluation.

If the initial screening determines that the concept has applicability and potential immediate benefit to the spill response effort, the technical portion of the proposal and the IATAP recommendation is forwarded to the *Deepwater Horizon* response FOSC for further action under its authority, in consultation with the responsible parties and/or other Federal agencies. If the initial screening determines that a more detailed investigation or evaluation is required it will be forwarded to the appropriate government agency overseeing that portion of the *Deepwater Horizon* Response (EPA, MMS, NOAA, or USCG), and that agency is responsible for further action.

To date, we have received 3,596 submissions from the BAA and 1,376 have completed the initial screening process. We are testing submissions that have cleared the initial screening process for potential deployment.

Conclusion

Through the IATAP, the Coast Guard is ensuring all applicable capabilities and resources—government, private, and commercial (to include small business) will be considered for use in developing and improving solutions to secure the environment and facilitate a rapid, robust clean-up effort.

Thank you for the opportunity to testify today. I look forward to your questions.

Senator CANTWELL. Do we have your full written statement, Captain? How many pages is it?

Captain SISSON. Four, ma'am.

Senator CANTWELL. OK. Thank you. Thank you very much.

Mr. Helton, welcome. Thank you for being here.

STATEMENT OF DOUGLAS HELTON, INCIDENT OPERATIONS COORDINATOR, OFFICE OF RESPONSE AND RESTORATION, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE

Mr. HELTON. Thank you, Chairwoman Cantwell and Senator Snowe, for the opportunity to testify today about NOAA's roles in response to the *Deepwater Horizon* incident and NOAA's ideas for activities to improve future oil-spill-response activities.

My name is Doug Helton. I'm the Incident Operations Coordinator in NOAA's Office of Response and Restoration. During spills, I help to manage emergency response efforts focusing on NOAA's role as the primary science advisor to the U.S. Coast Guard.

This event started with a tragic loss of life of the 11 crew members. And, like the rest of the public, I'm saddened by the events and frustrated as the spill continues to disrupt communities and injure natural resources in the Gulf.

As you know, NOAA responds to spills all over the country. We have responded to thousands of spills in our history and have a long history of science-based response decisions. My office was called over 200 times last year to provide emergency scientific support.

NOAA has three critical roles during spills. We serve as the science advisor to the Coast Guard, provide trajectory predictions, conduct over flights, identify sensitive areas and conduct surveys to guide cleanups. We also conduct damage assessments and restore natural resources injured by the spill.

And, finally, we represent the Department of Commerce in spill-response decisionmaking activities through the National Response Team.

My written testimony includes information on NOAA's roles in response to the *Deepwater Horizon* spill, and so I'll focus today in my oral statement about oil-spill research needs.

Spill research and development has been in a boom-and-bust cycle for many years. After a major spill, such as the *Exxon Valdez,* there's a national resurgence in interest in spills, but then this interest wanes.

Recent spills in Washington State, California, and Massachusetts raised awareness and concerns about the adequacy of response technologies at the state and local levels.

But, now, with the Deepwater spill, we're faced again with an incident that has captured the national attention, and research gaps that we have—such as mechanical recovery technologies, oil sensors, dispersant use, modeling of deepwater releases, seafood safety and the social and human dimensions of spills—are all painfully obvious gaps.

I'd like to talk about additional oil-spill research needs. The public has high expectations for a prompt and effective response, and responders must be equipped with the appropriate tools to meet those expectations. A robust research and development program can improve how we respond.

And Congress recognized that need for research on oil pollution when they passed the Oil Pollution Act, but the R&D envisioned by the Oil Pollution Act has not been achieved. With fewer large

spills, and competing national priorities, there has been a decline in oil-spill research in both the public and private sector.

Achievement of the comprehensive research and development program by OPA can only increase our effectiveness of our oil-spills research and response technologies.

While existing research has resulted in advancements of some technologies, more must be done to strengthen our Nation's capabilities. A renewed R&D commitment to focus on the most pressing needs, particularly now with the Deepwater releases and releases elsewhere in cold, icy waters of the Arctic is one place to start.

An effective response, based on science and smart decision-making reduces environmental and social impacts, and it also reduces the cost of spills.

As the *Deepwater Horizon* spill is demonstrating, there's a need to understand how oil behaves, moves and disperses both on the surface and in the water column. Research is needed for the rapid and accurate detection of oil and water and the effects of oil and dispersants on deepwater habitats and species, such as deepwater corals.

And the research on long-term effects of spilled oil would also improve cleanup. More than 20 years later, there's still oil in Prince William Sound from *Exxon Valdez*.

Research is needed to improve our understanding of the long-term effects of this oil on species and habitats. And while oil-spill research has focused on physical sciences, for the most part, social-science research is also needed on the human dimensions of spills.

How can we minimize the impacts on communities? And what can be done to make them whole? Better communication and sharing of information with impacted communities and incorporating their concerns is key.

The *Deepwater Horizon* spill will impact the Gulf for years to come. We can't prevent impacts, but with good science, we can improve response decisions. When spills happen, there's a rush of funding for science, but quality research takes time as well as support and sustained resources.

While we're working with all haste, it's important to understand that we have to take the time to ensure that the science is accurate and meaningful. It's important that we continue this work between spills, so that we can develop the tools and understanding before, rather than during, the next spill.

Thank you for allowing me to testify today on NOAA's response and areas of future R&D. I'm happy to answer any questions.

[The prepared statement of Mr. Helton follows:]

PREPARED STATEMENT OF DOUGLAS HELTON, INCIDENT OPERATIONS COORDINATOR, OFFICE OF RESPONSE AND RESTORATION, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE

Thank you, Chairwoman Cantwell and members of the Committee, for the opportunity to testify on the Department of Commerce's National Oceanic and Atmospheric Administration's (NOAA) role in the response to the *Deepwater Horizon* BP oil spill and NOAA's ideas for activities to improve future response and resource assessment efforts.

My name is Doug Helton and I am the Incident Operations Coordinator for the Emergency Response Division in NOAA's Office of Response and Restoration (OR&R). I appreciate the opportunity to discuss the critical roles NOAA serves during oil spills and the importance of our contributions to protect and restore the re-

sources, communities, and economies affected by this tragic event. Before I move on to discuss NOAA's efforts, I would first like to express my condolences to the families of the 11 people who lost their lives in the explosion and sinking of the *Deepwater Horizon* platform.

NOAA's mission is to understand and predict changes in the Earth's environment and conserve and manage coastal and marine resources to meet our Nation's economic, social, and environmental needs. NOAA is also a natural resource trustee and is one of the Federal agencies responsible for protecting, assessing, and restoring the public's coastal natural resources when they are impacted by oil spills, hazardous substance releases, and impacts from vessel groundings on corals and seagrass beds. As such, the entire agency is deeply concerned about the immediate and long-term environmental, economic, and social impacts to the Gulf Coast and the Nation as a whole from this spill. NOAA is fully mobilized and working tirelessly to lessen impacts on the Gulf Coast and will continue to do so until the spill is controlled, oil is cleaned up, natural resource injuries are assessed, and restoration is complete.

My testimony today will discuss NOAA's role in the *Deepwater Horizon* response and natural resource damage assessment process associated with the *Deepwater Horizon* oil spill, for which BP is a responsible party, and opportunities to strengthen the Federal response to future events through research and development.

NOAA's Roles During Oil Spills

NOAA has three critical roles mandated by the Oil Pollution Act of 1990 and the National Contingency Plan:

1. During the emergency response, NOAA serves as a conduit for scientific information to the Federal On-Scene Coordinator. NOAA provides trajectory predictions for spilled oil, conducts overflight observations of oil on water, identifies highly valued or sensitive environmental areas, and conducts shoreline surveys to determine clean-up priorities.

2. As a natural resource trustee, NOAA conducts a joint Natural Resource Damage Assessment (NRDA) with co-trustees to assess and restore natural resources injured by the oil spill. NRDA also assesses the lost uses of those resources, such as recreational fishing, canoeing, and swimming, with the goal of implementing restoration projects to address these injuries.

3. Finally, NOAA represents the Department of Commerce in spill response decision-making activities through the National Response Team.

Response

The U.S. Coast Guard (USCG) is the Federal On-Scene Coordinator and has the primary responsibility for managing coastal oil spill response and clean-up activities in the coastal zone. During an oil spill, NOAA's Scientific Support Coordinators deliver technical and scientific support to the USCG. NOAA's Scientific Support Coordinators are located around the country in USCG Districts, ready to respond around the clock to any emergencies involving the release of oil or hazardous substances into the oceans, shorelines and related areas. Currently, NOAA has all of its Scientific Support Coordinators located throughout the country working on the *Deepwater Horizon* oil spill.

With over thirty years of experience and using state-of-the-art technology, NOAA serves the Nation by providing its expertise and a suite of products and services critical for making science-based decisions. Examples include trajectory forecasts on the movement and behavior of spilled oil, overflight observations, spot weather forecasts, emergency coastal survey and charting capabilities, aerial and satellite imagery, and real-time coastal ocean observation data. Federal, state, and local entities look to NOAA for assistance, experience, local perspective, and scientific knowledge. NOAA's Office of Response and Restoration (OR&R) was called upon for scientific support 200 times in 2009.

Natural Resource Damage Assessment

Stewardship of the Nation's natural resources is shared among several Federal agencies, states, and tribal trustees. NOAA, acting on behalf of the Secretary of Commerce, is the lead Federal trustee for many of the Nation's coastal and marine resources, and is authorized by the Oil Pollution Act of 1990 (OPA) to recover damages on behalf of the public for injuries to trust resources resulting from an oil spill. Regulations promulgated by NOAA under the Oil Pollution Act encourage compensation in the form of restoration of the injured resources, and appropriate compensation is determined through the NRDA process. Since the enactment of OPA, NOAA, together with other Federal, state, and tribal co-trustees, has recovered approximately $500 million for restoration of natural resources injured by releases of

oil or hazardous substances, as well as injuries to national marine sanctuary resources, including vessel groundings.

National Response Team

The National Oil and Hazardous Substances Pollution Contingency Plan, more commonly called the National Contingency Plan, is the Federal Government's blueprint for responding to both oil spills and hazardous substance releases. The purpose of the National Contingency Plan is to develop a national response capability and promote overall coordination among the hierarchy of responders and contingency plans. NOAA represents the Department of Commerce on the National Response Team and works closely with regional response teams and local area committees to develop policies on dispersant use, best clean-up practices and communications, and to ensure access to science-related resources, data, and expertise.

NOAA's Response and Damage Assessment Efforts

NOAA's experts have been assisting with the response to the *Deepwater Horizon* oil spill from the beginning, providing coordinated scientific services when and where they are needed most. NOAA's support includes daily trajectories of the spilled oil, weather data to support short- and long-range forecasts, and hourly localized "spot" forecasts to determine the use of weather dependent mitigation techniques such as oil burns and chemical dispersant applications. NOAA uses satellite imagery and real-time observational data on the tides and currents to predict and verify oil spill location and movement. To ensure the safety of fishermen and consumer seafood safety, NOAA scientists are in the spill area taking water and seafood samples, and NOAA has put fisheries closures in place to maintain consumer confidence in the safety of consuming seafood from the Gulf of Mexico region. In addition, NOAA experts are providing expertise and assistance regarding sea turtles, marine mammals, and other protected resources such as corals.

To facilitate on-the-ground understanding of the spill's impacts, NOAA is awarding grants for rapid response projects to monitor the impacts of the oil spill on Louisiana's coastal marshes and fishery species through the Sea Grant Program. To support the local communities as they deal with the economic, social, and environmental impacts of the spill, the Gulf Coast Sea Grant Programs are hosting a series of open forums across the Gulf where citizens have the opportunity to interact with industry, government, and university representatives. NOAA-organized volunteer beach clean-ups to remove debris from state beaches are helping to facilitate the cleanup of oil along the shoreline.

With multiple agencies supporting a diverse array of research projects in response to the *Deepwater Horizon* oil spill in the Gulf of Mexico, it is important to coordinate research activities to ensure the best use of limited resources. NOAA's Gulf Coast Sea Grant Programs developed a website (*http://gulfseagrant.tamu.edu/oilspill/index.htm*) to serve as a central database listing ongoing research activities and identifying funding opportunities for oil-spill related research, whether conducted by government, academic, or privately-supported scientists. The website's intent is to provide a single, comprehensive view of research activities in the Gulf that are being undertaken in connection with the *Deepwater Horizon* oil spill and to foster coordination of these efforts.

At the onset of this oil spill, NOAA quickly mobilized staff from its Damage Assessment Remediation and Restoration Program to begin coordinating with Federal and state co-trustees and the responsible parties to collect a variety of data that are critical to help inform the NRDA. NOAA is coordinating the NRDA effort with the Department of the Interior (another Federal co-trustee), as well as co-trustees in five states and representatives for at least one responsible party, BP. NOAA and the co-trustees are in the initial phase of this process and are currently gathering data on resources such as fish, shellfish, birds, and turtles, and mammals; their supporting habitats such as wetlands, beaches, and corals; and human uses of affected resources, such as fishing and recreational uses across the Gulf of Mexico. The trustees will then quantify the total losses and develop restoration projects that compensate the public for their losses.

NOAA is also involved in many activities to assess the presence of subsurface oil from the *Deepwater Horizon* spill. Since the beginning of May, NOAA has been conducting and coordinating sampling of the sub-surface region around the *Deepwater Horizon* well-head and beyond to characterize the presence of subsurface oil. The sub-surface search involves the use of sonar, UV instruments called fluorometers, which can detect the presence of oil and other biological compounds, submersible laser-scattering instruments to determine oil concentration and distribution and collection of water samples from discrete depths using a series of bottles that can be closed around a discrete water sample.

NOAA, Federal partners, academics, and others in the research community have mobilized to research and quantify the location and concentration of subsurface oil from the spill. NOAA Ships *Gordon Gunter Thomas Jefferson, Nancy Foster, Delaware II*, and *Pisces* have conducted and continue to conduct missions to collect water samples from areas near the wellhead as well as further from the wellhead and in the coastal zone. Water samples from many of these missions are still being analyzed and additional missions are in progress or being planned to continue the comprehensive effort to define the presence of oil below the surface and understand its impacts.

For both the response and the NRDA, offices throughout NOAA are mobilized and hundreds of NOAA personnel are dedicating themselves to assist with this unprecedented effort.

Opportunities to Strengthen Federal Response Through Research and Development

When passed in 1990, OPA envisioned a robust oil spill research and development program coordinated by the Interagency Coordinating Committee (ICC) on Oil Pollution Research. OPA recognized the need for research and created the ICC to coordinate and direct a dedicated program on oil pollution research, technology development, and demonstration among industry, universities, research institutions and Federal agencies, state governments and other nations, if appropriate. To date, funding has been provided through various state and Federal agencies and industry for oil pollution research. While coordinated interagency research activities are occurring, important research questions remain.

Achievement of the comprehensive and collaborative research and development program envisioned by OPA can only increase the effectiveness of our Nation's oil spill response and restoration capabilities. While existing research has resulted in advancement of some research technologies, more must be done to strengthen our Nation's response capabilities. A renewed commitment of the ICC to focus on the most pressing research needs—particularly deepwater releases and releases in cold/icy waters—is one place to start. The Administration is committed to this effort.

Activities to Improve Future Response and Resource Assessment Efforts

The *Deepwater Horizon* oil spill is a grave reminder that spills of national significance can occur despite the many safeguards and improvements that have been put into place since the passage of OPA. Although the best option is to prevent oil spills, the risk of oil spills remains a concern given the offshore and onshore oil infrastructure, pipes, and vessels that move huge volumes of oil through our waterways. If a spill does occur, responders must be equipped with the appropriate tools and information. An effective response, based on solid science and smart decision-making reduces environmental and socioeconomic impacts, as well as clean-up costs. Research and development and technological innovation by the public or private sector in the following areas would greatly enhance the tools and technologies available in the event of a spill.

- *Oil Fate and Behavior from Deepwater Releases*—Our ability to know where the oil is located is limited by what we can see and detect. As the *Deepwater Horizon* oil spill is demonstrating, there is a need to understand how oil behaves and disperses within the water column when released at deep depths. The emerging advancement in modeling three dimensionally can greatly enhance response operations and mitigation efficacy. NOAA's surface trajectory models predict where the oil on the surface is going based upon wind, currents, and other processes, and visual overflights validate where it is now. NOAA is currently employing facets of deep water oil spill models that were developed in part from the findings of the MMS DeepSpill Joint Industry Research Project done in 1999–2000 with international participation. However, we still understand little about the movement of oil deep in the ocean or the movement of dispersed oil that is suspended in the water column. The enhancement of three dimensional models will improve our ability to predict the movement of oil at depth and allow us to direct precious resources to validate the model's accuracy. Currently, NOAA is working to implement FY 2010 funds to enhance three-dimensional models.
- *Technology for Oil Detection in the Water Column and on the Seafloor*—Research on new technologies for rapid and accurate detection of oil in deep water and plumes in the mid-water is needed. This would include the development of technologies to enhance our understanding of the fate and transport of oil, and to better understand the effects of oil on benthic habitat. There also appears to be some utility in applying existing technologies in a new and unique way to reach these same goals. For example, in limited research applications, mod-

ern multibeam echo sounders have been able to detect oil in the water column and on the seafloor. In addition, sensors on autonomous underwater vehicles and gliders are capable of detecting the presence of oil and gas in the water column. Whether provided by new technologies, or through re-examining the capabilities of current technologies, highly accurate information on the precise location of spilled oil would be of significant benefit to a spill response, such as *Deepwater Horizon* oil spill. Timely understanding of the precise location of the spilled oil would allow responders to position their activities and better utilize limited resources to maximize our contributions to protect and restore the resources, communities, and economies affected by these tragic events.

- *Surface Observations and Trajectory Models*—Real-time data on currents, tides, and winds as well as sustained observations of physical and chemical parameters of the whole water column are important in driving the models that inform the trajectory forecast for the spilled oil. As the Integrated Ocean Observing System generates more data from technological advances like high frequency radar, the prediction of oil location can be improved by pulling these observations into trajectory models quickly. Through the collaborative efforts of the U.S. Integrated Ocean Observing System (IOOS), two of the three radars along the northern Gulf of Mexico coast were quickly re-established and made operational and now all three are delivering surface current data. Because we cannot predict where a spill will occur, data delivery from high frequency radars is envisioned to be part of a seamless national system.

  Data collected by space-based synthetic aperture radar can be used to produce high resolution images of the Earth's lands and oceans and can also be used in all types of weather, as it can "see through" clouds and darkness. Current use of NOAA-generated experimental products suggest that data from space-based synthetic aperture radar can assist in detecting and refining the areal extent of oil, which would provide valuable information to help determine where response efforts and resources should be deployed.

  Current hydrographic surveys carry out sustained observations of the whole water column in the Gulf of Mexico, Florida Bay, and Florida Keys, and will be extended if the oil or dispersant spread through the Strait of Florida and into the Gulf Stream. These surveys, along with satellite observations and numerical models, allow monitoring of currents and features responsible for the transport of oil and dispersant. A sustained observing system for this region would allow NOAA to provide predictive information about how the spill may impact the East Coast of the United States.
- *Long-Term Effects on Species and Habitats*—Spilled oil can remain in the sediments along the shoreline and in wetlands and other environments for years. More than twenty years later, there are still toxic levels of sub-surface oil in Prince William Sound from the *Exxon Valdez* spill. Research is needed to improve our understanding of the long-term effects of oil on sensitive and economically important species and habitats. Continued research is also needed to determine the effects of oil and dispersants that are suspended in the water column on pelagic species, as well as research on the effects of oil on deep water corals, chemosynthetic communities (animal communities living in the deep sea on dissolved gases and benthic habitats) and benthic habitats. Important interagency studies are currently underway that will provide valuable information on the sensitivity and resilience of these deepwater communities, and will inform response actions.
- *Data Management Tools for Decision Making*—The key to effective emergency response is efficiently integrating current science, information technology, and real-time observational data into response decision-making. NOAA has developed the Emergency Response Management Application (ERMA), a web-based information management application, to facilitate preparedness, response, and restoration decision-making for oil spills and for other coastal hazards. ERMA integrates observations (*e.g.,* NOAA National Buoy Data Center data, weather data, shoreline data, vessel traffic information, etc.) with archived data sources (*e.g.,* NOAA's National Oceanographic Data Center's historical data) in an easy to use, Google-based format to aid in evaluating resources at risk, visualizing oil trajectories, and planning rapid tactical response operations, injury assessment and habitat restoration. Having access to retrospective data is critical to bring value to real-time observational data being collected. NOAA is working with the Department of the Interior (DOI) and state trustees to assure that data management tools can be integrated.

NOAA is currently using the Gulf of Mexico ERMA for the *Deepwater Horizon* oil spill response to help manage the common operational picture for all command posts (*http://www.geoplatform.gov/gulfresponse/*). The Gulf of Mexico ERMA is updated daily to provide a dynamic and automated tool allowing for greater access, more layers of data, and high-resolution photography. ERMA allows users to navigate through different layers of information to reveal actual data and magnify areas of geographic interest—ultimately improving decision-making. In addition to the Gulf of Mexico, ERMA is operational in the U.S. Caribbean and New England.

- *Natural Resource Protection Tools*—Environmental Sensitivity Index (ESI) database and map products provide information that helps reduce the environmental, economic, and social impacts from oil and hazardous substance spills. ESI maps include information on biological resources (such as birds, shellfish beds, and endangered species), sensitive coastal and nearshore habitats (such as marshes, tidal flats, and sea grass beds, National Estuarine Reserves and National Marine Sanctuaries), and human-use resources (such as public beaches, parks, and drinking water intakes). ESI maps are one tool that spill responders can use to identify priority areas to protect from the spreading oil, develop cleanup strategies to minimize impacts to the environment and coastal communities, and reduce overall cleanup costs. NOAA's goal is to update ESI maps approximately every 10 years to ensure responders have up-to-date information.
- *Research to Improve Tools for Assessment and Restoration*—Current techniques to assess and restore injured natural resources need to be constantly updated and refined. As our understanding of complex ecosystems evolves, so should our modeling tools and restoration techniques. For example, currently, site-specific protocols for assessing injuries to unique, high-value habitats such as those found in the Arctic are needed. In addition, research and tools to better assess and quantify natural resource services—such as water filtration and capture, flood protection, carbon sequestration, recreation, and education—across a range of habitat types can help ensure the public is fully compensated and the environment is fully restored.
- *Air Quality Impacts*—In addition to its marine responsibilities, NOAA assists in predicting the air quality impacts from oil and hazardous substance spills. The characteristics of pollution released from large areas of burning oil and the widespread evaporation of oil are significantly different from routine air quality/atmospheric dispersion scenarios. Research and development of improved tools to estimate the characteristics of compounds entering the atmosphere, and integration of those tools with NOAA's existing atmospheric modeling capabilities, would significantly improve NOAA's ability to predict smoke and chemical concentrations in the atmosphere resulting from such incidents.
- *Oil in Arctic Environments*—Continued acceleration of sea-ice decline in the Arctic Ocean as a consequence of global warming may lead to increased Arctic maritime transportation and energy exploration that in turn may increase the potential of oil spills in the Arctic. Recent studies, such as the Arctic Monitoring and Assessment Programme's Oil and Gas Assessment, indicate that we currently lack the information to determine how oil will behave in icy environments or when it sinks below the surface. We also lack a basic understanding of the current environmental conditions, which is important for conducting injury assessments and developing restoration strategies. Research is needed to better understand the challenges of spill response in Arctic waters and the most effective tools and techniques to utilize in such environments.
- *Human Dimensions*—Research is needed on how to incorporate impacted communities into the preparedness and response, restoration and recovery processes to help to address the human dimensions of spills, including social issues, community effects, risk communication methods, and valuation of natural resources. Transparency and communications can be improved to share information with impacted communities on how and why decisions are made, and the breadth of response and NRDA activities that have been and will be undertaken for the *Deepwater Horizon* oil spill.

Conclusion

As this committee is well aware, research takes time. A major research cruise can take a year to plan. A model can take years to develop and validate. A report can take months to get right. The *Deepwater Horizon* oil spill is causing harm that will impact coastal environments for years to come. Applying the latest science and continued research and development efforts in the public and private sectors can im-

prove our response decisions, thereby reducing injury to our Nation's economy and environment.

I would like to assure you that we will not relent in our efforts to protect the livelihoods of affected Gulf Coast residents and mitigate the environmental impacts of this spill. In the wake of such an event, we are reminded of the fragility of our coastal ecosystems and the dependence of coastal economies on the health and prosperity of our seas. Thank you for allowing me to testify on NOAA's response and damage assessment efforts and areas for future research. I am happy to answer any questions you may have.

Senator CANTWELL. Thank you, and thank you both for your testimony.

Captain Sisson, you have over 3,500 different proposals that have been through the Alternative Technology Assessment Program, 77 of which have been forwarded to the Incident Command. Is that Admiral Allen? Is that——

Captain SISSON. No, senator. That is directed to the Federal on-scene commander, who, at the time, until recently, was Admiral Watson. It is now Admiral Zukunft.

Senator CANTWELL. OK. And do they have a process there for reviewing those?

Captain SISSON. Right now, those ideas are forwarded to the Critical Resources Unit, who arraigns them with the other operational needs and requirements of the spill response.

Senator CANTWELL. So have any of those 77 proposals been given final approval and are in current use?

Captain SISSON. There are two right now that are being used. The U.S. Navy's blimp is one, and it's in a test-and-evaluation phase, but it is being used in the Gulf.

The other is a sorbent boom made by AbTech, called Smart Sponge. That has been approved for use both by the IATAP reviewers and the BP reviewers, and it's waiting for an opportunity to deploy.

There are several others that are being tested right now.

Senator CANTWELL. And where are they being tested?

Captain SISSON. They're being tested down on the beaches in Alabama, Florida and Louisiana.

Senator CANTWELL. This boom, is that what you're referring to or do you mean other technologies?

Captain SISSON. Other technologies. There's a Gravely Rapid two-wheel tractor. It's a self-propelled beach cleaner that's smaller, more mobile than the current beach cleaner that's being used. It was authorized through a request for funds yesterday, and we're seeking to buy that and put it to work on the beaches, as it can go closer to the water than the current sand cleaner.

Senator CANTWELL. So everything that has been submitted through the Coast Guard—77 proposals have been submitted on. Two have actually or one is actually in use. The other one's approved, but not in use, and a third one you've just taken action in the last 24 hours. Is that right? The tractor I'm saying.

You're saying the Navy blimp and the boom—The Navy blimp is in service, limited. The boom you're saying you're going to be testing. You've made a decision to use that technology. And the third one, you've started the acquisition process. Is that right?

Captain SISSON. Yes, senator. We've also approved the automatic information system transmit capability. That's an AIS transmitter

that'll be put on vessels of opportunity for greater command and control and message-receiving and transmittal from those vessels. It's been approved also, but it's still undergoing its initial purchase and deployment. We haven't tested it yet.

Senator CANTWELL. So out of those proposals, you can say four are—out of 77 proposals, four have made it through the process and the Coast Guard is deciding to use them.

Captain SISSON. Yes, senator, and also I'd like to add that we did test the supertanker, A Whale. So it would be considered a fifth.

Senator CANTWELL. And decided not to use it, is that what you're——

Captain SISSON. Yes, senator. The A Whale, although it's a compelling engineering feat, is not suitable to this particular type of spill, and that was the finding of our test team.

Senator CANTWELL. And I know the Coast Guard has access to the ideas that BP has submitted, but are you going to be going through that process? Are you going to be reviewing those submissions at some point?

Captain SISSON. We review the BP database on a daily basis to make sure that there are no duplications or if there are duplications what the actions are between BP and the IATAP.

But, at this time, we are not going through each and every BP submission and analyzing it on its own merits. We're strictly going through the BAA process for submissions.

Senator CANTWELL. Well, if you have about 3,500 submissions and they have over 100,000, how do you know that the process is working, that some of the things aren't falling through the cracks going through the BP process?

I get the point of looking for duplication, but isn't the point that you might be missing some—somebody's getting stuck in a process of viability on their technology?

Because I think it's probably safe to say the BP process is not working as well, in the context of their—If you just look at the sheer volume, I doubt that they've been able to process that information.

Captain SISSON. Yes, Senator. We set up this process because of complaints received from the public about the BP database's difficulty in getting feedback. And we also felt that the government should have a standalone capability in this regard.

Access to the BP database is not the same as reviewing each and every one, yes, senator, but we're not currently staffed to get that—It is possible, if we put on enough effort, but we don't have the staff for that right now.

Senator CANTWELL. Well, but, again, I think it draws the point that there is this much public interest and potential for technology and yet we're here at this point where we don't even have the capabilities of reviewing it. Is that correct?

Captain SISSON. Well, Senator, we have the opportunity to look at that, and many of the inputs to the process from BP are more, I'd say, vituperative than they are helpful.

There are many submissions that aren't exactly submissions. It's difficult to get through that database, and I think that that was one of the reasons why we went to a BAA submission, so that we could have an actual proposal with a technical approach and a

rough-order-of-magnitude cost associated with it. It's easier for us to handle that.

Senator CANTWELL. And so you think you're getting the best of the ideas out of that BP database?

Captain SISSON. Ma'am, I don't know that I have the best ideas from the BP database.

Senator CANTWELL. Thank you.

Senator Snowe.

Senator SNOWE. Captain Sisson, can you tell me, you have received 3,600 submissions, 87 of which were deemed worthy to be forwarded, correct?

Captain SISSON. Yes, Senator.

Senator SNOWE. And there are five that are currently being tested. None have been fully implemented at this point.

The five that are being currently tested includes a Navy airship, and a foreign-flag skimmer, meaning only three are from U.S. businesses.

Now, the Navy ship had to go through the process, correct? Why would they have to go through the process?

Captain SISSON. Actually, there were multiple tracks on the Navy airship. It's actually the Navy who contracted a corporation, the American Blimp Company of Oregon. They own the blimp. It was offered up on several different tracks to the BAA process, also directly to the Coast Guard. And we were actually contacted by CG–53 to see if we could assist in testing this vehicle.

So we each went out to our interagency partners—South and NAVAIR—and we worked with them to get the blimp up and running as soon as possible.

Senator SNOWE. We've been told for months now that all available assets have been brought to bear on this crisis. Is that true?

Captain SISSON. I don't know the answer to that, Senator.

Senator SNOWE. Yes. I think that's the concern. I mean, I just don't sense an element of urgency in this process.

I've been involved in a number of hearings now, and I feel like it's the status quo, that there's no synchronization between BP and the Federal Government and all of the agencies.

I mean, what is it that we don't know? We need to have all the assets available down there to contain the spill, to disperse the oil, to do everything we can to implement new technologies. And it doesn't sound like we are giving this the kind of energy that this process requires, given the nature of the calamity at stake.

I just think it's a bureaucratic process that has gotten so bogged down that we're just not making any headway. And it is not synchronized with BP to understand exactly what technologies are being rejected, what assets are being rejected, what ships are being rejected. We don't even know what they're rejecting. Do we?

Captain SISSON. Well, since we have access to that database, we know when we send our ideas down that we think are good ones, we have a discussion——

Senator SNOWE. But are they overruling our ideas, given what's at stake for us as a country, I mean, our national interests?

This really is a crisis of epic proportion for this country. So what's at stake is the public interest now. And so I just can't imag-

ine that a corporate interest would be overriding the national interest and making those decisions.

Captain SISSON. Senator, I can only speak for the work that I do, and in the case of the A Whale, the initial response from BP is that they were not interested.

The initial response from the IATAP technical evaluation team was that it was worth a look.

We had a basic disagreement and we settled that with a face-to-face meeting at Sector New Orleans on Lake Pontchartrain.

On a sit-down meeting between the owners of the vessel, BP and the Coast Guard, we came up with a way ahead that they could deploy the ship close to the source, that we would put a combined Navy, Coast Guard and BP observation team aboard to test whether or not that ship could take aboard much in the way of oil and water and then give it several days on scene.

We did that on two occasions over the Fourth of July weekend and then later on on the 12 and 13 of July. And I think that that was a case or template by which further cooperation is necessary.

Senator SNOWE. Well, I don't doubt that you're trying to do your very best, and I know it's not a decision that you would make.

But I do think that the process is so complex, and the fact is that if BP can override any of our decisions, or make decisions that are contrary to our interests as a nation, that's problematic and deeply disturbing. I think that's the point here. That's what concerns me above all else. And the corporate interests are not necessarily the public's interest.

They have decisions to make for their own interest. I understand that. They're a company. They're going to make decisions. They're going to make business decisions, but they don't necessarily square with the public-interest decisions, and that's what concerns me.

The fact is that you have to go through a convoluted process because BP has rejected something outright. The Coast Guard should be making that decision, in the final analysis, based on what's in the best interest of the Nation—cleaning up and doing everything that we need to do to bring the very best to bear in that process, frankly, and so that's what's disturbing to me.

There are only five of the 87 technologies and methodologies referred to the IATAP that are being tested and evaluated, so what is the status of the remaining 82?

Captain SISSON. They are currently being reviewed by the Critical Resources Unit. Some of them are being lined up but are not being employed at this time because of other operational needs.

Senator, I would like to point out that the Federal on-scene coordinator can direct the use of technology. It is not BP's call.

Senator SNOWE. Have they?

Captain SISSON. To date, I am not aware that they have.

But I think we were talking about the other ideas. We're trying to refine the IATAP process. It's kind of like working behind a guy who's hanging drywall, but you're handing him a sledgehammer. We have to put the right tool in the hands of the people who are busily engaged in this effort, and that's a process that needs refinement.

We've ended up sending members from the R&D and the IATAP down to the UAC on a permanent basis, so that they can advise

the Critical Resources Unit. And that has actually done us a lot of good the last few days. We have to make sure that the tools that we offer to the Federal on-scene coordinator are what he needs.

Senator SNOWE. Do you have enough personnel to vet all these technologies?

Captain SISSON. It is a large and daunting task, senator, and we are busily engaged with the bulk of the R&D staff to execute this work. All effort is scalable.

Senator SNOWE. So you don't have enough. That's obvious.

Well, it's regrettable. I mean, someone is obviously making decisions that aren't in the best interests of fulfilling, I think, an urgent need here. What's at stake for the country and for the Gulf Region and for the people who live there and have to work there is losing their livelihoods and we are not helping them in a way that they deserve, in that sense.

That's what's regrettable about this. There's just not a level of urgency involved here to amass all the resources that are absolutely essential and vital to getting this done.

Thank you, Madam Chair.

Senator CANTWELL. Senator Begich.

STATEMENT OF HON. MARK BEGICH,
U.S. SENATOR FROM ALASKA

Senator BEGICH. Thank you very much, Madam Chair, and thank you to the Coast Guard. I know every day in Alaska we value the Coast Guard and the work they do. We have the largest space up there in Kodiak, as you know, and it's just a great resource.

But I want to follow up on a couple of points, I think, the Senator just went through. And, first off, you know, as I watch and listen—and I hope to be in Louisiana on Monday—but, you know, I look at the skimming and dispersants and booming, this is the same technology they used in 1989 when we dealt with the *Exxon Valdez*. So I'm trying to understand, in all these years, where is the technology advancement?

I mean, back then, we didn't have a cell phone. Today, we have incredible technology around just using our phone and iPads and everything else. Where has the improvement occurred, if there has been any improvement? Honestly, I don't see it. Help me or clarify it for me.

Captain SISSON. Well, the greatest outcomes of the *Exxon Valdez,* in my opinion, were the double-hull requirement on supertankers that drove down the oil incidents greatly.

Senator BEGICH. That's a preventative spill issue. I'm talking about cleanup.

Captain SISSON. Yes, Senator, the in-situ burn was developed post-*Exxon Valdez* largely by the Coast Guard's Research and Development Center.

I worked on that project as a lieutenant back in the early 1990s, and we actually had to use oranges instead of oil to pour onto the water because we couldn't put oil on the water.

And then we got reports that a vessel had sunk off of Galveston, obviously because they had lost their cargo.

These efforts were actually very successful, but had never been tried in the United States on any scale until now.

And so we at the R&D Center are very proud of the fact that the in-situ burn is actually underway and working very well.

Senator BEGICH. Let me ask you, if I could follow up on that, I know in Norway they actually do controlled spills to test their technology. They haven't done it in some time, but that has been their method.

We are not allowed to do that in this country for a variety of reasons. It makes people very nervous. But would it help to advance with some controlled spills to really understand disbursements, understand controlled burns and other things?

I mean, Norway, which, in a lot of ways, has perfected drilling in very hostile environments and also cleanup capacity. Can you give me a comment on that?

Captain SISSON. Well, senator, we work within the laws that we're given, and we——

Senator BEGICH. That's not what I'm asking you. I'm asking you your view on how Norway has approached this on controlled spills and management of that to determine the best use of dispersants and other technologies, in real-life experience, rather than waiting for a disaster to happen. Do you think that's a good idea or a bad idea?

Captain SISSON. I think that's an idea worth considering, senator.

Senator BEGICH. That's fair.

Captain SISSON. But I would want to make sure that whatever I did to the ocean was fixable.

Senator BEGICH. Absolutely. No, that's fair. I mean, I hear it all the time, but I just wanted to test that and check with you.

Let me ask you—if I can follow up just on a question of personnel—earlier last week, I introduced a piece of legislation that deals with Arctic spill and research and technology. I think tomorrow we're going to do some markup on it here in this committee, in the broader committee.

And one of the funding sources—because I think I want to expand an answer for you, I know it's hard when you're sitting up here to answer budgetary questions. You do not have enough money—I'm going to tell you that—from the research and the capacity to research and develop oil-spill technology.

And so one of the pieces of legislation we've laid on the table is a three-cents, seven-cents. In other words, three cents per barrel on domestic-produced oil and seven cents on foreign oil—higher price for them, because I don't like foreign oil—produces about $300 million a year for NOAA and Coast Guard and other activities to really develop what we should be doing and should have been doing for the last 20 years.

Do you think those kind of resources would be—I'm asking in a positive way, so you cannot get in trouble with whoever is watching on the screen. Do you think that's a positive thing, that kind of resource? Would that help in developing and utilizing that kind of resource for you?

Captain SISSON. Senator, the R&D Center has been involved in past years in oil-remediation and oil-spill response technologies. Yes.

Senator BEGICH. Good. I'll leave it at that.

Let me ask you, if I can just—again, a quick one. You had mentioned that BP or the discussion—you know, there has been a rejection and debate on some of the utilization, and you can direct the use of technology through—because you have that statutory right. And you had mentioned or you had assumed or thought that that has not been done yet.

Expand on that, because I would think that if you all thought it was important, at the end of the day, you need to just do it and make the force of technology advancement or utilization of that technology despite the company's maybe question, because their track record hasn't been very good on their analysis of what works, to be very frank with you, and I'd rather put my hands, my trust in you guys.

So why have you been hesitant to just say, We're doing this, and, BP, we're going to send you the bill later, and we're trying this new technology?

Captain SISSON. At the R&D Center and the IATAP, senator, we create tools for the Federal on-scene commander to use. We hand them off to him to use in the OPTEMPO that he is working at.

For instance, we immediately took a look at all the submissions and tried to divide them up into what could be immediately useful, but we didn't do that regards to what he may have needed that particular day. So the ideas that we've triaged and sent down may not fit his needs. That's the extent of my knowledge of the process.

Senator BEGICH. Does your—And I'll end on this because I'm well over time here, but how aggressively do you promote the technology that you are bringing to the table?

In other words, I understand the military structure, to a certain extent. You kind of move it and someone else moves it, someone else moves it, but you guys are developing it. You know the reality of how it'll work or not work. How aggressive are you? Are you able to step out of the command structure and say, Look, this is what you need down there, rather than, Well, we'll let it go to the next department to make that determination. How aggressive are you in that arena?

Captain SISSON. Well, senator, I think that the IATAP process is a very clean and a great operating organization, in the sense that we have a direct line to the Federal on-scene commander. There is no chain of command between myself and Admiral Zukunft. The recommendations that we make have to be in light of what he needs at the time.

That said, if they make a decision that they don't want to pursue a particular technology at this time, we're not to get in their way. They've got a battle to fight.

Senator BEGICH. OK. I'll stop there, Madam Chair.

Senator CANTWELL. Mr. Helton, isn't the issue that we have lack of protocols or standards in place to evaluate technology?

And, as in your testimony, you mentioned the fact that we really have not done the level of research to say what is best technology of today, and so, consequently, here we are with this crisis in place

and now we're trying to do catch up for basically 20 years of lack of focus on this technology?

Mr. HELTON. Yes, I agree that we, as a Nation, have not invested in the R&D that we need, and NOAA has tried to move the ball forward with limited support in the sense of we have some base funding that we've put toward R&D. We had a very strong partnership with the University of New Hampshire, and you'll hear about that from the second panel, I'm sure.

But some of the work that was done there actually has been directly relevant to this spill, including things like deepwater oil and gas and how that behaves and how quickly those plumes surface and how they behave. So there definitely is a need to do that.

It's just that the challenges that we go from having a trickle to a fire hose of interest and how do we maintain an R&D effort in between those spills, so that we can develop the tools we need with the time it takes to properly test and vet these technologies.

Senator CANTWELL. Well, shouldn't it be more scientific than that? We see now—This committee has had oversight hearings over the number of large vessels, the growth in large vessels outside of oil tankers carrying large amounts of fuel, and so that has posed the question to us: Don't we need to have better regulations because of the large amount of oil that these ships are carrying? So we've had that discussion.

Shouldn't the discussion have been: We are now doing more and more deep-sea exploration and that raises the risk of challenge to the kind of spill or catastrophe that would happen, and you would have thought that that kind of permitting process would have put you on pace to do the kind of research and development on what kinds of dangers might exist there and what kind of technologies would be needed.

Mr. HELTON. Yes, and we're looking at——

Senator CANTWELL. So it's not really a guess. I mean, we're not sitting here going to guess about what's the shape of the next catastrophe. It's more: What are the practices that we are doing and what kind of safeguards do we need to have against those practices?

Because, obviously, boomers and skimmers, at this point in time, are totally inadequate to deal with the catastrophe.

Mr. HELTON. And we are continuing to explore in more and more remote locations, and we're continuing to propose navigation in places that are more and more remote potentially with the opening up of the Arctic for more navigation. So those are obviously very much a concern for my agency.

We have put forward some of those concerns. You mentioned them in your opening statement, I believe, about some of the comments that NOAA's made in the past about are we prepared. And so I think those are on the record already that we share those concerns.

Senator CANTWELL. Well, I'm sure my colleague disagrees with me, but it's one of the reasons why I don't support opening up more of the Arctic, because if this catastrophe would have happened in the Arctic, we don't have any of the resources there. We wouldn't have had any ability to get the level of resources that we've been able to amass in the Gulf up to that particular area.

But my question is the level of research that NOAA has been involved with so far has shown some promise in evaluating what is the crisis at hand today, which is the response to large volumes of oil moving about in the ocean. Is that correct?

There's some basic technology that we could have, if we put our foot on the accelerator, been at a better place right now to understand where these plumes would be going, the types of information we could have achieved from them and better helped our response plan. Is that correct?

Mr. HELTON. Yes, and NOAA's focus in this regard has been improving things like our three-dimensional modeling, so we understand how oil behaves in the water column, not just from subsurface releases, but when you have a surface release and that oil disburses into the water column where does that oil go relative to the surface. We have——

Senator CANTWELL. Which is very different technology and focus than saying let's look at single-hull tankers or let's look at vessels that have now, because they're carrying so much cargo, become larger carriers of fuel.

Mr. HELTON. Yes, I agree that NOAA's role is much less on the prevention and design of safer vessels or platforms and more on improving our understanding of how oil behaves and moves and what we can do to do a better job of cleaning up shorelines, how we can make better decisions about tradeoffs of things like dispersants and burning.

The other area that we've done a lot of work on recently has been on information technology. Everyone wants the information right away, and we've suffered for not being able to get information out as rapidly as possible.

And we have developed some prototype information systems that are up and running for this spill where all members of the public can go and see what the latest trajectory is, where the contaminated shorelines are, where the fishery closures are. So we're working on that information technology as well, so that the information that we do collect and learn we can share more rapidly.

Senator CANTWELL. Thank you.

Senator Snowe, do you have further questions?

Senator SNOWE. Yes, thank you.

Mr. Helton, did NOAA have any contingency plans in place with respect to a response to an oil spill in the aftermath of *Exxon Valdez*? What has been learned from that and what types of technologies or chemicals were used in the process? What was tested that would have been considered in a contingency plan in the event of another oil spill?

Mr. HELTON. Yes, NOAA participates as a member of the National Response Team and the regional response teams around the country to help plan for and prepare for spills and other kinds of events like this.

Senator SNOWE. And was one developed since *Exxon Valdez* in that sense of with the use of chemical dispersants?

Mr. HELTON. Dispersants are an accepted and approved tool by the U.S., and they're pre-approved in some areas of the country where the regional response teams have evaluated their use and put terms and conditions on when it could be and should be used.

Senator SNOWE. Has NOAA had any discussions with EPA regarding the use of these chemical dispersants? I understand they're using a sub-sea application that has never been used before. Was that even tested in the past?

Mr. HELTON. There has never been—I don't think it was even envisioned to do subsea dispersants. All the dispersant work that we're aware of has focused on dealing with a leaking vessel or platform at the surface and dispersing oil in the surface waters, not at that depth.

Senator SNOWE. I see. So the response teams that were developed never used a subsea application.

Mr. HELTON. No, that was a novel application for this incident.

Senator SNOWE. I see. So it's never been tested in that sense.

Mr. HELTON. No——

Senator SNOWE. Very unusual.

Mr. HELTON. Yes.

Senator SNOWE. So we're using something that has never been done before.

It is remarkable that in 20 years since *Exxon Valdez* that we have not been able to put certain technologies or carry out testing of chemicals. There were no chemicals ever used in the *Exxon Valdez*, nor in-situ burning, for that matter. It is a terrible oversight that we wouldn't have had all this tested in the interim in response to the plan.

And I raise this because, before the Small Business Committee, there was an individual who has a small business, had a technology that has been developed for 20 years, which had been used in other types of oil spills, and it's surprising to me that a lot of these technologies that have already been vetted could have been used in this instance.

So I'm just wondering why—and I'm going to ask you the same thing, Captain Sisson—in these contingency plans, some things that have been used before were omitted. Obviously, in this case, a subsea application wasn't used, but has Corexit ever been used?

Mr. HELTON. That's a standard dispersant that's stockpiled for use in the U.S., and it has been used on other incidents, but never to this scale.

Senator SNOWE. This scale of the approximately two-million gallons, I understand. So that amount has never been used.

So it's really shocking to think that, in the last 20 years, we haven't developed either the methods or the technology as part of a contingency plan.

Mr. HELTON. Well, there has been work on dispersants on a number of levels, from the efficacy of how they work and the biological effects, but, again, never envisioned at the scale that they're being used here.

But there have been—of the chemical countermeasures that we have available, dispersants are fairly well studied, but, again, studying them and using them in a small scale is different than using them at depth and using them in such large volumes.

Senator SNOWE. Captain Sisson, have any technologies been incorporated in the contingency plans for the Coast Guard in a response plan? Because it's surprising to me that we have to go through this arduous process perhaps even re-vetting technology

that has already been demonstrated to be effective, has been used in other types of oil spills in the past.

Captain SISSON. To get the details of the contingency-plan responses, I'd have to get back to you, Senator.

Senator SNOWE. OK. So we don't know whether or not we're going through a duplicative process in some instances that already could have been part and parcel of a plan. Is that correct?

Captain SISSON. Well, senator, I don't have personal knowledge of it.

Senator SNOWE. What?

Captain SISSON. I don't have personal knowledge. I'd have to check and get back with you.

Senator SNOWE. Well I think that, again, it sounds like a massive bureaucracy and not at the level that's commensurate with the catastrophe at hand, frankly.

I just cannot imagine that we would not have prepared for the worst-case scenario. Would it have made it different, had we prepared for the worst-case scenario at the outset or at least known the rate of flow from the oil?

Because, obviously, what was predicted initially ended up being less than one-tenth of what exactly happened and what has happened. Would it have made a difference in the deployment of assets and personnel and anything else that we would have required?

Captain SISSON. That's a question best answered by the Federal on-scene commander, Senator.

I know that the flow-rate question came up fairly early. The videography was an issue very early on, and we worked very hard to fix that flow-rate technical question.

Senator SNOWE. Well, it could have made a difference. The interagency task force wasn't developed until June, early June.

When you think about the lethargic response to this by the Federal Government, it is stunning, frankly. It is stunning.

Not to mention how the rate of flow was soft pedaled and underestimated, instead of saying, "we need to get everything out there that's possible." It was better to have it all out there and then decide whether or not you've got too much. But the reverse was true and could not contain the oil, and, ultimately, the damage. That's going to take years to rectify.

Thank you.

Senator CANTWELL. Thank you, Senator Snowe.

Senator Wicker, do you have questions for this panel?

And after your questioning, I think we'll move to the next panel.

STATEMENT OF HON. ROGER F. WICKER,
U.S. SENATOR FROM MISSISSIPPI

Senator WICKER. Thank you, Madam Chair, and I have to agree with my colleague, Senator Snowe, about the bureaucratic cumbersomeness of the response.

I'm going to try to remember this entire saga the next time I'm asked to vote for a huge Federal expansion or a huge Federal solution to problems that might exist out there in the United States of America.

Big bureaucracies do seem to be cumbersome and inefficient and the senator has pointed that out very capably today.

Let me ask either of you about weathered oil. It's certainly to our advantage that the skimmers get the oil immediately, before it washes to shore.

I'm told that once the oil has been on the surface for a while—and it has been on the surface, in many instances, many places for 3 months—that it is not as capable of skimming or burning right there onsite. Is my information correct there?

And, if so, are there technologies or effective ways of removing weathered oil from the surface before it washes onto shore?

Mr. HELTON. Well, when oil is spilled, it starts to weather immediately, and this oil, being released from depth, is already starting to degrade before it even reaches the surface. The challenges are that——

Senator WICKER. How long does it take to reach the surface, Mr. Helton?

Mr. HELTON.—it depends on the droplet size, but our models indicate that it's several hours, 2 or 3 hours, but the smaller droplets are much slower to rise and the larger droplets rise faster.

Senator WICKER. OK. Go ahead with your answer.

Mr. HELTON. So many of the technologies we have, such as burning and dispersants, work best on fresh oil, and when oil starts to mix with water and emulsify, it becomes less able to burn, has a higher water content. When it mixes and ages, it's less vulnerable to dispersants because the surface characteristics are different.

But that weathering process is also a good thing in the sense that that's the sign that the oil is beginning to degrade and ultimately biodegrade.

So what we're seeing on the shorelines of the Gulf is oil that might be as little as a week and maybe several weeks or months old by the time it drifts ashore. So we're dealing with weathered oil, mechanically picking it up.

There are some skimmers that have the ability to pick up that material, but some of the technologies, like I said, like burning and dispersants, are less appropriate for that weathered oil.

Senator WICKER. Are these technologies under further review, to your knowledge?

Mr. HELTON. I think that there's work being done on this incident as well as general R&D for oil-skimming technologies in trying to improve the effectiveness.

And, as Senator Cantwell said, we're seeing the same technologies we had in the *Exxon Valdez,* but there have been improvements on the margins, in the sense of improving the recovery rates and the efficacy of some of these technologies in dealing with different kinds of oil, dealing with heavier oils. So there is some progress in those regards.

Senator WICKER. Captain Sisson, do you have anything to add?

Captain SISSON. I think that answers the question very well, senator. I know of one particular skimmer that's in an evaluation phase that has a sort of parachute—looking device behind it to catch those globs of weathered oil that lie about a foot or two beneath the surface. That's a new development that I hadn't seen before.

Senator WICKER. So it's something that hasn't been used until the last few days, is that what you're telling us?

Captain SISSON. It's still under development, senator.

Senator WICKER. And where is the development center?

Captain SISSON. It's part of our BAA submission process, sir.

Senator WICKER. I see. So it has not actually been used yet——

Captain SISSON. No, sir, not that I know of, sir.

Senator WICKER.—to capture the weathered oil.

All right. And, finally, let me ask you this, Mr. Helton: With regard to streamlining the testing of seafood for oil contamination, would it be fair to say that it's helpful if we can do that locally, to the extent we can? Would it be more efficient and take less time?

Mr. HELTON. I think it's important that it be done in a way that encourages confidence in the markets and that we're closing the right areas and we're opening the right areas and we're allowing seafood harvesting to occur in places where it's safe to do so and prohibiting it if we're not certain that it's safe.

I am not aware of the logistics causing a significant delay in the testing. I know that some of the laboratory work takes time to process in the sense of getting the results back from the laboratories on what kinds of chemicals are detected in the analytical tests.

But some of the sensory testing can be done, and is being done, locally in Pascagoula to ensure that the seafood passes the sensory testing.

Senator WICKER. Is there more capacity at Pascagoula for more sensory testing, if we could get the work to them?

Mr. HELTON. I'd have to check with the Fishery Service to see what their capacity issues are. I know that, NOAA, as an agency, is stretched on this spill. We have brought in a lot of people from other labs and there are colleagues of mine in Seattle that have gone down to the Gulf, to Pascagoula, to assist in the sensory-testing efforts there, but I'd have to get back to you on specific——

Senator WICKER. OK. Please do that, and is there any reason why we couldn't do chemical testing there at the Pascagoula facility also?

Mr. HELTON. I'm not sure if they have the analytical capacity to do that. I know some of the NOAA labs have those kinds of petroleum-testing equipment. I know that the laboratory in Seattle has some of that work. I'm not sure if Pascagoula has that.

Senator WICKER. OK. Thank you very much.

Senator CANTWELL. Thank you, gentlemen. Thank you for your testimony.

Obviously, this is something the Committee is going to be dealing with in very near term. Obviously, tomorrow, we're going to have a markup and legislation is going to be moving through the Senate.

So we appreciate your testimony, and if members have follow-up questions, obviously, we'll leave the record open. So thank you.

We're going to move to our second panel, and I'd like to welcome up Dr. Fritz Stahr, Manager of Seaglider Fabrication Center, which is at the University of Washington; Mr. Dennis Yellowhorse Jones, President of U-Mate International Corporation; Ms. Cynthia Sarthou, who is Executive Director of the Gulf Restoration Network; and Dr. Nancy Kinner, Director of the Coastal Response Re-

search Center; and Dr. Scott Pegau, Executive Director of the Oil Spill Recovery Institute.

I know that there are people who are clearing out from the first panel, but if you could move outside as quickly as possible that would be great, so that we could get the next hearing witnesses underway.

Thank you. Thank you all for being here. We appreciate your making time to give testimony to the Committee on this important issue, and we're just going to start with you, Mr. Yellowhorse Jones. Is that how you pronounce your name?

Mr. YELLOWHORSE JONES. Yes, ma'am.

Senator CANTWELL. And start with you and just go right down the panel. So thank you for being here.

STATEMENT OF DENNIS YELLOWHORSE JONES, PRESIDENT, U-MATE INTERNATIONAL, INC.

Mr. YELLOWHORSE JONES. Thank you. It's an honor to be here today to represent my company in conjunction with me here, I'm with Dr. Mark Nanny from the University of Oklahoma and an extreme colleague.

My company is based out of Northwest New Mexico. We produce an organic material, humate, H-U-M-A-T-E. It's an organic mineral that's found in Northwest New Mexico and it's used for a variety of purposes. One is agriculture. Two is soil remediation.

We have been working on extensive agricultural processes for the past 15 years, and we sell our product all over the world. Our largest customer is the Dole Food Company, and they use it on different plantations and various different crop types.

We also sell it to the largest organic farm in Saudi Arabia, Al Khalediah Farm. It's owned by the royal family, and there, again, it's used as an organic medium and also to restructure contaminated soils.

Over the past several years, we've been working closely with the University of Oklahoma and the gentleman behind me, Dr. Mark Nanny, to come up with solutions to use our product for soil remediation.

It's environmentally safe. It's certified organic. It improves the soil structure and adds nutrients.

Dr. Nanny has received EPA funding over the past several years to study our product there in Norman, Oklahoma, for strictly soil remediation and oil-contaminated soils.

To date, we have been working very, very hard to try to have the Coast Guard and BP and different organizations review our proposal, which is called the Organic Solution. This was supplied to the Coast Guard as a white paper approximately 2 months ago.

We have heard back from the Coast Guard and we're told that we are in the screening process, and we really want to try to enlighten the American public, enlighten this committee that we are ready, willing and able to implement this technology.

I would like to talk a little bit about what is humate. Humate is decomposed animal and plant life, and it's loaded with trace minerals. It's like a multiple vitamin to the soil. Everything that a multiple vitamin has in it, our humate has in it—calcium, iron,

phosphorus, selenium, magnesium, in trace amounts. We consider this simple technology for a complex problem.

And, in closing, I'd like to say that we are, again, ready, willing and able to implement this.

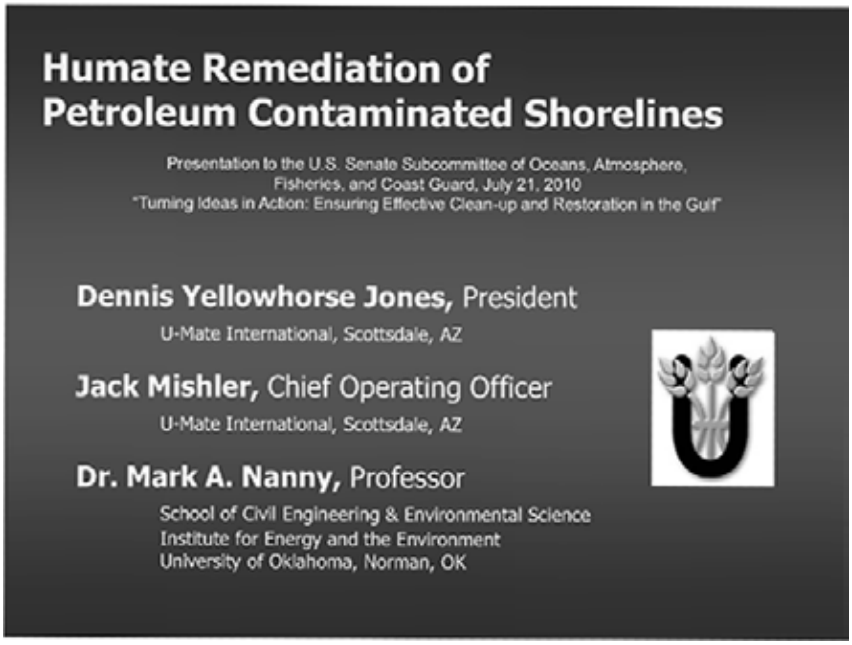
Thank you very much.

Senator CANTWELL. Thank you very much for your——

Mr. YELLOWHORSE JONES. I'll take any questions.

[The prepared statement of Mr. Yellowhorse Jones follows:]

PREPARED STATEMENT OF DENNIS YELLOWHORSE JONES, PRESIDENT, U-MATE INTERNATIONAL, INC.



Proposal:
Use humate to remediate and restore petroleum contaminated shorelines in the Gulf of Mexico

- **Simple Technology for a Complex Problem**
  - Simple application and treatment methods
- **Environmentally friendly**
  - Certified organic; used globally for agricultural purposes
- **Improve soil & sediment structure**
  - Foster vegetation growth
- **Sorption of petroleum hydrocarbons**
  - Decrease contaminant transport & bioavailability
- **Enhance biodegradation of petroleum hydrocarbons**
  - Supply nutrients, decrease petroleum toxicity, microbial growth medium

What's "Humate"?

- Highly heterogeneous mixture of lignite-like organic material, along with small amounts of humin, clay, and silicates.
- Originates from the diagenesis of terrestrial, marine, or lacustrine organic matter.
- 60 – 90% humic and fulvic acids
- Est. U-Mate reserves: 10 M tons

Unprocessed humate at mine located at Gallup, New Mexico USA

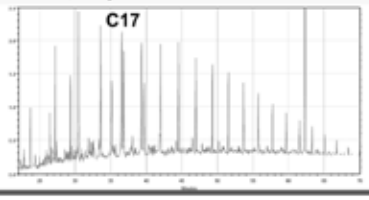
Current agricultural uses of U-Mate humate

- **Dole Food Company**
  - Honduras, Hawaii, and the Philippines
- **Burpee Seed Company**
- **Nutrimate, Ltd** (United Kingdom)
- **Al Khalediah Farms** (Saudi Arabia)

Humate Remediation of Petroleum Contaminated Soils

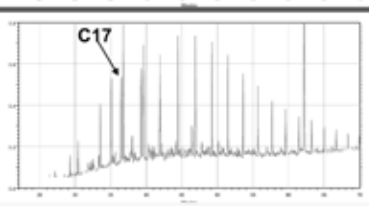
college of engineering

Crude Oil Contaminated Soil:
Control, Day 3

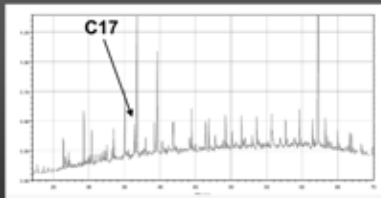


Microcosm Studies:

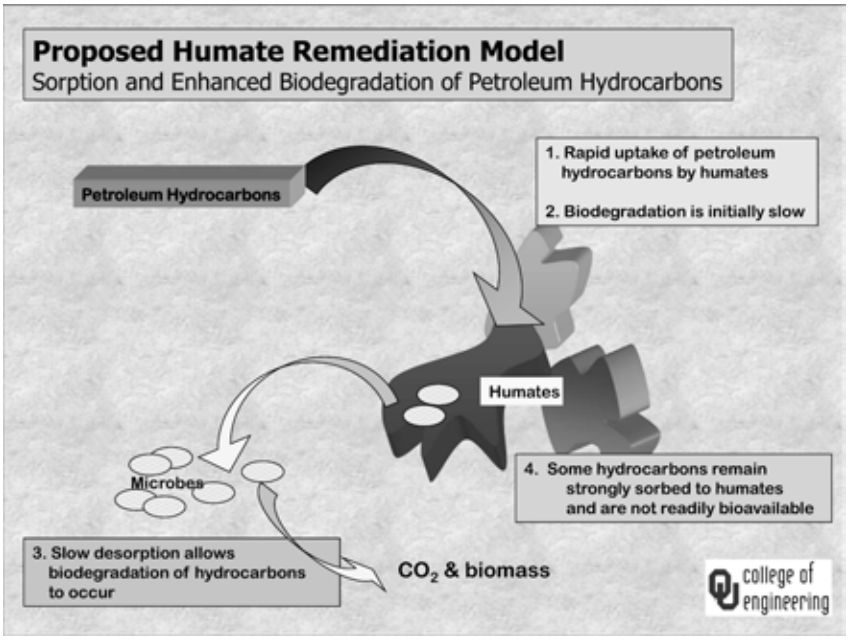
- Humates facilitate the degradation high-end linear alkanes
- Combination of sorption and biodegradation processes

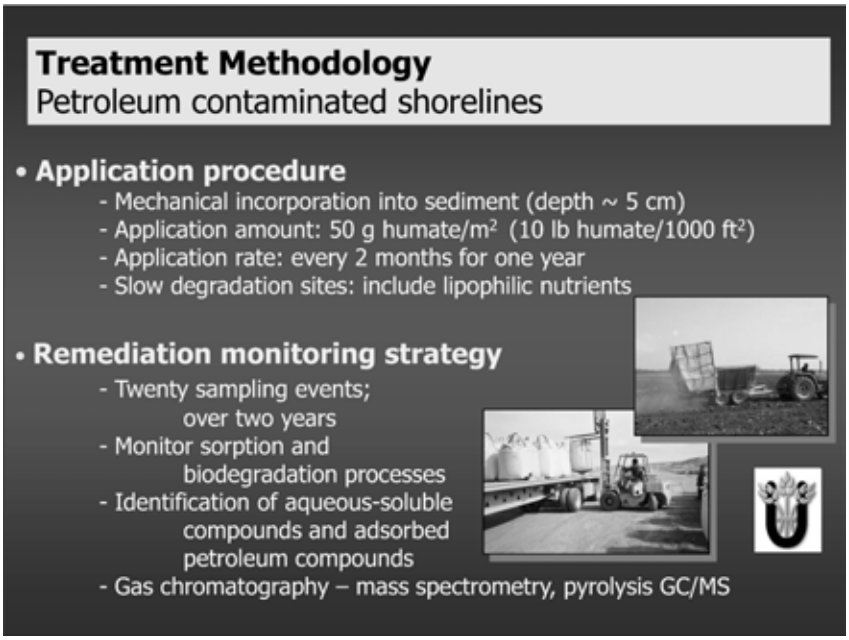


Crude Oil Contaminated Soil:
Control 3 Months



Crude Oil Contaminated Soil
+ Humate 3 Months


Proposed Humate Remediation Model
Sorption and Enhanced Biodegradation of Petroleum Hydrocarbons
Petroleum Hydrocarbons
1. Rapid uptake of petroleum hydrocarbons by humates
2. Biodegradation is initially slow
Humates
Microbes
4. Some hydrocarbons remain strongly sorbed to humates and are not readily bioavailable
3. Slow desorption allows biodegradation of hydrocarbons to occur
CO_2 & biomass
college of engineering


Treatment Methodology
Petroleum contaminated shorelines
• Application procedure
- Mechanical incorporation into sediment (depth ~ 5 cm)
- Application amount: 50 g humate/m² (10 lb humate/1000 ft²)
- Application rate: every 2 months for one year
- Slow degradation sites: include lipophilic nutrients
• Remediation monitoring strategy
- Twenty sampling events; over two years
- Monitor sorption and biodegradation processes
- Identification of aqueous-soluble compounds and adsorbed petroleum compounds
- Gas chromatography – mass spectrometry, pyrolysis GC/MS

Economic Analysis
Petroleum contaminated shorelines

Estimated costs for the treatment and monitoring of five miles of shoreline

- Cost of New-Mex Humate®, fob Houston	$21,500,000
- Monitoring	$ 1,584,000
- Shipping from Houston	$ 1,955,000
- Application equipment and labor	$ 500,000
- On-site storage	$ 20,000
Total estimated costs	$25,559,000

Approximately $5.1 M / mile shoreline
- 20 foot width shoreline; 2 inch treatment depth
- 12 months of applications (1 application every 2 months)
- 24 months of monitoring

Activities towards Implementation
Petroleum contaminated shorelines

- **Proposal submitted to the Office of Gov. Bill Richardson, New Mexico**
  - "Humate Enhanced Remediation of Petroleum-Contaminated Shoreline Sediments along the Gulf of Mexico
  - May 28, 2010
- **RDC BAA Whitepaper submitted to USCG**
  - "Oil Remediation Proposal – An Organic Solution"
  - Deepwater Horizon Response BAA HSCG32-10-R-R00019
  - June 24, 2010

ATTACHMENT

Title Page

Deepwater Horizon Response

Solicitation Number: HSCG32–10–R–R00019
Agency: Department of Homeland Security
Office: United States Coast Guard (USCG)
Location: Contracting Office, USCG Research and Development Center

BAA Technology Gap Area Addressed: 4. Alternative Oil Spill Response Technologies

Offeror:

U-Mate International, Inc. (A Native American Company)
Dennis Yellowhorse Jones, President
P.O. Box 4131
Scottsdale, AZ 85261
Website: *www.HUMATE.com*

Teaming Partner:

Dr. Mark A. Nanny, Professor, Environmental Chemistry
School of Civil Engineering and Environmental Science, and Institute for Energy and the Environment
The University of Oklahoma, Norman, OK 73019

Oil Remediation Proposal—An Organic Solution (Unclassified)

We are proposing a solution for oil contamination along the Gulf Coast where beaches, marshes and other lands by applying our humate to the affected areas. Our humate is a non-toxic, natural *organic mineral* that contains 60–90 percent humic and fulvic acids and other humic substances. We are fortunate to have large tracts of land with humate deposits estimated at 10,000,000 tons. Our humate is bagged under the product name, New Mot U-Mate® and is OMRI (Organic Material Review Institute) Listed. It is also a U.S. Government (Federal Highway Administration) approved product. Humate has been found effective for a number of purposes: a soil conditioner. a fertilizer used by organic farms, a decontaminate for hard metals, an oil remediation component, etc. Our Company will solely utilize the expertise of the University of Oklahoma to implement and control our solution, which includes six applications of our humate tilled into the affected areas over a one-year period, testing and modifying our initial concept for maximum results for dollars spent. Our plan initially calls for approximately 3,250 tons of our humate per application over a five-mile contaminated beach area. Our humate can be mined on an as needed basis and the volume increased as necessary. The following is a brief outline of a plan put together by Dr. Mark Nanny of the University of Oklahoma and our Company:

This study will characterize how humate application to petroleum contaminated shoreline sediments impacts the fate and resulting biodegradation of petroleum. It is proposed that humate, in the form of a finely ground powder, applied to petroleum contaminated shoreline sediments will facilitate *in-situ* remediation of petroleum through the sorption of petroleum to humate and stimulation of microbial degradation. Enhancement of these two processes will result in the improved remediation and restoration of the shoreline sediment quality relative to similar, but untreated, sediments. It is recommended that the humate-enhanced remediation process be examined over 2 years so that: (1) comparison of the degradation rate of labile petroleum components can be evaluated, and second, (2) so that the fate of recalcitrant organic molecules that are of environmental concern, such as thiophenes and polycyclic aromatic hydrocarbons, can be monitored for biodegradation and/or sorption to humate.

The research goals of this project are:

1. To demonstrate, over a 2-year period, that the application of humate stimulates and enhances *in-situ* remediation of petroleum-contaminated shoreline sediments relative to untreated sites.

2. To illustrate that the petroleum components are indeed biodegraded and/or strongly adsorbed to humate.

3. To determine an appropriate application rate and amount of humate necessary to enhance *in-situ* remediation.

4. To identify additional application methods that may be necessary to further stimulate the humatc enhanced *in-situ* remediation, *e.g.,* application of fertilizer.

It is proposed that application of humate will enhance the in-situ remediation of petroleum impacted shorelines sediments through multiple physical, chemical, and biological processes. (1) Humate will sorb petroleum components thereby; decreasing toxicity of the petroleum to indigenous microflora responsible for petroleum biodegradation; (2) humates may provide nutrients, act as a carbon substrate, and/or provide specific organic compounds stimulating microbial growth; (3) humates may provide a viable physical substrate surface for microbial growth and that allows access to sorbed petroleum; (4) humates provide moisture necessary for microbial growth in petroleum saturated environments; and (5) humates improve soil texture thereby allowing aeration which facilitates aerobic biodegradation. This later point is of importance because in the case of crude oil, which sometimes does not contain high concentrations of toxic components but rather is comprised mostly of saturated hydrocarbons, drastic changes in the physical characteristics of the contaminated soil (*e.g.,* porosity, water retention capability, permeability) may impede vegetation growth, inevitably leading to a decrease in soil quality.

Furthermore, humate-induced remediation is environmentally significant not only for the fact that it appears to stimulate remediation of crude oil contamination through hydrocarbon adsorption and biodegradation enhancement, but also because humates: (1) are a component of the natural organic carbon cycle, *i.e.,* they are a naturally produced material; (2) are environmentally benign; (3) help improve soil characteristics that encourage and foster vegetation growth; and (4) may stimulate indigenous microbial growth that may initiate and enhance intrinsic bioremediation.

Dr. Nanny has performed two oil remediation studies for the Integrated Environmental Petroleum Consortium (IPEC) who funded his research (with flow through funds from EPA). You can find his reports on the EPA website. He was held to strict protocols for QA/QC, methodology, sampling, and analysis.

Additional technical information is available upon request.

Rough Order of Magnitude

Estimated costs:	
Cost of New-Mex Humate® ultra fine	$21,500,000
University of Oklahoma (including Dr. Mark)	1,584,000
Shipping	1,955,000
Application equipment and labor	500,000
On-site storage	20,000
Estimated*	$25,559,000
Cost per mile of beach	$5,111,800

Coverage:*
- 5 miles of beach
- 20 foot width
- 6 applications at average of 2 inches

Time frame:
- Applications—12 months
- Follow-up—12 months

*Subject to specific identified area and testing protocol

Senator CANTWELL. Thank you.

We're going to go through the panel, then we'll take questions at the end.

Mr. YELLOWHORSE JONES. Yes, ma'am.

Senator CANTWELL. So thank you for your testimony.

Dr. Stahr, welcome. Thank you for being here.

STATEMENT OF FREDERICK R. (FRITZ) STAHR, PH.D., RESEARCH SCIENTIST, SCHOOL OF OCEANOGRAPHY, UNIVERSITY OF WASHINGTON

Dr. STAHR. Thank you for inviting me to testify today. My name is Fritz Stahr. I'm a Physical Oceanographer at the University of Washington, a research scientist and engineer there. I manage a group that makes an underwater robot called the "Seaglider™."

There are actually three Seagliders observing the plume of oil under the sea surface in the Gulf of Mexico right now, two of those owned by the Naval Oceanographic Office that we built for them about 3 years ago and still maintain for them, and one owned by iRobot Corporation, which is our sole licensee for the technology to be built for outside customers, outside the University of Washington now.

They volunteered to put one of their engineering units in service to—everybody, really, in looking at this plume, and all that data is available online. And the written testimony, which I've submitted, contains the URL link to those data available from the Seagliders.

So I'm here today to testify about that, in some respect, but also, in some respect, just as an outside scientist, an oceanographer looking at what has been going on, and having some experience with undersea vents.

I'm also a mechanical engineer and a member of the Marine Technology Society. Members of the Marine Technology Society are in the oil and gas business as well as in science endeavors. They represent really the cadre of people who invent the ROVs, invent the specialized tools and instruments that are used both by the industry and by the scientists to explore the oceans and to use the ocean resources.

And that organization contains a lot of members in the Seattle area, actually, and I'm the local section chair, the Puget Sound Section Chair of the Marine Technology Society.

So, as an engineer, I'm a mechanical engineer also. I have some background in trying to understand things like blowup preventers with rams that don't work, which was very interesting to me.

I think the most important part of what I'd like to say here today has to do with the fact that this was not a traditional spill. Spill implies containment in a vessel or a tank of some sort before it comes out and onto the ocean or onto the land.

In this case, this was an oil vent. In deep-ocean science, we look at things called hydrothermal vents, which are places in the sea floor. You may know them as black smokers. This is where very hot fluid comes out of the sea floor at mid-ocean ridges and they act incredibly like what we have seen here, lots of oil, in this case, instead of hot water, but oil and gas coming out of the sea floor as a vent.

And I think that one of the things that was difficult for many of us who have worked in the science of vents to understand was that there seemed to be little attention to those who are in that community in terms of turning to them for their expertise.

So it wasn't surprising to me that someone I know in that community, Dr. Tim Crone, who's at Columbia University's Lamont-Doherty Earth Observatory, was one of the first of what I would

consider sort of the general public of scientists who put out an estimate of what the flow rate really was.

And we all really wanted to know that number for a lot of reasons, and the initial numbers, none of us could believe, particularly after we saw the first 30-second video clip.

So Dr. Crone has experience in doing that, and, in fact, there were estimates quite early on at NOAA that matched much more closely to what we believe now to be something like 50,000 to 100,000 barrels a day coming out of that undersea vent.

The other thing that I wanted to talk about—and this is where the Seagliders come in—is that that venting process creates an undersea plume of oil droplets that may never come to the surface. So there is a plume that has now been established, I believe pretty well, between 800 and 1,300 meters deep. The sea floor there is roughly 1,900 meters deep where the oil well is.

This plume can be observed by things like the Seaglider, although we don't have perfect instrumentation on the Seaglider to do so, and that's where some development effort would be useful is to add instrumentations to really tell whether or not this was oil that the gliders are intersecting in their path up and down through the water column.

And that plume—the nature of that plume is very much like what comes out of hydrothermal vents. So, again, the folks who research hydrothermal vents would be able to help in researching that plume and where it is and where it's going.

And I think that that—the fundamental difference between a spill that comes out of a tanker on the surface and oil that comes in from a vent at the sea floor—is one of the things that was missed early on, and for quite a while about this. So we have lots of plans for dealing with vessels, but none for dealing with oil vents.

And I think, last, but not least, I'd like to just mention that the observing technologies available to coastal communities, such as high-frequency radar, that NOAA's IOOS program, Integrated Ocean Observing System, are slowly, but surely, trying to get going around the country, some of those were not available because of funding.

And I think the IOOS program, in general, is a great one. It gives us the ability to observe and monitor the ocean sort of 24/7, but they're operating on a relative shoestring of a budget right now.

And I think that that would have helped the responders a lot in having some of those facilities available, not only at present for watching the ocean—in fact, those high-frequency radars have been turned on, due to money from the incident commander—but, in the past, so that we could better model where these oil slicks, et cetera are going to go.

So that's the gist of my testimony, and I thank you very much and I would like to submit my written testimony for the record.

[The prepared statement of Dr. Fritz Stahr follows:]

PREPARED STATEMENT OF FREDERICK R. (FRITZ) STAHR, PH.D., RESEARCH SCIENTIST, SCHOOL OF OCEANOGRAPHY, UNIVERSITY OF WASHINGTON

Good morning Madam Chair, Ranking Member Snowe, and members of the Committee. My name is Fritz Stahr. I am a physical oceanographer at the University of Washington's College of the Environment School of Oceanography. Presently I run the Seaglider Fabrication Center within the School, which makes, and helps owners use an autonomous underwater vehicle (AUV, or more simply, underwater robot) called a Seaglider.™ Three Seagliders are presently deployed in the Gulf of Mexico around the *Deepwater Horizon* oil well observing various ocean properties, some which may show the presence of an underwater oil plume which comes from the seafloor oil well-head. Two of those units are owned and operated by the U.S. Naval Oceanographic Office (NAVOCEANO), which purchased them from us about 3 years ago, and for which we provide maintenance. The third is owned and operated by iRobot Corporation, which has a sole-license from the UW to make, sell, and maintain Seagliders for all parties outside the UW. You may see the data from all these Seagliders, as well as other ocean gliders, at a webpage sponsored by NOAA's Integrated Ocean Observing System (IOOS): *http://rucool.marine.rutgers.edu/deepwater/*.

I am also a mechanical engineer, and Chair of the Puget Sound Section of the Marine Technology Society (MTS—*https://www.mtsociety.org/home.aspx*). MTS has many members in the business of designing, building, and operating a wide range of research and operational marine equipment and instruments, including for both the oil industry and basic ocean research. My testimony today will touch on aspects of this Nation's capacity for better use of basic research-related technologies, and observations as an engineer of the series of equipment failures that gave us 80+ days of crude oil venting from the seafloor.

An Oil "Vent", Not "Spill", and the Connection to an Active Ocean Research Community

To call this incident a spill implies the oil was in a container at one time, such as a ship or tank on land. But it actually comes directly from the Earth at ~1,500 meters below the ocean surface in a fashion analogous to deep-sea hydrothermal vents, often called "black-smokers" for their appearance of venting black smoke underwater (*http://en.wikipedia.org/wiki/Hydrothermal_vent*). Hydrothermal vents are found on or near mid-ocean ridges at depths from 700 to 3000+ meters beneath the ocean's surface. The terrestrial analogy to calling this a vent holds as well—oil "gushers" from uncontrolled well heads on land spew tall jets of oil into the air much like geysers at Yellowstone spew jets of water—both geysers and oil wells vent high-pressure, low-density fluids from the Earth into either the atmosphere or ocean. I will continue to use the phrase "oil vent" throughout this testimony to distinguish this oil-generating seafloor feature from a spill (which is limited in scope to the size of the container) and emphasize its similarity to naturally occurring hydrothermal vents.

In considering a response to an accidental seafloor oil vent, particularly at this depth and of this strength, it seems natural to turn to one of the two communities used to working at there—ocean researchers and engineers who measure and explore hydrothermal vents. (The other community now accustomed to working at that depth are oil drilling and well-head engineers, but they are relative newcomers to this extremes of the environment). To work safely at the high pressures and extreme fluid temperatures and corrosive compositions found at seafloor vents one requires well designed, specialized equipment and instruments such as custom Remote Operated Vehicles (ROVs), high-pressure instrument housings, ultra-robust probes and tools—all things basic researchers have been inventing and using for decades. As a post-doctoral researcher, I measured hydrothermal-vent generated heat from groups of black-smokers in the northeastern Pacific with Dr. Russ McDuff (UW). There exists a very active community of vent researchers at universities and laboratories around the world, including UW, all of whom understand the technological and scientific demands of working at ultra-high pressure with fluids that are extremely acidic, toxic, hot, and volatile—very much like the oil from the *DeepWater Horizon* vent. Therefore it was reasonable that one of the first independent scientists to estimate the true flow rate of the oil vent based on the 30-second video clip BP finally released was a colleague who worked on exactly that problem with hydrothermal vents as part of his doctoral dissertation—Tim Crone, now at Columbia University's Lamont-Doherty Earth Observatory. His work, along with that of three colleagues of diverse expertise, on this flow-rate estimate was published in an Op-Ed piece in *The New York Times* on May 21, 2010, (about a month after the original blow-out) titled "Measure of a Disaster," in which they conclude:

> Taking all this into account, our preliminary estimates indicate that the discharge is at least 40,000 barrels per day and could be as much as 100,000 barrels. Certainly, our assessments suggest that BP's stated worst-case estimate of 60,000 barrels has been occurring all along. What matters most is that we take the steps to find out if it has.

All the oceanographers I know, and much of the general public, agreed with the last statement—we wanted to determine what the *real* flow-rate was. But no one could do so for two reasons: First, access to the well-head for such a direct measurement was controlled entirely by BP and the U.S. Coast Guard (USCG); and, second, neither BP nor the onsite incident commander (USCG) took steps to learn how much oil was actually entering the environment from this vent. This willful ignorance on BP's part is understandable as they have a pecuniary interest in that number. Current Federal law will use that rate, and the time it flowed, to help determine how much oil was vented, and therefore what clean-up cost BP will incur. However, it is unclear why the USCG did not turn to natural partners in the ocean science community to gather that information and put it ahead of the containment and clean up efforts.

Frustration of Research Oceanographers at NOAA's Public Stance Regarding Flow-Rate

BP, the USCG, and NOAA either were ignorant of, or missed entirely, an opportunity early on in this crisis to employ existing basic-research techniques, and scientists knowledgeable in them, to determine the flow rate from this oil vent. Knowing that number (or at least an accurate range for it) may have guided a more meaningful and focused containment and clean up effort. The fact that public statements by the USCG and NOAA indicated no real interest in knowing the flow rate for a long time into the disaster frustrated me and fellow oceanographers. We were deeply disappointed that the government agencies nominally responsible for protecting our oceans, shorelines, and fisheries took the same stance that BP did in this respect. Further, we were baffled by a failure to employ tools and techniques we already have to determine flow rate from deep-water hydrothermal vents, or to contact members of the ocean science and technology community who were speaking out on behalf of all the rest of us with estimates based on publicly available data. The situation left many of us wondering whether we were the only ones who cared or believed that knowing the oil vent flow-rate was important to the response.

As a bit of raw data on what people inside NOAA thought, or knew, I recently found and watched a 10-minute video clip created sometime on or shortly after April 22, 2010, taken in various rooms at NOAA's HazMat office in the Western Regional Center in Seattle. The video records people meeting in-person and by phone, with images of whiteboards, notepads, and audio, in which one can see and hear estimates for oil flow-rate from various sources. The numbers are the likes of "64k to 110k barrels a day", and "52–110,000 barrels a day". (Clip available at *http://blog.al.com/live/2010/05/video_shows_Federal_officials.html*, published May 1, 2010—NOAA credit slide at the end of clip.) Given that the NOAA HazMat group's job is to envision the worst case for a spill and help the affected area cope with it in a response they term "least regrets," I can understand why NOAA would not necessarily release those numbers to the public.

I believe that no oceanographer, however, would be surprised that the flow-rate estimates generated by Dr. Crone and his colleagues correlate well to those generated (or gathered) almost a month earlier by NOAA HazMat. But once this correlation was apparent, it became scientifically embarrassing that NOAA continued to maintain publicly the original extremely low flow-rate estimate of 5,000 bbls/day. As the op-ed piece authors said, "what matters most is that we take steps to find out" whether the flow rate has been higher all along.

Perhaps sensing that frustration, the Flow Rate Technical Group (FRTG) was finally formed by the Incident Commander and is led by an experienced and technically savvy ocean scientist, Dr. Marcia McNutt. Some had high hopes for a quality result from a 32-member strong team, many in academia and others from Federal agencies such as the U.S. Geological Survey, the Department of Energy, and Minerals Management Service. Divided along lines of different scientific approaches to the question, it appeared promising to those of us on the outside. On May 27, they published a "consensus" number of 12–19,000 bbls/day for flow rate. But the press release did not make it clear what subsequently was revealed—that those numbers really represented the low-end of the range as none of the groups could agree on the high-end of the range. Some of the FRTG groups estimated up to 40,000 bbls/day and others wouldn't say what the high-end could be, so no value for that was published and the press (and public) believed the high-end to be 19,000 bbls/day. In a later report FRTG released (June 10, 2010), the FRTG noted that a group led

by scientists from the Woods Hole Oceanographic Institute with an ROV that was allowed access to the well-head estimated the flow rate after the top-kill attempt failed (May 29, 2010), but before the riser was cut, to be 65–125,000 bbls/day—certainly much higher than anything the FRTG published 2 days before or subsequently, but in line with NOAA HazMat's original estimates made in the days just after the rig sank. All of this just served to cause those of us on the outside further doubt of the Federal Government's intent or ability to protect us, and the ocean environment, from the ravages of an out-of-control seafloor oil vent. Lack of knowledge means lack of control—clearly where the country has been put by this incident.

The Underwater Oil Plume

Another parallel to hydrothermal vents exhibited by this oil vent is the creation of an underwater plume at a level of neutral density for some of the vented fluid. As they leave the seafloor, both types of vent fluids have momentum (from pressure) and buoyancy (from being lower density than the surrounding seawater). The momentum typically dissipates within a short distance by draining into turbulence all around the plume (typically seen as billows and vortices on the edges). But the buoyancy persists and drives the plume higher off the seafloor. In the case of a hydrothermal vent, this buoyancy is due to the high temperature of the venting water, often as much as 400° C. But it mixes with surrounding 2–4° C water and becomes neutrally buoyant a few hundred meters above the bottom, rarely rising all the way to the surface except in the case of an underwater magma eruption. From this oil vent, some fluid will be buoyant enough to rise all the way to the surface creating the large slicks being observed, mapped, skimmed, and washing ashore. But some of the oil will become so small as to become neutrally buoyant only part way to the surface. (A numerical and lab study of this process was conducted in May by professors at the University of North Carolina—video at *http://www.youtube.com/watch?v=6Cp6fHINQ94*.)

These subsurface plumes are then subject to the currents and microbial breakdown processes at depth, away from sunlight and surface wave effects. Such plumes were detected by Dr. Samantha Joye (University of Georgia) and Dr. Vernon Asper (University of Southern Mississippi) in their ship-board cruises during May and June. The plume(s) appear in a depth range of 800 to 1,300 meters. Dr. Joye discussed this, and many other important effects on the natural environment and oil from *Deepwater Horizon* vent in her testimony on June 9 to the House of Representatives Committee on Science and Technology, Subcommittee on Energy and Environment. Dr. Asper was instrumental in getting iRobot Corporation to launch and fly their Seaglider on the west side of the oil vent to look for this plume.

Gliders, unfortunately, can only help track this neutrally buoyant plume down to 1,000 meters, as none of those currently on the market are capable of diving deeper. Further, they do not as yet, carry any sensors that directly detect oil, only detecting parameters that are a proxy for oil, such as Colored Dissolved Organic Matter (CDOM) fluorescence and oxygen concentration. So, while gliders, and other AUVs, can currently help somewhat, there is significant room for improvement in that technology to monitor oil-vent plumes. Two developments are underway with promise. Professor Charlie Eriksen at the University of Washington's School of Oceanography is in the process of testing a Deepglider* that has a dive depth and operational capacity to 6,000 meters below the sea surface. This will cover to the deepest place an oil well has ever been drilled 93,000 m) or is ever likely to be drilled. And second, a German company, Contros Systems and Solutions GmbH, makes a fluorometer-type sensor for polyaromatic hydrocarbons (oil) but it is too large and power-hungry to be integrated onto a glider. Pushing either of these technologies along will likely assist us in really measuring the next oil vent plume that occurs from deep-sea drilling incidents.

And last, in the "frustrated ocean scientist" arena again, I was outraged that both BP and NOAA denied the existence of these subsurface plumes long after conclusive physical evidence came aboard research vessels in the form of oil-coated filters from water collected at plume depths. Once more, it seemed that the agency charged with helping us measure and understand what was happening in the ocean due to this oil vent spent whatever potential it had for positive impact on obscuring the facts.

Ocean Observing Facilities Unavailable Due to Lack of Funds, but Needed to Understand Fate of Oil Slick

NOAA has been slowly building an ocean observing system around the country known as the Integrated Ocean Observing System (IOOS). It is intended to benefit all sectors of our society—business, agencies, general public, and science—and is a system of systems building on many facilities and instruments already installed and taking data for other projects. We hope that someday it will help us observe the

ocean like we do the atmosphere—continuously and everywhere along the coasts and Great Lakes. But at present it operates on a shoestring budget so in some cases is not sustainable on a full-time basis. (Legislation authorizing IOOS passed in early 2009, but a prototype system funded by a consortium of fisheries and academia in the Gulf of Maine was operational as early 2001.) When the White House asked for a list of ocean observing assets available in the Gulf of Mexico at the outset of this event, it was the Gulf of Mexico Coastal Ocean Observing System (GCOOS) of IOOS that responded. The list delivered contained some high-frequency radars (HFRs) that can track surface currents far out to sea. But those HFRs had been shut down months earlier due to lack of operational funding. They are running now thanks to funding from the Incident Command, and are critical to tracking the currents pushing the oil slick around. But knowing what the currents were before the disaster, and for years before that, could have helped greatly in understanding the system into which this oil vent erupted. (See *http://www.cencoos.org/sections/news/Gulf_oil_spill_2010.shtml*) for HRF data from the Gulf.) The general lack of funding for basic ocean observations and research in the Gulf was well covered in a *New York Times* article by Paul Voosen published June 3, 2010, titled "Federal Funding Cuts Leave Oceanographers, Spill Responders in Dark". What we need in terms of fund for IOOS and its regional associations pales in comparison with many other demands on tax dollars. Even the equivalent of one "inexpensive" NASA robotic mission of $200 million would make IOOS a functional reality.

Opportunities for Action in Measuring, Monitoring, and Evaluating Accidental Oil Vents

What is clear from all this is that our country has put little effort into creating tools and instruments to measure, monitor, evaluate, and clean up a deep-sea oil vent caused by a well-head incident such as the *Deepwater Horizon* rig explosion and sinking. While oil company engineers do amazing work to create drills, rigs and methods to work in deep water, it is apparent from this event that no one can design, build, and operate a one-hundred-present fail-safe system for deepwater oil wells. A national effort, that includes work on both engineering and scientific challenges, is critical if we are to be truly prepared for another such event. We must take some action and several paths forward are offered in two bills proposed to this committee by members.

Senator Cantwell proposes the "Oil Spill Technology and Research Act of 2010" which creates a committee to oversee research and development spanning a wide range of concerns revealed by this disaster—from surface and sub-surface current prediction capability (typically a pure research endeavor), to containment and removal technology (typically done by agencies and oil companies), to rehabilitation methods (often handled by concerned citizen volunteers). The Committee will act through NOAA and the National Academy of Sciences, which is important as it provides a balance necessary to make these efforts move forward with transparency and attention to impartiality. Though funded at a relatively small scale, the fact-finding part of this effort alone may be worth it—as Socrates pointed out, knowing what we do not know is the critical first step to true learning.

Senator Rockefeller proposes the "Securing Health for Ocean Resources and Environment Act," or the "SHORE Act," which invests in a variety of improvements to NOAA and the Coast Guard to better monitor and respond to oil spills, indentify aging oil infrastructure that puts us at risk, provides grants to states and other regional organizations to improve their readiness to respond, and establishes a long-term environmental monitoring system for the Gulf of Mexico where most deep offshore oil is being pursued. The funds for this are greater, but so is the scope and duration. And those funds come from industry-paid fees, which at present, are popular with the public given what has happened in the last 90 days.

Both of these bills are good steps forward in turning ideas into action and adding to our clearly weak arsenal of oil vent (and oil spill) response, monitoring, clean up, and restoration technologies. Even wider recognition of the important role basic oceanographic research plays in this field will be a welcome addition to the mandate of NOAA and the Coast Guard.

Thank you for inviting me to testify today.

Senator CANTWELL. Thank you, Dr. Stahr. Thank you for that testimony and we definitely will have questions for you about the Seaglider. So thank you.

Dr. Pegau, thank you very much.

STATEMENT OF SCOTT PEGAU, PH.D., RESEARCH PROGRAM MANAGER, OIL SPILL RECOVERY INSTITUTE (OSRI)

Dr. PEGAU. Good morning, and thank you for the opportunity to speak with you today.

My name is Scott Pegau. I'm the Research Program Manager for the Oil Spill Recovery Institute. OSRI is a Congressionally-mandated organization that was developed after the *Exxon Valdez* oil spill. We bring together Federal, state agencies and local peoples to guide where our research and technology development should go.

As the Research Program Manager, I'm responsible for ensuring that OSRI's funding goes toward the best science and technology in trying to get it transferred into the applied world, and we use a research plan to guide where we're going for the next 5 years.

The subject before us today has many aspects, given time constraints, how focus on issues related to adoption of new cleanup technologies, although there are overlaps with other areas.

In developing new technologies, there are some obstacles that won't ever change, but there are some that we can address, such as improving the process for getting new technologies adapted. We've got to keep in mind that an underlying issue that we have to deal with is that spill response is conducted by a large number of small businesses. For instance, there are at least six spill-response organizations in Alaska alone.

The decentralized approach limits the technologies that can be purchased or maintained. High-end technologies, like spill-surveillance aircraft with cutting-edge sensors are outside the capabilities of small businesses. To purchase and operate those highly specialized equipment would require being done by a national spill-response group.

Developing and adapting new technologies could be made much easier by developing a clear set of standards that equipment must meet, providing facilities that allow for testing opportunities and clearly outlining how to become approved for use during a spill.

We all want proven technologies during a spill response. This requires us to actually have tested them prior to the spill. So we need to look at testing, from bench-top tests, large-scale laboratory tests and field testing.

For instance, as an example for bench-top testing, the access of oil or other materials needed, you can go to the National Institute of Standards and Technologies and buy 50-millileters—you know, a little cube of oil—for 380 bucks, that's about $300,000 a gallon, if you want to buy crude oil for developing your new sensor. Obviously, that's not feasible for larger things.

Large-scale national test facilities are expensive to rent. They're expensive to operate, and getting permission for field testing runs into issues of regulation and approvals that few can figure out.

Similarly, testing is critical for transitioning scientific products, such as circulation models and ocean-observing capabilities.

During a spill, there's rarely time to ensure that new scientific data can be incorporated into the spill-response model or that the response personnel understand the limitations to the information being provided. This testing must be accomplished ahead of time as part of a clear transition effort.

Funding is obviously an obstacle. Currently, new development is primarily left to industry. They're doing some really neat things, but it does lead to other issues. They don't often align with the people's desires necessarily. Otherwise, we generally require pooling of the limited assets of the non-industry groups to try to move our field forward.

Keep in mind that there will always be a gap between current science and its application in spill cleanup. This gap is natural, and it's actually desirable, as science is out there to go down many wrong paths in identifying the best path.

When we look at funding, it's critical that the funding organizations bridge between the scientific and the applied worlds. Like others here, I rely heavily on the input from spill-responders. I need their reality check. We've been supporting several different things, and some of them have gone through very fast because the spill responders said, Yes, I need that.

We developed a balloon surveillance system that was a scientific idea that came out 2 years ago. A year ago, we tested it, and BP has purchased it for operation.

We've had some failures, which are quite happily not in the field at this point.

As well as the input from the responders, we require input from the scientists to keep us aware of the new directions in improving opportunities we must consider. It's only by bridging these two worlds that we can efficiently ensure best technology transfer.

Thank you.

[The prepared statement of Dr. Scott Pegau follows:]

PREPARED STATEMENT OF SCOTT PEGAU, PH.D., RESEARCH PROGRAM MANAGER, OIL SPILL RECOVERY INSTITUTE (OSRI)

My name is Scott Pegau and I am the Research Program Manager for the Oil Spill Recovery Institute (OSRI) in Cordova, Alaska. OSRI's mission is to support research, education, and demonstration projects designed to respond to and understand the effects of oil spills in the Arctic and sub-Arctic marine environments. As the Research Program Manager I am responsible for guiding OSRI's funding toward the best ecological and technological research and development related to oil spill recovery. OSRI is one of a very small group or organizations that fund this type of research. I also have experience as a researcher who has submitted proposals for conducting oil spill related research and development.

My comments focus on trying to develop new cleanup technologies that are likely to be utilized. I address the issue from the funding organization's perspective, however, there are many similarities faced by businesses that are trying to develop new technologies. Issues associated with restoration can be different, although they have some similarities.

When considering on the issues that impede introduction of new technology and approaches into spill response I find that there are several causes, but primarily there are three root issues that come into play.

1. Oil is a toxic substance. This creates numerous difficulties in proving a system works by making it difficult to test the system.

2. Oil spill response in the U.S. is conducted by a large number of small businesses. There are six spill response organizations in Alaska alone. Because they are small businesses there are generally limitations to the types of equipment they can afford or operate. The relatively small spill response community can create difficulties for outside approaches to be adopted.

3. The spill response efforts are highly scrutinized with high probability of litigation. This leads to wariness in using unproven technologies during spill response.

Note the Catch 22 situation between the first and third root issue.

When looking at developing new technologies the first issue to consider is "What type of technology is needed?" Most development is in response to lessons learned at an earlier spill. I am closely watching events in the Gulf to help inform me of gaps in our response capabilities. Unfortunately, the degree of information control being applied in the Gulf is making that job extremely difficult.

When dealing with situations that haven't occurred before this is a little trickier. Often issues are fairly obvious, like needing to improve the abilities in inclement weather conditions, or the ability to operate in different sea ice conditions. Based on experience we can guess at a majority of issues that need to be addressed, but our experience only provides us with a theoretical model of the situation. As with any model there are differences between the model and reality. These differences lead to adapting our approaches on the fly. Such an example in the Gulf is the use of dispersants at the well head, which is an application outside of what they were designed for. The way to reduce these unexpected issues is to conduct the appropriate experimental spills so we can learn in a more controlled set of conditions and extent than relying on spills-of-opportunity. Such controlled spills have not been possible since the early 1980s in the U.S., which is probably one of the greater factors in preventing the advancement of spill response capabilities. We can't fix problems we are not aware of.

Another issue regards knowing whether a new technology works or is any better than the existing systems. Standards are needed against which new equipment can be tested. How can a manufacture invest in developing new equipment if they don't know what the measures of success are? Or how can a responder be confident that a new piece of equipment works if there are no standards? There are now testing standards for skimmers, but I don't think many of the skimmers have been actually tested using the standards. Additional standards need to be developed so manufacturers are aware of the tests their equipment must pass if it is to be considered for spill response. This will also provide a measure that demonstrates the equipment is proven technology to the response organizations that are the potential adaptors of the technology.

This can become more complicated if protocols are written with one technology named rather than listing the required capabilities. If the measurement protocols require a Turner fluorometer then there is no incentive for other companies to develop competing equipment because it cannot break into the market.

Beyond developing standards there must also be an ability to demonstrate that the technology meets those standards. This means there must be an ability to test the design, potentially at several different levels. Benchtop testing is needed during development, large scale laboratory tests are needed to show it may work in the environment, and in the end actual field tests must occur. There are many difficulties in conducting these tests.

One example to consider is the development of a new oil detection sensor. Among the first things needed is a sample of oil to work with. I am involved in such a project so I am learning the difficulties involved. The Advisory Board and Scientific and Technical Committee that guide OSRI funding includes members from the oil industry, and I work with a number of other individuals in the industry so I have a much better starting point than most, but here is what I am finding.

Based on recommendations from my Board I made a request for two liters of oil from the North Slope. I was put in contact with a couple of very cooperative people who thought it would be no problem to provide a couple liters of oil, but they had to check with the lawyers. The latest response is that they expect that it will take two to 3 months to get a decision whether my request can be filled. I could go to the National Institute of Standards and Technology and purchase oil for $379 for 50 ml (over $300,000 per gallon). This is not an option for someone who needs to test a large piece of equipment. A much more clearly defined means is needed for people to access affordable samples of oil and other materials, such as dispersants, for use in the development of new technology.

Once a new technology is developed it must be tested either in the lab or in the field. There is a strong reluctance to apply an unproven technology during an actual spill response so the preference is to operate in a laboratory environment. However, there are very few large scale testing facilities. The Minerals Management Service Ohmsett facility is the large national facility. It is fairly expensive to rent, which creates difficulties for small businesses trying to prove their approach. The last quote I saw for operating the facility was for approximately $40,000 for 3 days of testing of a new large skimmer. There is a lot of work involved in being able to conduct these tests so I don't think the cost is unrealistic, but it can be prohibitive to smaller organizations. The funding for testing of this new skimmer was provided by a partnership of four organizations including OSRI. MMS has been very willing to let people test equipment when other tests are running, but it is difficult to figure

out how to properly schedule these tests. Small businesses would greatly benefit if a small number of days were made available at the national facilities for testing their technologies at lower costs. For Arctic issues this means being able to work at the U.S. Army Cold Regions Research and Engineering Laboratory ice facilities.

In the end we still need to prove the technology in the field. Currently that is done by waiting for a spill-of-opportunity. When a spill occurs there may be a reluctance to use newer technologies in case it fails. It is also very difficult to arrange a test in a timely manner. There are a large number of potential technologies that are being marketed to the spill responders during a spill. The volume of new techniques may inhibit any being selected for testing. There are several ways that the issue of field testing may be overcome. One way is to develop a list of technologies waiting for testing during a spill-of-opportunity. Most importantly, have a clearly defined approach to get technologies on the list.

At this point most of improvements are incremental because they are easiest to get into the field. Another method to get equipment field tested is to allow controlled releases. The U.S. hasn't had controlled spills since the mid-1980s. I believe that lack of testing our knowledge is one of the biggest factors in our not moving forward in spill response capabilities.

Finally, consider developing a national testing and training facility associated with a natural seep. While natural seeps don't provide all the conditions necessary to test all equipment they do provide an opportunity to test equipment in the field.

The biggest issue facing field testing is regulatory. Regulations often prevent the newest technologies from being tested. For example, there is a lot of interest in using Unmanned Aerial Vehicles for spill response. These vehicles face significant hurdles in getting FAA permits to be used. This is not to say the hurdles are not appropriate and if people keep the regulations in mind there are still opportunities for advancement. OSRI tested a balloon-based surveillance system for spill response because tethered balloons have a simpler regulatory environment. This system allows for spill responders to get a greater view of the spill around them and gets the information directly to them instead of waiting for reports from aircraft, when they are flying.

At other times the regulatory environment is more difficult to work with, for example getting permission for a controlled spill. An alternative to using oil in the environment is to develop an oil simulant to use in testing and training. Oranges and popcorn have been used as simulants, but have very limited application for actual testing of equipment. More appropriate simulants have been developed, but cannot get approval for use. Even normally benign and natural substances can have negative impacts when used at higher concentrations. It is becoming difficult to get permission to even use oranges or popcorn because they are not natural to the marine environment.

Most of my comments so far have focused on the development of new response technologies, but there are a number of other aspects of research that may transition from the scientific world to the spill cleanup and restoration activities. One issue that must be overcome is that the scientific research needs to be cutting edge to get funding. This generally means very specialized equipment or training that is not ready or appropriate for transition into everyday use. Remember spill response organizations are generally small businesses that cannot afford to hire people with the skills needed to apply the cutting edge science that may not be used for a decade.

It is difficult to incorporate cutting edge science during a spill response because people are extremely busy and don't have time to learn how to integrate the science into their current tools. This not true for restoration, which has more time to develop in its approach and has to be flexible in approach because of the range of species and environments that may be damaged. One thing OSRI tries to accomplish is to provide a bridge between the science and response world. It is critical to develop organizations that can bridge these worlds. By working to identify potential transitions and testing their application for spill response before a spill occurs we can help transition new science into cleanup and restoration efforts.

OSRI works closely with the Alaska Ocean Observing System and spill responders to provide opportunities for the newest models and observing capabilities to be used by spill responders and for the scientists to understand how to provide their data in a manner that can readily be incorporated by responders. Being a bridge between science and the applied world is not easy. I am trained as a scientist and often think that I have some great idea. Fortunately, I work with a number of spill responders that help me understand the issues with applying those ideas. It is important to have groups that bring responders together with scientists to see where overlaps between capabilities and needs exist.

Finally, we need to consider funding for bringing on the new approaches and equipment. There is little funding dedicated to spill recovery outside of industry. Minerals Management Service, U.S. Coast Guard, the Coastal Response Research Center (with NOAA), and Oil Spill Recovery Institute are primary funding organizations. Budgets are commonly under one million a year and organizations like OSRI funds improvements in environmental knowledge along with development of new equipment. Over the past few years the funding level has continued to decline. This may be in part because there hasn't been a major spill in years so people did not think that this type of research was necessary. The lack of a national oil pollution research plan makes it more difficult to sell the need for particular research. There is also a very appropriate focus on improvements in spill prevention. It is important to remember that no matter how much prevention is in place we still must be able to respond if those measures fail. The *Deepwater Horizon* accident is emphasizing that need.

Funding from national programs, such as from the National Science Foundation, is difficult to obtain. This is largely because the needs are not cutting edge science. I submitted proposals for improvements in spill detection systems to national requests-for-proposals and generally the comments indicate the reviewers are looking for more complex systems than are needed in a spill response. Dedicated opportunities with required application are the approach that has succeeded.

The standard peer-review funding process generally does not promote innovation. Reviewers examine a proposal with the thought "Will this work succeed?" and if there is doubt the proposal won't be funded. For innovative improvements the reviewers need to ask: "Will this work fail?" and "If it fails, what will we learn from the attempt?". The best approach to funding is through organizations that bridge the response and science worlds. However, with limited funding these organizations will also tend to fund the work most likely to succeed, which tends to be incremental changes. The advantage of limited funding is that industry, government, and nongovernmental organizations must partner together, which provides for coordination between the funders.

The bridge between industry and science also must bridge national and regional interests. Without a doubt there are many issues common between the Gulf of Mexico and Alaskan waters, but there are important differences as well. OSRI has an advantage in that we can focus on issues that are consistent with the desires of people in Alaska. At the same time the need to partner with other groups means many of our projects have applications nationally. National funding organizations generally do not have a means to address issues that are regionally important.

Industry is the largest funder of new developments and are supporting some pretty amazing projects. The disadvantage with industry being the leaders of development is that their interests may not align well with the people living in the area where spill response may occur. For example, there is an emphasis on research on dispersants, which are controversial to people in Alaska. They also tend to respond primarily to regulatory requirements and financial advantages. These drivers do not necessarily focus research in the most appropriate directions.

This leads us back to research and development by other businesses. These are the businesses that need the improvements in standards and testing opportunities described earlier. Funding organizations often get requests for help supporting new developments by these businesses. It is an area that remains difficult for me. I believe that we should provide opportunities for any business to tackle a defined problem rather than supporting a single business to develop their approach. At the same time there are definitely times when opportunities arise to assist in the development of particularly promising technologies that we should not pass up. If the process for businesses to get technologies tested and approved it should reduce pressure on the funding organizations.

Even if an approach is approved for use there is no guarantee it will be adopted by oil spill response organizations. In Alaska, the largest spill response organizations are industry supported consortiums. This gives an advantage to industry supported developments and makes it a bit more difficult for outside industries to break into the field. I suspect that this is one of the reason there has been more interest in developing dispersants versus developing solidifiers.

In conclusion there are some issues that we cannot deal with, such as the fact we are working with a toxic substance, and others that we can, such as improving the process for getting new technologies adapted. We must remember that spill response is conducted by a large number of small businesses. The decentralized approach limits the technologies that can be afforded. Oil spill response organization cannot afford to purchase and maintain high end technologies like spill surveillance aircraft with cutting edge technologies that many other countries operate. To pur-

chase and operate highly specialized equipment would best be done by a national spill response group. This could be a duty of NOAA, MMS, or U.S. Coast Guard.

Transitioning of newer technologies could be made easier by developing a clear set of standards that equipment must meet, providing facilities that provide testing opportunities, and clearly outlining how to take advantage of spills of opportunity, or better yet develop field testing opportunities through controlled releases or potentially using natural seeps.

It is important that research is coordinated. Currently this is primarily done informally by looking for opportunities to partner with other organizations for funding projects and sharing research plans. The Interagency Coordinating Committee for Oil Pollution Research, which was formed under the Oil Pollution Act of 1990, has increased its activity, even before the current spill, but hasn't reached the point where they have a research plan that helps to guide the efforts of the member agencies.

It is important to renew funding opportunities. Additional funding should go through organizations that can bridge the worlds of science and spill response. MMS, U.S. Coast Guard, Coastal Response Research Center/NOAA, and the Oil Spill Recovery Institute all are organizations that have established that bridge. It is also important to realize that there are regional differences in spill response needs that should be accounted for when funding new research.

Senator CANTWELL. Thank you very much.

Ms. Sarthou.

Ms. SARTHOU. Thank you, Senator——

Senator CANTWELL. Is that right? I got Dr. Pegau's name wrong the first time, so I want to make sure. Is it Ms.——

Ms. SARTHOU. Sarthou.

Senator CANTWELL. Sarthou——

Ms. SARTHOU. It is Sarthou.

Senator CANTWELL. Thank you very much.

STATEMENT OF CYNTHIA SARTHOU, EXECUTIVE DIRECTOR, GULF RESTORATION NETWORK

Ms. SARTHOU. My name is Cynthia Sarthou, and I am Executive Director of the Gulf Restoration Network or the GRN, which is a 15-year-old environmental advocacy organization exclusively focused on the health of the Gulf of Mexico.

And I have to say, at the beginning of my testimony, that in talking to some people from Alaska, the experience in the Gulf of Mexico may be slightly different than that of Alaska, possibly because they suffered the *Exxon Valdez* and there was some recognition of a potential disaster.

Throughout my tenure with the GRN, I have tried to monitor the efforts of the work of the MMS, and much of my research and focus has been on the MMS. And during that period of time, we've seen a lot of research on many things, none of which have been technology development for purposes of oil-spill response.

I have not worked on the Coast Guard as much, so I don't know quite where their status was, but my experience with this spill tells me that there has been very little research done by them as well, in the long term, on how to effectively respond to an oil spill.

This despite the fact that oil spills are relatively common in the Gulf, which is why I'm kind of surprised that anybody would need to create a spill in order to do research.

We have had over 167 spills in the last 10 years of 50 barrels or more, which is 2,100 gallons, and 58 larger spills of 10,000 gallons or more, plenty of opportunity for, I think, efforts to use new oil-spill technologies.

Of course, the failure, I believe, to really press for oil-spill technologies may lie in MMS and the Federal Government's acceptance of the oil industry's, I guess, position that a large spill was actually technically impossible because they were too far advanced in their technology to ever let it happen, an assumption that I think we have found, by this disaster, to be false.

What has become very clear from day one of the BP Horizon disaster is that there has been a total failure of MMS, the Coast Guard, the oil industry or even Congress, for that matter, to invest in research and development to improve oil-spill-response capabilities.

The OPA required that that research occur. It was never fully funded and has never gone forward, and although MMS has spent millions of dollars annually on research, most of that research has focused on the effectiveness of booms, skimmers and burns, such as the best possible weather conditions to use those measures and the extreme difficulty in capturing and stopping oil from blowout preventer failures in deeper waters. Few studies looked at the existence and effectiveness of new response technologies.

As a result, the response to the BP Horizon disaster has involved the inadequate technologies used during the *Exxon Valdez,* with the exception, I now learn, of burning, which, although potentially effective in capturing oil, carries its own consequences, including burning turtles alive and releasing VOCs, et cetera, into the air, which are now getting complaints from some people on land who are trying to figure out why certain things are dying because of potential acid rain.

Technology that has been allowed has not really stopped the spread of oil throughout the waters of the Gulf and onto state beaches and coastal wetlands, and, as you pointed out, that's not to say that there aren't potential technologies out there.

We alone received hundreds of calls from people after the spill asking us why they were not allowed to deploy these technologies, despite the fact that these technologies had been approved in Delaware, after a spill, that they had been approved for Santa Barbara's use in Santa Barbara.

Many of those, I might add, were bioremediation technologies that would have broken down the oil, and, from what I heard today of the Coast Guard's testimony, it seems like none of those technologies are moving forward. Most of what is moving forward are technologies for viewing or determining where the oil is or how to better find it or, you know, additional or new skimmers.

An additional complaint that I have to tell you I've heard from entrepreneurs is if you don't know a Governor or somebody at high levels of government, you are not getting your technologies to go through.

Now, I haven't been able to verify that, but I will tell you that two of the technologies I've heard tested were Kevin Costner's technology and the Whale, both of which got a lot of PR and seemed to have a lot of politics behind them.

Additionally, even with regard to existing technologies, the Coast Guard and the oil companies have not had sufficient of those technologies in place before this spill to address a worst-case scenario, despite the fact that many of the plans, if you look at them, by the

oil companies showed that expected worst-case scenario could be from 300,000 gallons a day, in one instance, which was pretty surprising, we found it, but most of them were 30,000 gallons a day, but, nonetheless—or 30,000 barrels a day.

So, nonetheless, it was predicted that there could be significant releases of oil from deep-water drilling, and when we look, none of that equipment was actually deployed in the area or stockpiled in the area for very quick response. So, I mean, our, I think, conclusion from that, and possibly yours, is that they clearly weren't ready for a disaster.

My testimony also speaks to the absolute failure in this response to allow public access to information. We have had significant trouble getting any of the data. We have had a 3,000-foot limit on our aerial deployment to try to monitor what's going on, despite the fact that they can't tell us what the real safety concern is.

The Coast Guard recently put in a 65-foot barrier to any response. They subsequently lifted it for the press, but still are not allowing scientists within that 65-foot area. So we're not having an ability to really see or monitor the impacts.

And the other issue which—I know I need to stop—is that on animal rescue, some of the groups that have the most expertise on animal rescue have, in fact, not been allowed to actually get engaged or to even give advice on it.

So we're being told things like we cannot capture an oiled bird that can still fly, despite the fact that scientists are telling us that they can do that. It's just that the people who are doing it don't know how.

So I thank you for allowing me to testify.

[The prepared statement of Ms. Cynthia Sarthou follows:]

PREPARED STATEMENT OF CYNTHIA SARTHOU, EXECUTIVE DIRECTOR, GULF RESTORATION NETWORK

I am Cynthia Sarthou, the founding Executive Director of the Gulf Restoration Network. I have been working on ocean and coastal issues for over three decades, with the last xx years spent in the Gulf. The Gulf Restoration Network or GRN is a 15-year-old environmental advocacy organization exclusively focused on the health of the Gulf of Mexico. Our mission is to unite and empower people to protect and restore the natural resources of the Gulf for future generations. Our primary efforts have focused on ensuring healthy waters, protecting and restoring coastal wetlands, and defending marine fisheries and ecosystems. Our board members hail from all five Gulf States.

Since our founding in 1994, the GRN has followed activities related to oil and gas development in the Western and Central Gulf of Mexico, attending hearings and filing comments. Throughout that time period, I continually heard from representatives of the Bureau of Ocean Energy Management, Regulation, and Enforcement, ("BOEMRE") formerly the Minerals Management Service ("MMS"), and various oil companies that my concerns about the potential impacts to marine species and habitats from oil and gas exploration and development were negligible. The reason given was generally that the industry was so far advanced in its technological ability and its technology so fail safe that a major accident could never happen. As the BP drilling disaster has shown all too clearly, they were wrong.

I. Research and Development and Its Effectiveness in Preparing for the BP Horizon Disaster

What has been equally evident is that BOEMRE failed, as did Congress, to invest in research and development intended to improve oil spill response capabilities because of their belief that an oil spill of any significant magnitude was improbable. As a result, the response to the BP *Horizon* disaster has involved antiquated technologies, such as skimming, burning and the use of dispersant. Because of this lack

of preparedness a significant amount of oil has spread across the waters of the Gulf and onto Gulf state beaches and coastal wetlands.

After the *Exxon Valdez* spill in 1989, the Minerals Management Service (MMS), the Coast Guard and NOAA, had reason to believe that research into oil spill response technology was necessary to improve oil spill response efforts. In fact, Section § 2761 of the OPA established the Oil pollution research and development program. However, monies needed to support the research under Section 2761 were not appropriated.

Since 1995 the MMS has spent between $6 and $7 million annually on research,[1] however, little, if any, of that research focused on developing new oil spill response technologies that could more safely and effectively contain oil either at the surface or subsurface. The MMS did conduct research on the effectiveness of booms,[2] burns,[3] dispersants[4] and skimmers,[5] looked into the best possible weather conditions to apply the respective measures,[6] published many studies showing the extreme difficulty in capturing and stopping oil spills from blow out preventer failures in deep depths, and researched the formation of subsea oil plumes. However, even though dispersants are an approved method of addressing oil spills, neither the MMS nor EPA has completed research regarding the long-term impacts of chemically dispersed oil on the marine ecosystem. Yet, in response to the BP Drilling Disaster, they have approved the application of approximately 2 million gallons of dispersant—the largest amount applied in U.S. history. Additionally, the MMS has not required that oil companies have sufficient amounts of other existing oil spill technologies in place to respond to a worst-case scenario oil spill. Instead, the MMS trusted oil companies to have the resources available and in place. As the BP *Deepwater Horizon* disaster illustrates, the companies are grossly unprepared to deal with a spill the magnitude of the current disaster.[7] If the companies had sufficient booms and skimmers in place prior to the BP-*Deepwater Horizon* disaster, they could have prevented more of the oil from spreading along the Gulf coast.

While the MMS did conduct research into certain aspects of oil spill response technology, the response to the BP *Deepwater Horizon* disaster illustrates that BOEMRE failed to complete necessary research on or support development of new oil spill response technologies. Our research has revealed that BOEMRE has received little, if any, funding to verify the effectiveness of technologies developed by the private sector to address oil spills or support research and development of more effective oil spill response technologies. This is not to say that technologies have not been developed. GRN's staff received hundreds of calls and e-mails, as did BP and all of the state and Federal agencies involved, pressing for the use of new oil spill response technology. However, because there had been no research and approval of these technologies prior to the BP disaster, the agencies were faced with the impossible task of trying to effectively sort out the truly effective technologies, approve and begin use of them to address oil already spewing from the BP Horizon well. With the exception of the higher profile media worthy technologies, such as that pressed by Kevin Costner, this led BP and the Coast Guard to simply revert to the

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[1] Le, Phuong. "Little Money, Study Devoted to Oil Spill Cleanup Technology—*The Boston Globe*." *Boston.com.* 27 June 2010.Web.<*http://www.boston.com/news/science/articles/2010/06/27/little_money_study_devoted_to_oil_spill_cleanup_technology/*>.

[2] Air Jet Atomization and Burning of Oil Slicks, S. L. Ross Environmental Research Limited, 1991. *http://www.mms.gov/tarprojects/152.htm* (see also Technology Assessment and Concept Evaluation for Alternative Approaches to In-Situ Burning of Oil Spills in the Marine Environment, Final Project Report, Marine Research Associates, North Stonington, Connecticut, September 1998. <*http://www.mms.gov/tarprojects/291.htm*>).

[3] S.L. Ross Environmental Research, Ltd., and Applied Fabrics Technologies, Inc., The Effect of Buoyancy to Weight Ratio on Oil Spill Containment Boom Performance, Final Report, May 2003. <*http://www.mms.gov/tarprojects/457.htm*> (see also Screening Test for Fire Resistant Booms in Waves and Flames, SL Ross Environmental Research, Ltd, April 1998. <*http://www.mms.gov/tarprojects/244.htm*>).

[4] *Identification of Window of Opportunity for Chemical Dispersants on Gulf of Mexico Crude Oils*, November 2007, By Randy Belore, S.L. Ross Environmental Research Ltd., Ottawa, ON, Canada <*http://www.mms.gov/tarprojects/595.htm*>.

[5] Investigation of the Ability to Effectively Recover Oil Following Dispersant Application—Final Report, SL Ross Environmental Research Ltd., 21 pp., December 2007. <*http://www.mms.gov/tarprojects/589.htm*>.

[6] *See Identification of Window of Opportunity for Chemical Dispersants on Gulf of Mexico Crude Oils*, November 2007, By Randy Belore, S.L. Ross Environmental Research Ltd., Ottawa, ON, Canada <*http://www.mms.gov/tarprojects/595.htm*>.

[7] <*http://www.gomr.mms.gov/PI/PDFImages/PLANS/29/29977.pdf*> (page 7–1) (BP's exploration plan stating that they could address a 300,000 barrel a day spill); *http://www.gomr.mms.gov/PI/PDFImages/PLANS/25/26601.pdf*> (see page F 1) (Shell claiming that they can respond to an oil spill of 80,000 barrels per day).

less than effective, but better known, techniques of booming, skimming, burning, and dispersing.

If MMS had fulfilled its duty to increase the effectiveness of oil spill response technology, more oil would have been captured near the site of the blowout and the impacts associated with the *Deepwater Horizon's* would probably be much less severe.

II. Public and Scientist Involvement in Federal Government Response

The Federal Government's response efforts have largely excluded members of the public and the independent scientific community. From the beginning, even obtaining information about response planning and deployment of equipment and manpower has been difficult. Additionally, the FAA imposed a 3,000 foot requirement on all over flights, which severely limited monitoring of response efforts or verification of impacts to coastal barrier islands and the like. Similarly, the Coast Guard recently issued a rule prohibiting the public from coming within a "safety zone" which encompasses 65 feet of any response vessels or booms on the beach or the water.[8] The Coast Guard recently modified the rule to allow representatives of the press to obtain credentials that allow them within the safety zone.

Although Administrator Jackson and Secretary Lubchenco have met with local groups throughout the Gulf to discuss their concerns, the knowledge of local organization's on existing contamination or others issues that could affect water sampling have not been solicited or incorporated into sampling plans. Equally concerning, EPA and NOAA have not required BP to make the monitoring data that they have collected available to the public. This significantly impairs the ability of independent and academic scientists to perform detailed analyses of the impacts of this disaster.

Similarly, in bird rescue efforts, private non-governmental organizations, such as the Wildlife Rehabilitation and Education Center (Texas), although having significant experience with the rescue of brown pelicans and other birds, have been excluded from the rescue process efforts. These groups have asserted concerns that there has been no effort by the U.S. Fish and Wildlife Service (USF&WS) and BP's contractor, Tri-State Bird Rescue & Research (Tri-State), to share best techniques, discuss innovative approaches, and realistically evaluate changing needs and breakdowns in the effort. Similarly, the U.S. F&WS and Tri-State rescue team currently lacks input from the non-profit groups and rescuers with the most extensive field rescue experience on the most-refined field capture techniques. As a result, there is a concern that bird mortality is higher than it might otherwise have been.[9]

Conclusion

To ensure that the Bureau of Ocean Energy Management, Regulation, and Enforcement and the Coast Guard are better able to address the next major oil spill, they must greatly expand their support of research and development and push the oil industry to adopt the best possible oil spill response technology. The Congress must greatly increase the funding available for necessary research into the efficacy and environmental impacts of developing technologies. Moreover, oil companies should be required to invest significant monies on: (1) production of oil spill response equipment, including the construction of "caps" and the like needed to stop the release of oil from deepwater wells should a blowout occur, in advance and have them at the ready in each region, and (2) oil spill response technology research and development to ensure that we move into the twenty-first century in terms of our response capability.

Finally, national contingency planning for oil spills must incorporate better methods for involvement of the public and independent scientists in oil spill response activities.

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[8] *See* Appendix A: Times Picayune Editorial, July 5, 2010.

[9] *See* Appendix B; Letter to Acting Director Rowan W. Gould from the Atchafalaya Basinkeeper, Gulf Restoration Network, Lake Pontchartrain Basin Foundation, Louisiana Environmental Action Network, Lower Mississippi Riverkeeper, and Natural Resources Defense Council (July 14, 2010) (attached).

APPENDIX A: EDITORIAL ON COAST GUARD "SAFETY ZONE"

IS THE COAST GUARD WORKING FOR THE PUBLIC OR BP? AN EDITORIAL

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Editorial page staff, *The Times-Picayune*

The Coast Guard says that *rules aimed at keeping the public and news media away from the oil spill response* are necessary to protect the environment and the people and equipment involved in the cleanup.

But the new "safety zone" that the agency has set up within 65 feet of any response vessels or booms on the beach or the water mostly protects BP from bad PR.

Since booms are often placed more than 40 feet outside of islands or marsh grasses, this additional buffer will make it difficult to document the effect of oil on the land or wildlife.

That's not in the best interest of the Gulf Coast. Reporters and photographers, including those who work for *The Times-Picayune,* serve a vital function in documenting the disaster and the response.

This decision isn't the only one that has hampered media coverage of the *oil spill.* The Federal Aviation Administration has ordered that no media flights to photograph the spill can go below 3,000 feet without special permission.

Coast Guard Admiral Thad Allen, national incident commander for the spill, said that the safety zone restrictions are not unusual. He said BP didn't bring up the issue, but that local officials in Florida and elsewhere had raised safety concerns.

But plenty of local officials understand the need to inform the public. "Anytime you all want, you all can come in there wherever we go on our boats," Plaquemines Parish President Billy Nungesser told reporters.

At this point, the Coast Guard has not justified its position. In fact, its reasons keep changing. First the restrictions were needed to protect civilians. Now the claim is that workers and equipment are at risk. But what's clearly at risk is the public's right to know, and that deserves protection, too.

APPENDIX B: LETTER TO FISH AND WILDLIFE SERVICE

Atchafalaya Basinkeeper, Gulf Restoration Network, Lake Pontchartrain Basin Foundation, Louisiana Environmental Action Network, Lower Mississippi Riverkeeper, and Natural Resources Defense Council

July 14, 2010

Acting Director ROWAN W. GOULD
U.S. Fish and Wildlife Service
Washington, DC.

Dear Acting Director Gould:

The undersigned groups write to express our concerns about several elements of the ongoing response to the BP drilling disaster. Our concerns stem both from the efforts to clean-up the oil on barrier islands and areas used by birds as rookeries and our concern that little is being done to rescue fledglings from nests abandoned by oiled birds.

First, we have received reports from volunteers monitoring response efforts that cleanup crews are negatively impacting nesting areas. For example, cleanup crews working on islands off the Louisiana coast crushed nests and eggs of birds nesting on that island. Similarly, crews on beaches have been disturbing least tern nests along the water edge and, at times, crushing or otherwise endangering fledglings.

In relation to beaches, the environmental/conservation community are willing to work with USFWS to establish a beach steward volunteer program. These volunteers could help to flag and then monitor beach-nesting bird colonies, educating contractors and other people about the risk to the birds and the need to not encroach on colonies. Of course, to be effective, beach stewards would need either some authority to interact with/direct BP contractors, or would need to simply document and report encroachment on colonies, preferably directly to Louisiana Department of Wildlife and Fisheries (LDWF) biologists in Joint Incident Command (JIC). The state of Louisiana has maps of the colonies, and has indicated a willingness to have this kind of help. Although we understand that USFWS has indicated an interest in getting a beach steward program, this effort appears stalled. *Forward movement must occur quickly, as time is of the essence if we are to ensure maximum action to protect nesting birds*.

Additionally, there must be improvement in communication from JIC to BP field supervisors regarding this issue—supervisors must be trained to recognize risks and better control access to dune and back beach areas by their workers. This will only occur if Department of Interior directs BP to make training available and take the necessary action to reduce interactions between cleanup crews and nesting birds.

Second, while efforts are being made to rescue adult oiled birds; similar attention is not being paid to abandoned fledglings. We have the following suggestions for action that can be taken to increase survival of oiled birds and fledglings:

1. *Evaluation Teams*: Small evaluation teams should be formed in each state to assess, at least weekly, the oiled bird situation in the field and recommend improvements to the field rescue effort. The teams should consist of one lead person from IBRRC, USFWS, the appropriate state wildlife agency (*i.e.,* LDWF) and one or two individuals from uninvolved NGO's with experience in wildlife rescue. . These teams should focus on sharing best techniques, discussing innovative approaches, and realistically evaluating changing needs and breakdowns/logjams in the effort, not critiquing past efforts.

2. *Oiled Bird Capture Experts with the most Field Experience Should Guide/Provide Training*: The field rescue team currently lacks input from the non-profit groups and rescuers with the most extensive field rescue experience, who likely know the most refined field capture techniques. USFWS has asked that International Bird Rescue and Research Center (IBRRC) conduct classroom training for incoming field rescue personnel from USFWS and LDWF. Having IBRRC provide this requested basic training, and including a field training rescue component to demonstrate the more effective techniques that they employ should improve the rescue effort. (*E.g.,* IBRRC has methods of baiting birds that allow them to draw birds out of a colony so that they can single out the oiled birds and capture them without risk to the nestlings in the colony.

We recognize that the professionals involved are caring and doing difficult work under trying conditions. To improve this difficult environment and strengthen the efforts of USFWS we recommend decreasing territoriality among the various agencies/organizations, while also providing training, enhancing communication, boosting teamwork and supplying expert oversight where appropriate.

3. *Increase Efforts to Rescue Orphaned birds*: USFWS personnel routinely capture and band all fledgling chicks, including royal terns, pelicans and others, on colonies. However, currently little effort is being made to monitor colonies at night to identify nests not incubated by an adult pelican. The orphaned chicks could then be collected and forwarded to available rescue centers. There is likely much more mortality of adults than we are seeing through the rescue effort, and there needs to be more effort to identify orphaned chicks and forward them to centers that have the capacity to rear and release orphaned chicks. If orphaned chicks are not heavily oiled and may have better survival rates than oiled birds, this may be an effort that helps at more of a population level. If a lack of personnel for night monitoring is a problem, experienced volunteer rescue groups could be drafted for this purpose.

4. *Rehabilitated Chick-rearing*: Many chicks have been rescued and rehabilitated, and need to be raised on islands until they are ready to fledge in the presence of wild birds. Standard practice is to put them on a grassy island that is not a nesting colony, feed them, and allow them to begin to follow wild pelicans as they are ready.[10] Planning for this type of release has been ongoing for most of a month with little result. This is a serious logjam, and holding these chicks too long is not improving their odds of surviving and fledging well. We understand that concerns about where to raise the chicks is the central obstacle. For example, we understand that Louisiana has stated a preference for rearing chicks on Louisiana islands, because adults tend to return to nest on or near the islands from which they fledged. At this point we feel that the central consideration in choosing the location should be protection from re-oiling. Given the oil now reaching Florida, locations in far-western Louisiana or Texas would seem to make sense from the standpoint of increasing the likelihood that these birds would not be re-oiled. Whatever site is chosen, there are several experienced rehabilitation groups that are well-qualified to handle the on-site

[10] There is precedence for this type of rearing and release from the Louisiana Brown Pelican restoration plan from the 1970s, and this technique was also used successfully to rear and release 250 pelican chicks in 2005 after the Breton Island oil spill. This technique results in comparable survival rates to naturally-reared pelican chicks.

rearing process. These groups should be identified and subcontracted through the current lead rescue groups as appropriate.

5. *Improvement Needed to Oiled Wildlife Hotline*: This hotline functions, but does not inspire confidence in callers. The hotline is located in Houston, TX, and is run by BP. Many of the operators do not speak English very clearly, and none of them are familiar with birds or the areas from which oiled birds are being rescued. This results in a need to repeat all information very clearly, several times, and to spell the names of every bird, usually several times. Also, operators seem to be following a script, resulting in them repeatedly asking where the nearest town or city is, and at what intersection a bird is located. The process is causing increasing concern for people calling in to the hotline.

We concede that the information does go directly to a wildlife biologist in Joint Incident Command, and is relayed to a field team that goes to the site and evaluates the rescue potential for the bird. So, the system seems to work. But the communication difficulty has caused concern about whether reported birds will actually be rescued.

This problem could easily be solved by putting local people, or birders, in the call centers. There are many potential volunteers through Audubon and other bird advocacy groups who may be able to fulfill this function. At the very least, someone with good knowledge of the landscape and birds should be assigned to each of the centers. Further, the script being used by operators must be re-evaluated and more training given to operators to make the process of collecting information more efficient. Large, well-labeled maps in the centers might also help.

Third, I understand that all birds are being banded prior to release. However, rehabilitation is expensive, survival studies are few, and the oil in this spill has weathered more than most before it hits shore. We should take advantage of the opportunity to learn more about survival for future oil spills. Color-marking Brown Pelicans is a logical first effort, as they are most commonly captured and should return to areas where they could be more easily re-sighted next year. As Laughing Gulls are also being rehabilitated in large numbers, they too would be a logical choice as a second study species using color-banding. We should also be working in advance to design studies to look at survival of migratory shorebirds, since little is known about how they survive oiling. The study plan should specify how survival will be estimated, and frequency of re-sighting efforts, if color-banding studies are the method of choice.

Conclusion

While we recognize the many pressures imposed on the USFWS by the ongoing disaster, we believe that through implementation of the above suggestions and more effective use of well trained volunteers, more birds can be saved. We request that the actions/approaches suggested above be implemented immediately to increase the protection of both adult birds and chicks. We would appreciate a written response to this letter. Moreover, if you have questions or concerns, please contact us to set up a meeting. We would like to have an opportunity to meet with you to discuss our concerns and suggested solutions.

Sincerely,

DEAN WILSON,
Atchafalaya Basin Keeper.

CYNTHIA SARTHOU,
Executive Director,
Gulf Restoration Network.

JOHN A. LOPEZ, Ph.D.,
Director—Coastal Sustainability Program,
Lake Pontchartrain Basin Foundation.

RICHARD BRYAN, JR.,
Vice President,
Louisiana Audubon Council.

MARYLEE ORR,
Director,
Louisiana Environmental Action Network,
Lower Mississippi Riverkeeper.

LISA SPEER,
Director of Ocean Programs,
Natural Resources Defense Council.

BARRY KOHL,
Vice Chair,
Sierra Club Delta Chapter.

Senator CANTWELL. Thank you very much.
Dr. Kinner. Thank you for being here.

STATEMENT OF DR. NANCY E. KINNER, CO-DIRECTOR, COASTAL RESPONSE RESEARCH CENTER, AND PROFESSOR OF CIVIL/ENVIRONMENTAL ENGINEERING, UNIVERSITY OF NEW HAMPSHIRE

Dr. KINNER. Chairman Cantwell, Ranking Members Snowe and distinguished members of the Committee, thank you for giving me the opportunity to appear before you today.

My name is Nancy E. Kinner, and I am a Professor of Civil and Environmental Engineering in the Environmental Research Group at the University of New Hampshire, and I am the UNH Co-Director of the Coastal Response Research Center.

The center is a partnership between NOAA's Office of Response and Restoration and the University of New Hampshire. It acts as an independent, honest broker to oversee research on oil-spill response and restoration and serves as a hub for the spill-response R&D community.

In my testimony that I have submitted for the record, I discuss several products created during center-funded research that are being used in the *Deepwater Horizon* spill, including the Environmental Response Management Application, ERMA, which manages and displays information about the spill to responders, and, now, to the public.

Today, I will focus on what I see as the major obstacles impeding transformation of spill response and restoration research into practice and possible solutions going forward. The first and most significant obstacle is that there has not been enough funding to address oil-spill R&D needs.

The two pieces of proposed legislation that accompanied Chairman Rockefeller's invitation to speak before you today, and a number of other bills pending before Congress, address Federal spill R&D and would markedly increase the amount of funding available.

Unfortunately, technology development is often very time consuming and costly, and most R&D funding ends before the technology becomes part of standard practice.

Compounding this, oil spills are relatively infrequent and the payback on a commercial venture is a very long process, if it ever occurs.

The key is to ensure that the R&D funding is authorized and is consistent and long term and does not follow a boom-and-bust cycle similar to the one that occurred after the *Exxon Valdez,* when much of the money was never appropriated and certain key response agencies did not receive an annual R&D budget for spill-response research.

Put simply, response research and development must be conducted to develop new and enhanced approaches to spill response and restoration so that we can limit the impacts of future spills when they occur. In order to reap the benefits of that R&D, we must provide consistent and sufficient funding.

Second, R&D needs must be identified by more than Federal agencies involved in spill response and restoration. For example, workshops should be held on spill-related topics to identify R&D needs and develop research plans to address them. These work-

shops should include stakeholders from Federal and state agencies, industry and NGO's, as well as international entities.

Once the research plans are established, the funding entities must work together to coordinate which projects each one will fund, sharing the findings produced and identifying new R&D needs when they arise. This kind of extensive coordination must occur among the spill-response community to prioritize research and translate that research into practice.

Third, while R&D can develop solutions to address a variety of oil-spill response and restoration issues, there is always a problem adapting these technologies to specific spill scenarios and local environmental conditions.

While there must be some direct investment in site-specific technologies, the better overall approach must be to build flexibility into a technology, so that it can be developed and rapidly adapted and deployed.

Fourth, it is important to address spill-related human dimensions R&D issues, most of which have been largely ignored. Topics such as risk communication, valuing natural resources and social impacts are always major factors in spill-response and restoration.

One major problem is the frequent disconnect between the metrics used by responders and those used by the public to judge success of a cleanup. Seeking a consensus on these metrics for success must be addressed as part of spill-response planning and preparedness.

Fifth, it is critically important that the research undergo rigorous peer review and be widely available to maximize its ability to improve spill response and restoration.

Finally, as the discussions and activity surrounding R&D evolve in the wake of the *Deepwater Horizon,* there must be coordination among all of the stakeholders and funding entities, if we are to avoid duplicating efforts, overlooking critical R&D needs and having valuable research results sit on the shelf.

In summary, I believe we do have a chance to overcome the problems conducting and implementing R&D that have occurred in the 20 years since OPA 1990 became law, but, in order to do this, we must coordinate our efforts to make it happen.

Thank you for giving me this opportunity to speak before you today. I would be happy to answer any questions.

[The prepared statement of Dr. Nancy Kinner follows:]

PREPARED STATEMENT OF DR. NANCY E. KINNER, CO-DIRECTOR, COASTAL RESPONSE RESEARCH CENTER, AND PROFESSOR OF CIVIL/ENVIRONMENTAL ENGINEERING, UNIVERSITY OF NEW HAMPSHIRE

Chairman Cantwell, Ranking Member Snowe, and distinguished members of the Committee on Commerce, Science, and Transportation's Subcommittee on Oceans, Atmosphere, Fisheries, and Coast Guard, thank you for the opportunity to appear before you today on behalf of the Coastal Response Research Center and the Environmental Research Group at the University of New Hampshire. My perspective on the use of the applied research during the *Deepwater Horizon* (DWH) spill response, and obstacles that impede transforming research results into practice, is highly influenced by my work with the Coastal Response Research Center (CRRC). In order to make that perspective clear, I will first give you an overview of the Center's history, mission, activities and its approach to oil spill research and development (R&D).

1. Overview of Coastal Response Research Center

In 2002, NOAA's Office of Response and Restoration (ORR) became increasingly aware of the lack of oil spill R&D in its areas of primary responsibility: fate and behavior of spills and their impacts on natural resources and human activities. ORR recognized the role that a research university could play in addressing these needs, and started working with the University of New Hampshire to address this problem. The CRRC (*http://www.crrc.unh.edu*), a partnership between NOAA ORR and the University of New Hampshire, was created to address the need for improved spill response and restoration. The Center oversees and conducts independent research, hosts workshops, and leads working groups that address gaps in oil spill research in order to improve response, speed environmental recovery, and reduce the societal consequences of spills. In 2004, the partnership was codified by a memorandum of agreement between the University of New Hampshire and NOAA. CRRC acts as an independent, non-partisan entity to bring together members of the oil spill community, as well as those in relevant fields outside the spill community, including industry, local stakeholders, and state, Federal and international agencies to address the many technical, economic, social, and environmental issues associated with oil spills in marine environments. Funding for the Center has been largely by Congressional appropriation (Table 1) with some allocations from ORR's base budget.

Table 1.—CRRC Funding History

Fiscal Year	Appropriation	Grant to UNH	[Other funding; specify]
2002	$750,000	$701,997	
2003	$750,000	$714,580	
2004	$2,000,000	$1,978,955	
2005	$2,000,000	$1,694,312	
2006	$3,000,000	$2,481,900	$75,000 (Marine Debris/NOAA, ORR)[1]
2007	$1,800,000	$1,435,249	
2008	0	0	$49,000 (eSCAT/NOAA, ORR)[1] $60,000 (ERMA®/NOAA, ORR)[1] $36,000 (In-situ/API)[2] *$145,000 (2008 Subtotal)*
2009	0	0	$25,000 (Workshop/ExxonMobil)[2] $63,000 (Workshop/NOAA OCRM)[3] $162,000 (ERMA®/NOAA, ORR)[1] *$250,000 (2009 Subtotal)*
2010	0	$200,000	$220,000 (ERMA®/for Gulf/NOAA)[1] $30,000 (eSCAT for Gulf/NOAA)[1] $65,000 (NOAA, OCRM)[3] $139,000 (NOAA, ORR)
TOTAL 02–10	*$10,300,000*	*$9,206,993*	*$924,000* ($139,000 for CRRC's Direct Oil Spill R&D Use)

[1] eSCAT and ERMA® funding is primarily for the UNH Research Computing Center to work on computer programming. Marine Debris funding was for an Environmental Research Group project.
[2] $61k to the Center for Spills in the Environment from API ($36k for In Situ Burning) and $25k from Exxon Mobil for partial support of the 2009 R&D Workshop).
[3] Funding for workshop on Ocean Thermal Energy Conversion (OTEC) from NOAA OCRM—not oil spill related.

The Center is served by a multi-agency advisory board, comprised of members from U.S. EPA, NOAA, USCG, state-based R&D programs, and industry that provide guidance on program direction. The board, in conjunction with the UNH and NOAA co-directors, developed five objectives for CRRC: (1) funding and oversight of relevant, peer-reviewed research that is able to be developed into practical improvements in oil spill response; (2) hosting topical workshops and working groups that include representatives of all spill community stakeholders to focus research efforts, and ensure that crucial real-world experience from oil spill practitioners is considered; (3) educating the next generation of spill responders through outreach and support of undergraduate and graduate student projects; (4) involving members of the international oil spill community to tap into expertise from around the world; and (5) develop response tools to aid responders.

Funding of relevant, peer-reviewed research is accomplished through a periodic request for proposal (RFP) process. Proposals are reviewed by three to four experts in the area of the proposed research. They are ranked by their scientific validity and

how well they address key research needs related to the fate, behavior and effects of oil in the environment, and is likely to lead to practical improvements in oil spill response and restoration. A panel of leading scientists and practitioners then review the peer-reviewed and ranked proposals and recommend which should be funded. Each funded research project is assigned a NOAA liaison to ensure the research can be transformed into practice, and, in addition, CRRC's Science Advisory Panel meets annually to review progress of the research and provide feedback to improve the quality and efficacy of the research.

2. Use of Applied Research Available and Implemented During DWH Incident

There are numerous examples of information and technology created during applied oil spill R&D being used during the DWH incident. I will highlight a few that CRRC has been involved with.

A. CDOG/GNOME Model Linkage

One of the first projects that the Center funded was conducted by Dr. Poojitha Yapa of Clarkson University. Dr. Yapa developed a computer model to predict the fate and behavior of oil and gas as it rises to the surface from a deepwater well blowout. The development of the Clarkson Deepwater Oil and Gas (CDOG) model was funded by the Minerals Management Service (MMS). NOAA's Office of Response and Restoration (OOR) uses its GNOME model to predict the fate and behavior of oil in surface water. A key issue, identified by NOAA modelers, was the inability to input data from the CDOG model into the GNOME model. This link is essential to the understanding of the fate, behavior and trajectory of the oil from a leaking deepwater well, as well as developing impact predictions (*i.e.,* where the oil from a leaking deepwater well would appear on the surface and what resource it would potentially impact). With this information, responders can determine the best response strategy to protect these critical resources. During the DWH response, ORR modelers used the CDOG/GNOME predictions to generate daily trajectories for the Unified Command to aid in decision-making.

B. Environmental Response Management Application (ERMA®)

In the Spring of 2006, the Center began funding a collaboration between NOAA ORR scientists and UNH computer researchers to display spill related information in a graphical and user-friendly manner. Data visualization can increase situational awareness during a large spill, especially when many of the decisionmakers are in different locations (*e.g.,* for the DWH incident: Houma, LA; Mobile, AL; Tyndall, MS; St. Petersburg, FL; Washington, D.C.). In addition, it is important that the application is in a common format that allows most individuals to easily use it. The common way to display geographical data (referenced by its latitude/longitude) uses GIS software that requires special expertise and high-end computers to operate.

The NOAA/UNH collaboration resulted in the Environmental Response Management Application (ERMA®), a web-based platform that displays data (*e.g.,* spill trajectories, current and predicted wind direction and strength) on a map that is familiar to most people. In this way, data can be overlaid on a common geospatial grid (*e.g.,* the Gulf of Mexico) to see resources at risk of oiling, the predicted trajectory, and the assets available to protect oil from contacting the sensitive resources.

ERMA® is a good example of how a data management and visualization tool used in one field (wastershed management) can be applied to another (oil spill response) as a result of interactions between scientists and spill response practitioners. The method in which ERMA® evolved was crucial to its development and successful transfer from academia to the DWH Incident Command systems. In June 2006, after a very basic prototype was developed for Portsmouth, NH harbor. CRRC hosted a workshop that brought together Region I spill responders to demonstrate how ERMA® could aid in spill response. The workshop helped identify a team of practitioners who were willing to work with ORR and UNH researchers to develop a more detailed version of ERMA®. During the next several months, development continued, as did demonstrations of ERMA's® capabilities to various agencies and the private sector. EPA Region II then funded an ERMA® for the Caribbean which was fully developed and used in a spill exercise in 2009.

When the DWH blowout occurred, the base platform of ERMA® was used to create and populate a Gulf of Mexico ERMA (GOMEX ERMA) specific to the incident, and has been in use ever since. A public site (*www.geoplatform.gov*) was created, and much of the information is also available to the public.

C. Other Applied Research Being Used During the DWH Incident

CRRC facilitated a webinar the third week of June hosted by the Interagency Solutions Group (IASG) of the National Response Team (NRT). The purpose of the

webinar was to determine what data is available and being collected regarding the efficacy and effects of surface and subsurface dispersant use during the DWH incident. Over 70 representatives from Federal and state partners participated, and data was presented by USGS, USCG, NOAA, U.S. EPA, and DOE scientists and practitioners. Much of the data was being collected using techniques developed and modified for use in oil spills during the last decade (*e.g.,* Tier II/III SMART dispersant monitoring protocols, LISST particle counter, holographic imagery to determine particle size and distribution). While many of these tools are in use, they are not at a stage where the interrelationships among them and the ability to use their output in a quantifiable manner are possible. This is in large part because the resources to fund such research and development have not been available.

I would be remiss if I did not also acknowledge that as is typical during most prolonged environmental events, technology has also been developed and applied during the spill. Some noteworthy examples include the work of the Flow Rate Technical Group (FRTG) where members used mass balance, plume analysis, and nodal and reservoir analyses methods to estimate the flow of oil from the wellhead. Their work has refined the estimate of the size of this leak from its initial estimated 1,000 to 5,000 barrels/day (BPD) to the range of 35,000 to 60,000 BPD. Additional post-spill R&D will improve the ability to predict the flow and yield a more precise estimate. Another example is the Oil Budget tool being developed by USGS, NOAA, and the USCG which will help estimate the mass of oil that is naturally weathered (*e.g.,* evaporated, biodegraded, dispersed) as well as that mechanically recovered and chemically dispersed or burned. Again, the tool is a prototype and will need further development, testing, and refinement before it is part of the standard package of a response, but it is well on its way.

Obviously, it is not desirable to have to build tools or response/restoration technologies during a spill, but as has been demonstrated over history, "necessity is the mother of invention." This is especially true because oil spill R&D has been typically under-funded since the mid-1990s.

3. Obstacles that Impede Transformation of Research into Practice

There are several obstacles that impede the transformation of research results into practice, but the most significant among them is that much of the necessary oil spill response and restoration research is not funded. I was delighted to read the two pieces of legislation that accompanied the invitation from Chairman Rockefeller to speak before you today. The establishment of a Federal Oil Spill Research Committee and improvement of NOAA's, USCG's, and the coastal states' abilities to sustain healthy ecosystems through the spill preparedness, prevention, response, restoration, and research will help address the lack of adequate resources to do the R&D needed. As you clearly know, the existing R&D structure codified in OPA 90 has not been adequate to address the gaps in data, tools, and techniques that have been highlighted in the DWH incident and in many of the workshops the CRRC has held since 2003. (Table 2).

Table 2.—CRRC-led R&D Needs Workshops

U.S. Coast Guard Arctic Response—April 23, 2010
NRDA in Arctic Waters: The Dialogue Begins—April 20–22, 2010
Sea Grant and NOAA ORR Collaboration—January 25, 2010
Ocean Uses Atlas—January 12–14, 2010
Response to Liquid Asphalt Releases in Aquatic Environments—October 21, 2009
2009 Research and Development Needs—March 17–19, 2009
Oil Spill Modeling Working Group Meeting—September 16–17, 2008
Opening the Arctic Seas: Envisioning Disaster and Framing Solutions—March 18–20, 2008
HEA Metrics Workshop—December 4–6, 2007
Environmental Response Data Collection Standards—September 25–27, 2007
Modelers' Summit—June 26, 2007
Submerged Oil Workshop—December 12–13, 2006

Table 2.—CRRC-led R&D Needs Workshops—Continued

Innovative Coastal Modeling for Decision Support: Integrating Physical, Biological, and Toxicological Models—September 26–28, 2006
Toxicology Working Group Summit—August 15–16, 2006
Workshop on Research Needs: Human Dimensions of Oil Spill Response—June 13–15, 2006
Research and Development Needs for Making Decisions Regarding Dispersing Oil—September 20–21, 2005

In fact, the Center, in its workshop reports has outlined consensus R&D plans for dispersants, dispersed oil, submerged oil, modeling, Arctic response, National Resource Damage Assessment (NRDA), and human dimensions, as well as a 5-year overall R&D plan that includes proposals for oil forensics, geospatial data management, and spill response during disasters. These workshops have included participants from Federal, state and international agencies, NGO's, industry, academia, and private sector researchers. The issue is not identifying the needed R&D, but rather it is having the funds to support this work. The Center maintains five working groups (Table 3) that consist of members of oil spill R&D community. These working groups coordinate which agency funds specific R&D projects to help avoid duplication of effort and best use of scarce financial resources. In addition, these working groups help to disseminate results among practitioners and monitor which research needs have been addressed. The CRRC typically works in concert with other working group members to hold educational sessions at conferences such as Clean Gulf where practitioners meet to learn about recent developments in oil spill R&D. Some examples are found in Table 4.

Table 3.—CRRC-led Working Groups

Dispersants Working Group
Modeling Working Group
Submerged Oil Working Group
Toxicity Working Group
Ephemeral Data Working Group

Table 4.—Conferences Where CRRC Hosted/Co-Hosted 1/2 Day Technology Transfer Sessions for Practitioners

Conference	Date	Title of Session	Sponsors
Clean Gulf	November 17–19, 2009	Applied Research for the Spill Response Community	LOSCO, OSRADP, TGLO, and CRRC
Clean Gulf	October 28–30, 2008	Applied Research for the Spill Response Community	LOSCO, OSRADP, TGLO, and CRRC
International Oil Spill Conference	May 4–8, 2008	Efficacy and Effects of Dispersants in Oil Spill Response: Progress since the 2005 NRC Report	CRRC
Clean Gulf	November 15–16, 2007	Applied Research for the Spill Response Community	LOSCO, OSRADP, TGLO, and CRRC

Another key issue with R&D funding is that it follows a "boom and bust" cycle, usually centered only spurred by major oil spills. A large infusion of funding for oil spill preparedness, prevention, and response came after the *Exxon Valdez* in 1989, encouraged in part by implementation of OPA 90. While R&D funding was authorized and appropriated for USCG, MMS, and EPA, as well as the two Alaska regional citizen's advisory councils (RCACs) and the Oil Spill Recovery Institute (OSRI), the budgets have not grown commensurate with inflation, resulting in less R&D as time goes on. For example, the MMS full-scale oil spill research tank in Leonardo, NJ (OHMSETT) has run a number of equipment and training studies with mechanical recovery devices and dispersants. However, these tests are expensive and maintenance on such a facility is high. A fixed budget has diminished what can be tested at OHMSETT, and many research and development budgets cannot accommodate the costs of doing full-scale testing there, even though it would be desirable.

Technology transfer is an arduous process and is often very costly and time consuming. It requires linking the researcher and the end user together, so that the goals and capabilities of each party are identified clearly so that the technology can be best adopted to meet their final goals. It is not only the researcher who must continually modify and adapt, but often also the practitioner who begins to "see" the potential and weaknesses of the new technology and revises his/her understanding of its application. The CRRC addresses this by assigning NOAA liaisons to each funded project to help ensure the project remains focused on the end user. As with ERMA®, this may evolve into interactions with teams of end users as the technology matures. For example, several CRRC staff and students worked with NOAA Assessment and Restoration Division (ARD) scientists/practitioners to develop a field manual on acute toxicity data for polycyclic aromatic hydrocarbons (PAH), a common contaminant during release of oil to the environment. The information and format of the manual was presented to a cross-section of private sector and Federal and state end users on several occasions via webinar. Each time, the end users have excellent recommendations for improving the product, some of which were addressed in subsequent editions of the manual. The toxicity manual is currently being used as a source of toxicity information during the DWH incident because each data point included has met the most rigorous quality control standards (*i.e.,* the data have all been carefully validated) and it is in format available and useful to practitioners.

A significant obstacle to continued oil spill R&D is the infrequent nature of oil spills. The last major well blowout in the Gulf of Mexico was the IXTOC in 1979. In the interim, drilling and production technology for offshore oil and gas has grown tremendously and allowed work to proceed at water depths greater than 5,000 feet, tapping reservoirs many miles below the sea floor. R&D for the requisite response technology needed to address such a deepwater accident as the DWH has *not* occurred.

The Center is currently involved in organizing a series of meetings with a broad spectrum of stakeholders on the R&D issues identified during the DWH incident, using models we have used for similar topics in the past (*e.g.,* dispersants R&D workshops followed by working groups) including Federal, state, and local stakeholders, NGO's and the private sector. These workshops will also involve a commensurate effort to identify and collect existing literature on related topics to ensure research efforts are not being duplicated. The stakeholders involved in the spill as a result of BP's funding of LA, MS, AL, and FL researchers at universities and institutes will also be included. This is absolutely necessary and must be done immediately to avoid duplication of effort, insure that the practitioners' research needs are addressed and the research is transferred to end users for incorporation in future spill response and restoration.

Even if the needed spill response or restoration technology is developed as a result of an R&D effort, the incentive for a private sector partner to produce it for commercial sale is minimal. This is less true if use of the technology is mandatory. For example, if the DWH incident results in regulations requiring caps to be available for immediate deployment in case of a blowout, there will be a fairly major incentive to manufacture the caps (*i.e.,* there are roughly 4,000 platforms of production platforms alone in the U.S. waters of the GOM). The incentive to manufacture large numbers of technology-enhanced skimmers and booms is less clear. The reality is that a fleet of such devices is expensive to maintain, especially when the likelihood they will be used more than a few times, if at all during their useful life. Even then, the "fleets" will likely be regional and not site specific as it is almost impossible to predict where and when a spill will occur. In this regard, the Arctic poses an even more difficult challenge, as assets may only need to be deployed seasonally when there is open water.

While R&D can develop solutions to address a variety of oil spill response and restoration issues, there is always the problem of adapting those technologies to a specific spill and the prevailing environmental conditions. Each spill is unique in its timing, location (*e.g.,* water depth), and variables (*e.g.,* flow rate, type of oil) as well as the habitats and resources that must be protected. While this dictates some direct investment in site-specific technologies (*e.g.,* skimmers designed to collect and process oil in broken sea ice), it often can be addressed by building in flexibility in devices or developing robust templates, as with ERMA®, that can be used and adapted quickly to a given spill. These are details that must be addressed in the initial stages of an R&D project.

Finally, it is important to address human dimensions-related issues, a topic that, with the exception of how to incorporate volunteers in response, has been largely under-funded for oil spill response and restoration. Human dimensions R&D relates to risk communication, valuing natural resources, social impacts, coordination in response and restoration, subsistence, and environmental ethics. It is a factor in *every*

spill. It involves regional and local culture and can render a "successful" spill response in the perspective of the local community a "disaster." One major problem is the frequent disconnect between the metrics used by responders to assess success of a clean-up vs. those used by the local community. For example, the number of gallons of oil recovered per day in on-sea activity by skimmers and in-situ burning may be meaningless to local residents or fishermen if the beaches are fouled or commercial fisheries are closed. Likewise, in Alaska, responders who do not incorporate local knowledge of currents and seasonal migration may find that they are greeted suspiciously. Indeed, this may turn to scorn if generated oil trajectory is incorrect and the oil goes where the local fisherman predicted it would. Going forward, human dimensions research, such as that conducted by Tuler and Webler for CRRC, must become a R&D priority (Table 5).

Table 5.—Socio-economic research by SERI (Thomas Webler, Seth Tuler)

"Establishing Performance Metrics for Oil Spill Response, Recovery and Restoration"	$229,362	Completed 2007
"Social Disruption from Oil Spills and Spill Response: Characterizing Effects, Vulnerabilities, and the Adequacy of Existing Data to Inform Decision-Making"	$239,335	Fall, 2010

Conclusion

There are several impediments to translating oil spill R&D into practice:

- The lack of adequate, sustained, funding for R&D on a long-term basis.
- The need for rigorous peer review at all stages of the R&D process.
- The need for coordination between Federal, state, and international governmental agencies and other critical stakeholders (*e.g.,* NGO's, industry) regarding oil spill R&D.
- The need to facilitate the translation of the results of spill R&D into practice.
- The infrequency of major spill events and the resulting disincentive for the private sector to produce technologies that may be in low demand.
- The site specific nature of most spills that dictates specialized technologies (*e.g.,* for use in the Arctic) and/or robust templates that can be adapted quickly to a given spill.
- The issues of diverse and specific human dimensions related aspects to a given spill involving: (a) the ecological role of humans as proximate causes of ecosystem stress, and underlying social drivers of those causes; (b) consequences of ecosystem stress for the achievability, sustainability, and trade-offs among diverse societal objectives; and (c) human mitigation and adaptive responses to ecosystem stress, that must be addressed to insure productive interactions with local and regional stakeholders.

Going forward, R&D needs can be identified using an inclusive stakeholder approach with specific R&D workshops and coordination of subsequent efforts by working groups.

R&D must incorporate rigorous peer review by scientists, engineers and practitioners and end users as well as human dimensions related stakeholders to ensure the technologies developed will meet the needs identified. This may include assigning practitioners as liaisons during R&D and in using the team approach to review as the technology matures.

There must be coordination of R&D across the stakeholder groups for the U.S. to succeed in spill response and restoration technology development and implementation. This requires cross-agency Federal coordination, as addressed in legislation being considered in Congress, but must also encompass other governmental agencies (*e.g.,* state, local, international), as well as NGO, academia, industry and the private sector.

Federal R&D funding must be authorized and appropriated on a consistent, long-term basis.

Federal R&D funding should require the research to address: existing data and appropriate literature on the topic, technology transfer by incorporating end users in all aspects of the process, flexibility to adapt to spill specific conditions, and consideration of human dimensions.

Senator CANTWELL. Thank you, Dr. Kinner, and thank you for your testimony.

I want to go first to you, Dr. Stahr, because you talked about these Seagliders and the fact that some of them were deployed.

I thought the issue is that they could be much more technological, sophisticated in the information that they could gather and we could be deploying many more of them. Is that correct?

Dr. STAHR. That's correct. You know, as is usual in a crisis situation, people pick up the phone and say, you know, What have you got available?

The Navy was charged with putting a couple of their Seagliders into the Gulf right away. They had some ship problems, so they didn't get them out there right away.

But the issue—There are two issues. One is gliders can only go to 1,000 meters. Currently available gliders can only go to 1,000 meters. This wellhead is at about 1,800 meters. So we cannot actually look at the bottom end of this plume, which we believe from shipboard data to be down around 1,300 meters.

There is in development right now a deep glider. Professor Charlie Eriksen of the University of Washington is actually going out this week or next week to the Puerto Rico Trench to test that. That glider will be capable to 6,000 meters. It will cover anywhere and deeper than you can put an oil well, basically.

The other issue is instrumentation. What we have for instrumentation on the gliders right now are measuring proxies for oil, oxygen utilization. So microbes break down oil and they use oxygen in the water column in that process, and the measurement of something called Colored Dissolved Organic Matter in a fluorescence capacity.

That's not oil, but it acts—Oil fluoresces somewhat like CDOM. So from our CDOM fluorescence measurements we can guess that what we're looking at is oil, but we don't know.

There are actual oil sensors for polynucleic aromatic hydrocarbons, but they're all too big and too power hungry to actually put on a glider, so more development in that respect would help in terms of getting gliders that could be used to observe oil plumes under water.

Senator CANTWELL. And let's just envision that for a second that that kind of technology and research, again, was—somebody said let's make that investment. Somebody was making a decision that, given the level of deep-sea drilling that we were doing, that kind of information might be valuable and that we actually were at that stage of having Seagliders that were capable of measuring the hydrocarbons, what would our response plan look like today then? What would we have been able to take advantage of?

Dr. STAHR. I think that probably one of the most important issues is to know where the plume is. And it's being pushed around by currents that are different than the surface currents, and the oil in that plume will affect different things, because it's not coming to the surface.

It's not being weathered by the sun or the air, and it is being absorbed by animals—deep shrimp, et cetera—that we don't really know how it's going to move up the food chain.

But there's a plume of toxic oil and dispersant—we assume the dispersant is still with it in some respect—but we don't really know

how big it is or where it is. And this plume is likely to hang out in that environment for much, much longer than the surface oil.

So I don't know that the response—The response plan could have been to get more gliders into service more quickly and to have a better idea of where the edges of this plume were. Although, there was some debate about whether the plume contained oil at all up until probably the end of May when I think it was pretty well proven with the shipboard data that, in fact, this was as well, an oil plume.

Senator CANTWELL. And, Dr. Kinner, can't we, in coming up with standards and protocol, look at what kind of activities are most—that basically are putting forth the most risk to us and then make sure that the R&D is going there?

I appreciate your comments about vessel and human safety, because I know that on these large cargo container ships we have seen a lot of confusion or let's just say not good communication among various commands on the ship and then, consequently, incidents occurring, so that very important issue.

But can't we look at the risks for oil spill, or, as Dr. Stahr is saying, oil vents, and say that these are our big risks and this is where R&D should be applied?

Dr. KINNER. Yes, I think we can do that, Senator, and if you look at some of the topics that have been addressed in the last couple of years—for example, dispersants. There have been a number of workshops, the first of which happened in 2005, looking at a whole array of R&D needs for dispersants, and many of those issues are still the ones that we are facing today in this particular spill.

Of that about $40 million of R&D that was identified that needed to be conducted, there was a dispersants working group formed of the different funding entities. They decided we have these resources. This is what we can fund and prioritize. But a total of only $8.4 million was available to do that research. So a whole range of questions, all of which would be very vital to know today, have not been answered.

So I think by getting together practitioners, as Dr. Pegau said, and scientists we can get the questions addressed that need to be addressed. It's just getting them into the R&D pipeline and then into implementation.

Senator CANTWELL. Thank you.

Senator Snowe.

Senator SNOWE. Dr. Stahr, what surprised you most about our response?

Dr. STAHR. I think what surprised me the most was this notion of it being a vent very similar to a hydrothermal vent didn't seem to register with the agencies in charge of dealing with it.

I did learn later that, in fact, some folks from Woods Hole, at that time between the attempted top kill, but before they sliced the riser—I think it was late May—were there with an ROV and they took some measurements, and, from video, basically, came up with a number of like 60,000 to 100,000 barrels a day of discharge.

So I was surprised, one, at the almost denial of what the flow rate really could be or actually was with numbers like 5,000 barrels a day, and the fact that the hydrothermal-vent research com-

munity was not really engaged in trying to make better measurements of that.

And I think perhaps a lot of people were frustrated by that, and perhaps that was one of the causes of the formation of the flow-rate technical group that Admiral Allen finally put together in late May.

So that it really sort of took me by surprise, and I was very happy to see that some folks just completely independently, like Dr. Crone, actually wrote an op-ed piece in *The New York Times*—it was published on May 21—with their best estimates based on the little bit of—you know, the thirty-second video clip that finally got released.

Senator SNOWE. Well, it was a huge issue at the time: trying to determine the true flow rate. That could have made a huge difference in our response, could it not?

Dr. STAHR. I think so.

Senator SNOWE. In terms of tenor and pace of the response?

Dr. STAHR. I agree, and I believe that's what I felt in my community, in the oceanographic community, and I believe the public was feeling also, that being prepared for a lot more oil, which really there was a lot more oil coming out, would have been important.

I found a very nice little video clip that was taken at the NOAA operations center in Seattle, their hazmat offices, sometime shortly after April 22, may have even been on April 22. And in that video clip, you see on white boards, in people's notebooks and you hear audibly estimates of 50,000 to 110,000 barrels a day. This is what they were thinking about at that time, and yet it wasn't until June, I believe, that the rest of the public ever heard any figure to that effect.

So I guess, to me, what was disappointing, and perhaps it's because us in the physical oceanographic sciences hold NOAA to a high standard, it was just disappointing that we didn't get that kind of robust—well, what we thought was robust numbers.

Senator SNOWE. Well, at one point prior to our last hearing there was an article in the paper that somebody from NOAA was even dismissing the idea that we needed to know the true flow rate.

Dr. STAHR. Yes, that was disappointing as well, and I understand the idea that—I mean, their job is to create a response that is, in the terms of Dr. C.J. Beegle, who used to be there—quote—least regrets, and that's important. They also have to envision what the—sort of the worst case was. And, truly, doing everything you can, regardless of what the flow rate is, right. That's the right thing to do.

But just not knowing that number felt like a lack of control, you know. Yes, I agree. It was frustrating.

Senator SNOWE. Mr. Jones, where are you in the process right now with respect to your method?

Mr. YELLOWHORSE JONES. Senator, we submitted our proposal and we have heard back via e-mail from the Coast Guard that we are in the screening process.

Other than that, that's all we have heard.

Senator SNOWE. How long have you been in this process now?

Mr. YELLOWHORSE JONES. Probably 60 days.

Senator SNOWE. Sixty days.

Mr. YELLOWHORSE JONES. Yes, ma'am.

Senator SNOWE. And is there anything you would like to tell us about your experience with respect to this process or recommendations on how to improve it?

Mr. YELLOWHORSE JONES. Well, it's a tedious, long, drawn-out government process. I expected a faster response. We had submitted our proposal, our whitewater paper to our elected officials in New Mexico and Arizona, and it has just been a tough road.

You know, it's like the lady said there, if you don't have any political connections, you're just kind of one of many. You're just out there in a big stack of proposals and hoping some way, somehow, some day you will make it to the top where people will take an objective review.

And that's what we're asking for our proposal is just an objective review of what we're telling the Coast Guard on our product.

Senator SNOWE. Yes, I understand your frustration. We've heard from others in that regard, and it's unfortunate that there hasn't been, as I said earlier, a level of urgency moving this process along.

Your organic methodology—Is it a liquid product?

Mr. YELLOWHORSE JONES. It's both liquid and dry, but what we have approached here is strictly on shore, so it will be a dry product that will be dispersed on shore in lagoons, marshes, beaches.

Senator SNOWE. So it's an absorbent?

Mr. YELLOWHORSE JONES. Yes, ma'am. It will absorb and eventually break down the contaminated oil and increase the microbial activity.

Senator SNOWE. Has it been used before in any way?

Mr. YELLOWHORSE JONES. Yes.

Senator SNOWE. It has been. So——

Mr. YELLOWHORSE JONES. Yes, Senator.

Senator SNOWE. How long——

Mr. YELLOWHORSE JONES. And that has been in conjunction with my colleague here from the University of Oklahoma, who's received EPA funding and have studied exactly what my product does in terms of soil remediation for several years.

Senator SNOWE. Well, hopefully, it's going to get attention now, from the Coast Guard via Captain Sisson.

Mr. YELLOWHORSE JONES. I do, too. I really do.

Senator SNOWE. [Laughter.] I do. I do. I know. We need to bring everything to bear in this process that's workable, and I just feel very sorry for people in the region, the families——

Mr. YELLOWHORSE JONES. So do I.

Senator SNOWE.—and the businesses, the livelihoods. Both of us, the Chair and I live in the coastal regions, and it's a way of life for generations. It's heartbreaking.

Mr. YELLOWHORSE JONES. It's sad.

Senator SNOWE. That's why it just seems we must move heaven and earth, literally, to get this done in a way that is commiserate with the level of this destruction, and what it means and what it portends for the future.

Thank you.

Senator CANTWELL. Thank you.

Senator Udall.

STATEMENT OF HON. TOM UDALL,
U.S. SENATOR FROM NEW MEXICO

Senator UDALL. Thank you, Madam Chair, and I thank both you and the Ranking Member for allowing me to participate today, and I very much appreciate the questions directed to Mr. Yellowhorse Jones, and I want to welcome him here today.

I believe you're a geologist from Gallup, New Mexico, and it's great to have you here, and I've been staying very involved in your procedure that you've put forward. I've read a number of the slides and things. And I think you've put forward the idea that is really the focus of this hearing: How can we take an idea like yours, and, as our chair has outlined, have it be effective cleanup and a restoration, and this is what this material that you've come up with does is it not only helps in the cleanup, but it restores the environment and the ecosystem to where it was before.

So we need to find a way, and I think it's being emphasized in this hearing, to take these ideas and take them early on and get them into the process, so that we can have an effective cleanup.

I also want the record to reflect that Mr. Jones is here testifying based on the recommendation, and you said it, of the Oil Spill Recovery Institute. And your proposals have been backed by engineers and scientists at the University of Oklahoma. So it's had a good deal of vetting.

And I'd also like to take the opportunity to briefly highlight some of the other proposals New Mexico and New Mexicans have put forward. We have the Sierra County Economic Development Organization has proposed another New Mexico material called Zeolite for oil-spill cleanups. Zeolite is a mineral with a number of uses, including as an absorbent for oil.

Other New Mexicans have also made proposals for oil containment and skimming devices, including engineers from Los Alamos, Santa Fe and Albuquerque. And, Madam Chair, I'd ask unanimous consent to include these proposals in the Committee record——

Senator CANTWELL. Without objection.

[The information referred to follows:]

ST. CLOUD MINING
Winston, NM, July 20, 2010

Mr. ANTHONY SEDILLO,
c/o Office of Senator Tom Udall,
110 Hart Senate Office Building,
Washington, DC.

Via E-mail

Dear Mr. Sedillo:

It was a pleasure speaking with you today and we thank you and Senator Udall for your willingness to take a few minutes to understand the benefits St. Cloud zeolite could bring to the environmental rehabilitation efforts underway in the wake of the BP—*Deepwater Horizon* calamity.

St. Cloud Mining Company is in the business of locating, developing, mining, producing and selling industrial minerals in North America. We are currently the largest natural zeolite producer in North America producing from our mine located near Winston, NM. St. Cloud is in the early stages of producing and selling dolomite from its mine located near Deming, NM, where the company also produces industrial aggregates. We also provide mine reclamation and civil construction services throughout the Southwest United States. St. Cloud Mining Company has been in continual operation in Sierra County since 1970 and currently employ 65 full-time employees. We enjoy an outstanding reputation within the public and private sectors and have

received numerous awards and recognition for our environmental stewardship by the State of New Mexico.

Attached please find a very brief summary of the applications and benefits of St. Cloud Zeolite for the remediation of petroleum contaminants and spills. If you have additional questions or concerns, please feel free to contact me. In the meantime, you can learn more about St. Cloud and our products by visiting our websites at *www.stcloudmining.com* and *www.stcloudreclamation.com*.

We thank you for your efforts on our behalf and we are confident the natural mineral resources of New Mexico can help address this problem of national concern.

Very Truly Yours,

JOSEPH P. MCENANEY,
Vice President.

ST. CLOUD ZEOLITE,
Winston, NM.

St. Cloud Mining Company

- Produces environmentally inert, highly absorbent/adsorbent natural zeolites from its operations in southwest New Mexico.
- Has strategic, collaborative relationships for the development of proprietary sorbtion technology for specialty filtration/separation/environmental remediation applications.
- Has working relationships with marine service providers currently operating in the Gulf of Mexico.

Products/Technology

Our natural zeolites are lightweight alumino-silicates widely used for their high cation exchange capacity in filtering and adsorbing harmful cationic compounds such as heavy metals and ammonia. Industrial applications encompass hazardous waste clean up and radionuclide remediation, as well as waste water, mine water, industrial process water, and agricultural effluent treatment. Our specialty chabazite products are used for mercury removal in coal fired boilers as well as additives in down hole cement applications.

Our zeolite material will absorb 100–125 percent of their weight in water and 80–85 percent of their weight in petroleum products. Because of their open lattice structure, high surface area, and pore sizes ranging from 4–7 angstroms, zeolites are also widely used as molecular sieves in separation technologies.

St. Cloud manufactures specialized sorbents (surfactants) for use in spill remediation which when applied to the zeolite media chemically bond complex anionic molecules, which once reacted, will not separate from the sorbent/zeolite structure.

Our products can be produced and packaged according to customer specification in particle sizes ranging from <325 mesh (44 microns) to percent inch material. Packaging is available in bulk, supersack or 50 lb bags. Production and shipping facilities are located near major interstate highways. Rail trans-loading is also available.

Land/Sea Oil Spill Remediation

- Lightweight and highly sorbent
- GRAS Products—Generally Recognized as Safe
- Catalytic mineral surfaces to help breakdown the oily wastes
- Porous to allow the organic contaminants to enter as well as allow natural or inoculated bacteria access to the oil for more rapid decomposition
- Modified (surfactant treated) or unmodified products available
- Cost effective with multiple modes of application and treatment (Sorbent, Catalyst, Bioremediation, Solidification)
- Effective as on shore beach or tidal barrier; or in near shore waters as sorbent and sink agent
- Immediately available
- Proven
- Continuous technical assistance provided

UPPER PRODUCTION/DRILLING CONDUIT SUPPORT SYSTEM AND EQUIPMENT SHIELD

Inventor: Kenneth Cain

Background of the Invention

Recent off shore environmental disasters were caused by off shore oil well operations that were in part not controllable at the surface. The loss of the risers and drilling stem also has resulted problems in the recovery operations thereby producing excessive loss of hydrocarbons on the sea floor and in the water column. The lack of upper sub sea control also has resulted in problems in follow-up operations to regain well control.

The loss of a drilling ship recently resulted in the loss of property and life. The environmental damage due to lack of well control at or near the surface has resulted in hydrocarbons from the accident being dispersed over a large area of the water*. This and other major disasters have been devastating to the environment and have cost billions of dollars to partially rectify.

These events alone have demonstrated that a need exists for an effective and easily deployable system for the support of the drilling and/or production conduit used in the drilling and/or production of hydrocarbons to be controlled at or near the surface.

There is also the potential loss of control of drilling and/or production facilities due to the present time consuming process of deploying and redeploying of drilling and/or production surface facilities when conditions require deployment and redeployment such as storms at sea. This process also results in loss of production, drilling time and adds additional expense in drilling and/or production operations.

References

Shearable completion riser joint

United States Patent 5979943

The following list includes some of the major oil spills involving off shore drilling and production since 1977. The circumstances surrounding the spill, amount of oil spilled, and the attendant environmental damage is also given.

1977—April, North Sea: blowout of well in Ekofisk oil field leaked 81 million gallons.

1979—June 3, Gulf of Mexico: exploratory oil well Ixtoc 1 blew out, spilling approximately 140 million gallons of crude oil into the open sea. Although it is one of the largest known oil spills, it had a low environmental impact.

1980—March 30, Stavanger, Norway: floating hotel in North Sea collapsed, killing 123 oil workers.

1983—February 4, Persian Gulf, Iran: Nowruz Field platform spilled 80 million gallons of oil.

1988—July 6, North Sea off Scotland: 166 workers killed in explosion and fire on Occidental Petroleum's Piper Alpha rig in North Sea; 64 survivors.

November 10, Saint John's, Newfoundland: Odyssey spilled 43 million gallons of oil.

1990—June 8, off Galveston, Tex.: Mega Borg released 5.1 million gallons of oil some 60 nautical miles south-southeast of Galveston as a result of an explosion and subsequent fire in the pump room.

1991—May 28, Angola: ABT Summer exploded and leaked 15–78 million gallons of oil off the coast of Angola. It's not clear how much sank or burned.

1992—March 2, Fergana Valley, Uzbekistan: 88 million gallons of oil spilled from an oil well.

2010—*April 24, Gulf of Mexico: The *Deepwater Horizon,* a semi-submersible drilling rig, sank on April 22, after an April 20 explosion on the vessel. Eleven people died in the blast. When the rig sank, the riser—the 5,000-foot-long pipe that connects the wellhead to the rig—became detached and began leaking oil. In addition, U.S. Coast Guard investigators discovered a leak in the wellhead itself. As much as 25,000 barrels (1,050,000 gallons) of oil per day were leaking into the water, threatening wildlife along the Louisiana Coast. Homeland Security Secretary Janet Napolitano declared it a "spill of national significance." BP (British Petroleum), which leased the *Deepwater Horizon,* is responsible for the cleanup, but the U.S. Navy supplied the company with resources to help contain the slick. Oil reached the Louisiana shore on April 30, affected about 125 miles of coast. By early June, oil had also reached Florida, Alabama, and Mississippi.

It is the largest oil spill in U.S. history.

The Ixtoc off shore oil well blow out in the Gulf of Mexico off the coast of Mexico and the sinking of the BP *Deepwater Herizon* simi-submersible drilling rig in the Gulf of Mexico off the Louisiana coast resulted in unprecedented environmental destruction to the water, shore line, habitat and the livelihood of thousands of people receiving the brunt of the aftermath of these events.

One object of this invention is to establish a system to protect the drilling and/or production conduit and hold it at or near the surface to allow for more expedient well recovery operations.

Another object of this invention is to establish a platform and shield for at or near the surface for safety equipment for greater safety for drilling and production surface facilities.

Another object of this invention is to allow for the quick disconnect of the upper portion of the drilling and/or production conduit for rapid deployment and redeployment of surface operations.

Yet another object of this invention is to allow for greater protection from willful destruction of surface operations.

This invention is cost effective, easily constructed and deployed at the site without interruption of existing surface operations.

This invention meets other objectives, advantages and capabilities that are apparent from the following detailed description and accompanying drawings illustrating a preferred embodiment of this invention.

Description of the Invention

The *Upper Production/Drilling Conduit Support System and Equipment Shield* consists of an upper safety shield for equipment and lower vessels for buoyancy of the safety shield and the drilling and/or production conduit.

The *Upper Production/Drilling Conduit Support System and Equipment Shield* can be configured and constructed to meet any water depths and drilling and/or production conduit configurations and safety equipment in all equipment configurations. The system is deployable by surface operations and/or subsurface vessels such as ROVs as an onsite component assembly system.

The equipment shield is deployable by surface operations and/or subsurface vessels such as ROVs after the drilling and/or production conduit and the safety equipment are in place. The safety equipment can also be installed after the *Upper Production/Drilling Conduit Support System and Equipment Shield* is in place. The safety equipment should consist of at least two stacked shear rams. A quick disconnect system included in the safety equipment should be included as outlined in the referenced patent United States Patent 5979943 would also be desirable.

In one embodiment, the invention relates to a riser support system and BOP shield at or near the surface for off shore drilling and production of hydrocarbons where there exists a riser and/or drilling stems and/or production tubing or similar apparatus for the exploration and production of hydrocarbons in water comprising:

a. An upper portion having a submersible member for the shielding of safety equipment;

b. A lower portion(s) connected below the upper portion, said lower portion(s) having a plurality or singularity of substantially vertical vessels providing buoyancy to support the safety equipment and the drilling and or production apparatus.

These and other embodiments of the present invention will also become readily apparent to those skilled in the art from the following detailed description of the embodiments having reference to the attached figures, the invention not being limited to any particular embodiment(s) disclosed.

The following drawings below outline some preferred embodiments of the *Production/Drilling Conduit Support System and Equipment Shield "System":*

a. *Fig. 1* depicts the view of various configurations for deployment of the *System*. The *System* has no configuration limitation in its deployment and can be deployed around any apparatus for the exploration and/or production of hydrocarbons.

b. *Fig. 2* depicts one embodiment of the *equipment shield* of the *System* which provides shielding for the safety equipment.

c. *Fig. 3* depicts the plan view of one embodiment of the *equipment shield* of the System.

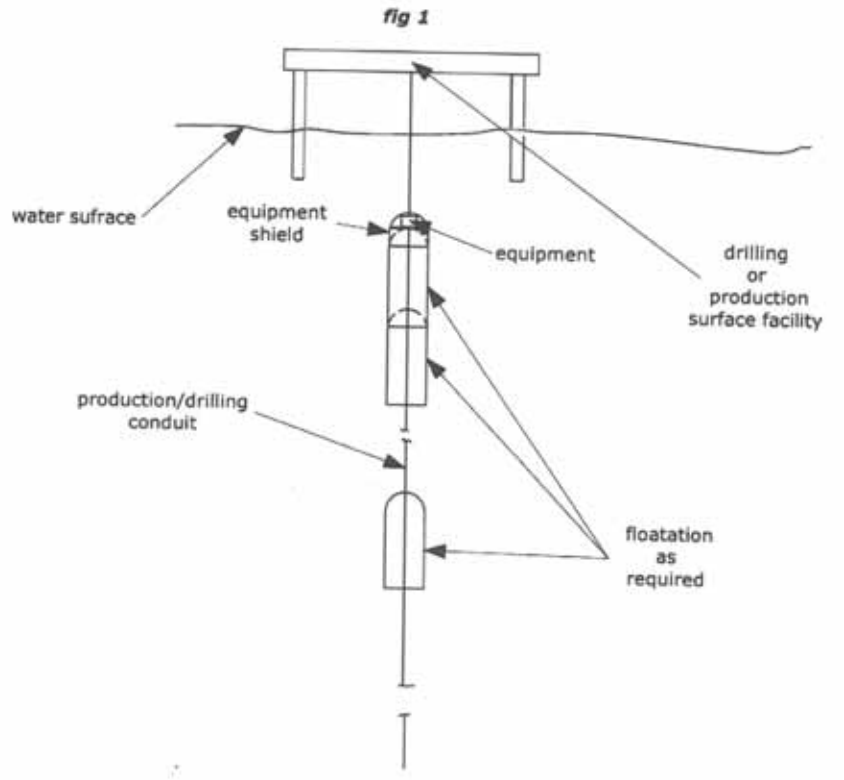
d. *Fig. 4* depicts one embodiment of the *floatation vessel(s)* of the *System* that extends downward in the water column from the *equipment shield* of the *System* to provide support and buoyancy for the *System*.

e. *Fig. 5* depicts the plan view of one embodiment of the *floatation vessel(s)* of the *System*.

The elements of the drawings arc not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the invention. Furthermore, reference to "an embodiment," "one embodiment," "various embodiments," or any variant thereof means that a particular feature or aspect of the invention described in conjunction with the particular embodiment is included in at least one embodiment of the present invention. Thus, the appearance of the phrases "in one embodiment," "in another embodiment," or variations thereof in various places throughout the specification are not necessarily all referring to its respective embodiment. All embodiments disclosed may be provided in other specific forms and embodiments without departing from the essential characteristics as described herein. The embodiments described below are to be considered in all aspects as illustrative only and not restrictive in any manner.

While particular embodiments of the invention have been described, it will be understood, however, that the invention is not limited thereto, since modifications may be made by those skilled in the art, particularly considering the teachings herein. It will be, therefore, contemplated by any claims in an ensuing non-provisional application claiming priority to this document to cover any such modifications that incorporate those features or those improvements that embody the spirit and scope of the present invention

Deployment of the *System:*



The *System* has no configuration limitation to its deployment.

The configurations for the deployment of the *System* can be at or near the surface and deployed either by ship or ROV. The depth of deployment can be at the surface

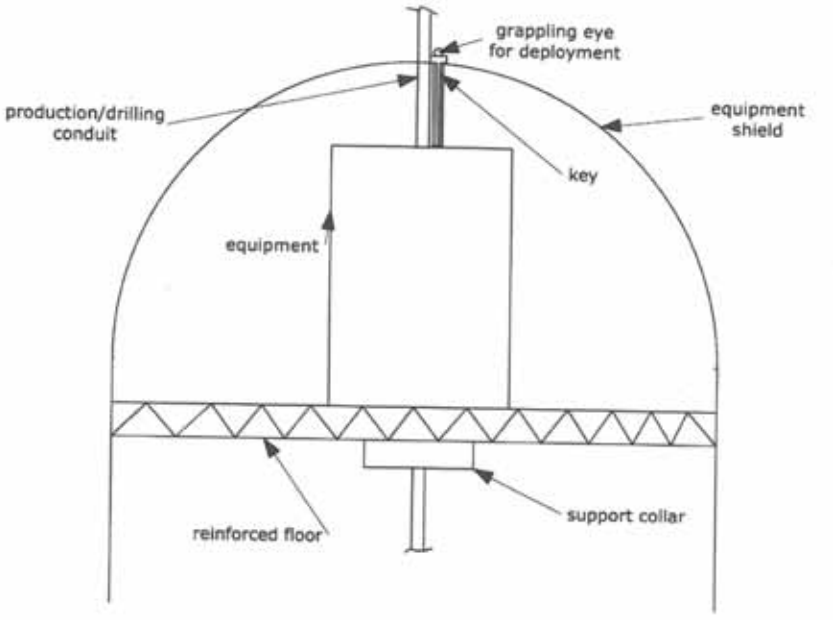
or below the surface to meet the various requirements of need. The deployment can be for drilling, work over of existing wells and/or production. The deployment of the *System* is not limited to drilling and/or production platforms but may be deployed under any surface operation vessels and around any sub-sea conduit apparatus employed in the operations involving hydrocarbons. The *System* may be used any or no safety equipment for the operation involving hydrocarbons as necessary.

The deployment of the *System* can be accomplished in an assembled configuration or in any various assembled components to meet the deployment situation.

The *System* is constructed from readily available materials and is cost effective and easily deployed. The materials used in the construction of the *System* can be, but not limited to, steel, PVC, cables, cable connectors, rope, and other subsystems.

One embodiment of the *equipment shield* of the *System:*

fig 2



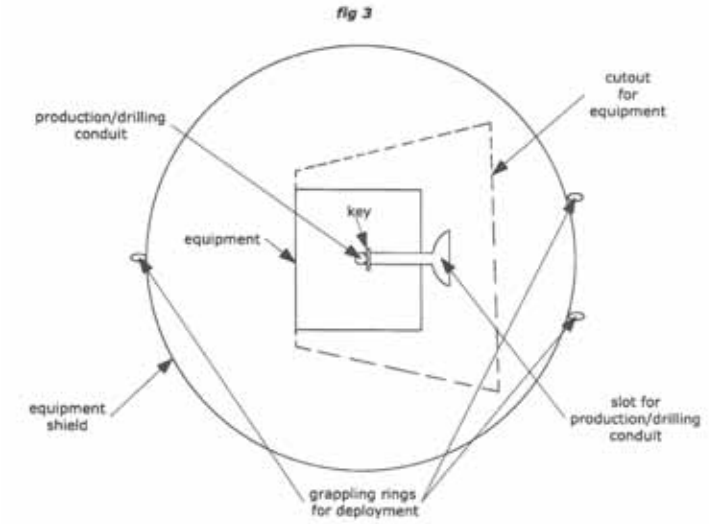
The *equipment shield* of the *System* consists of an open to the water vessel providing a shield to any safety equipment and a support for the lower buoyancy vessel(s) below.

The top of the *equipment shield* preferably is at or below the surface of the water and to allow for ingress and egress by service equipment and to prevent damage to the *System* from surface conditions such as storms and surface structure failure or other surface dangers to the *System*.

A support column at the floor of the *equipment shield* provides attachment of the drilling and/or production conduit to the *System* and to secure the drilling and/or production conduit to the *System*.

A key locking system as shown provides further securing of the drilling and/or production conduit to the *System*.

One embodiment of the plan view of the *equipment shield* of the *System* is shown below:

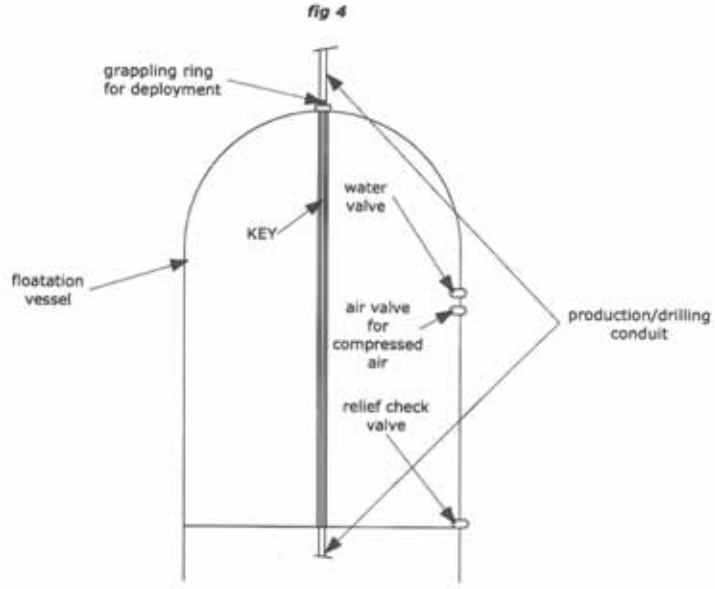


A slot is provided to guide the drilling and/or production conduit into position during deployment of the *System*.

A cut-out that is appropriate for the equipment is provided to allow for the placement of the equipment durning deployment of the *System*.

Grappling rings are provided for deployment of the *System* by surface vessels and or sub-surface vessels such as ROVs.

One embodiment of the *floatation vessel(s)* of the *System:*



A slot is provided to guide the drilling and/or production conduit into position during deployment of the *floatation vessel(s)* of the *System.*

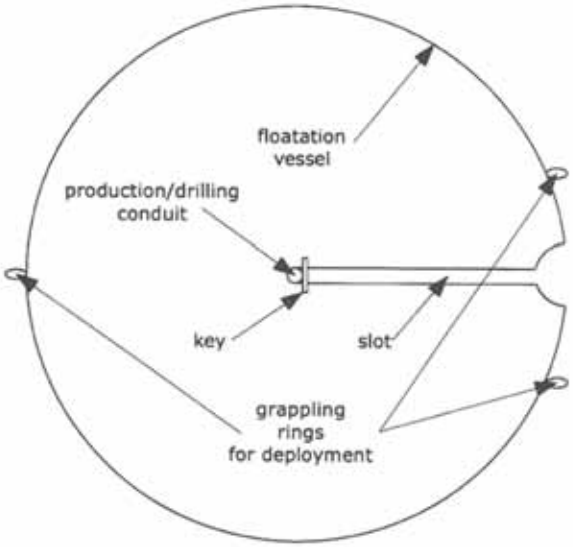
A cut out that is appropriate for the equipment is provided to allow for the placement of the equipment dunning deployment of the *floatation vessel(s)* of the *System.*

Grappling rings are provided for deployment of the *floatation vessel(s)* of the *System* by surface vessels and or sub-surface vessels such as ROVs.

Valves are provided to control the buoyancy *floatation vessel(s)* of the *System* for deployment. Negative buoyancy is achieved for deployment by allowing water to inter the *floatation vessel(s)* through the water valve and exit the *floatation vessel(s)* through the check valve. Once the *floatation vessel(s)* is (are) fully deployed with the key locked into place, complete buoyancy is achieved by introducing compressed air for the surface into the *floatation vessel(s)* and discharging all of the water from the *floatation vessel(s).*

In one embodiment of the plan view of the *floatation vessel(s)* of the *System:*

fig 5



A slot is provided to guide the drilling and/or production conduit into position during deployment of the *System.*

A key locking system as shown provides further securing of the drilling and/or production conduit to the *System.*

Grappling rings are provided for deployment of the *System* by surface vessels and or sub-surface vessels such as ROVs.

CLAIMS

What is claimed is:

A system for the support of production and/or drilling conduit for any and all operations involving hydrocarbons and for the shielding of equipment for any and all operations involving hydrocarbons at or near the surface of the water for all operations involving hydrocarbons including:

a. An upper portion having a shielding system for equipment for any and all operations involving hydrocarbons.

b. Lower protions that provide for support vessels for the shielding system and production and/or drilling conduit and for any and all equipment for all operations involving hydrocarbons.

TITLE PAGE

Solution to the Gulf Oil Leak Problem—Broad Agency Announcement (BAA) HSCG32–10–R–R00019

Oil Wellhead Control and Submerged Oil Response

Offeror: Melvin L. Prueitt
Contact person: Melvin L. Prueitt,
Address: See above

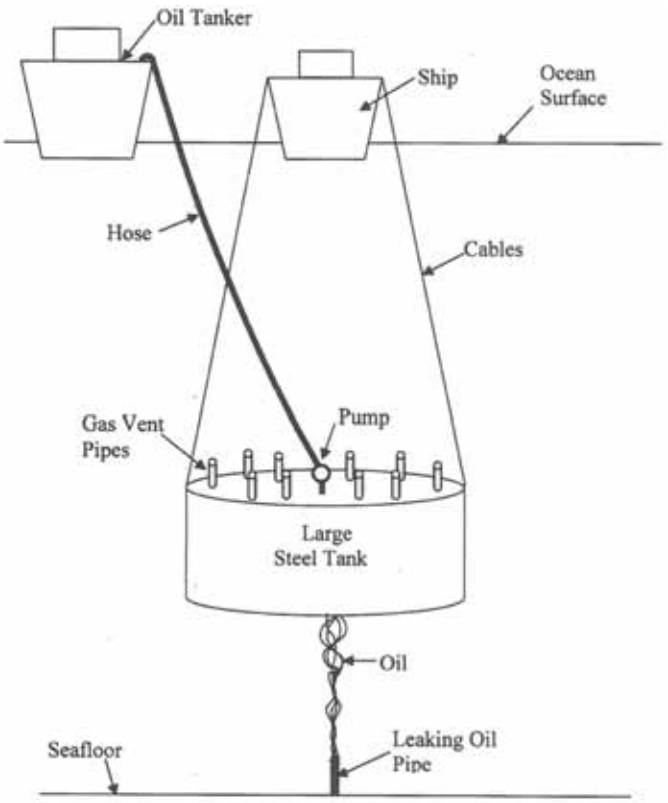
Solution to the Gulf Oil-leak Problem

This proposal is different than other tank solutions that have been proposed. The solution used so far at the Gulf oil spill was a relatively small tank or cap that they put over the well. Turbulence and ocean currents caused much of the oil to miss the tank, and the oil did not have a chance to separate completely from the water. Natural gas leaking from the well also created turbulence. The mixing of the gas with the cold ocean water produced hydrates, which formed a semi-solid slush that clogged the exit from the cap. Since the cap (tank) was small, the slush had only a few seconds to harden. It hardened in the tank exit.

The drawing below illustrates a solution to the leaking oil well at the seafloor. A large steel tank is suspended above the leaking well. The tank is suspended from a ship. The tank is open at the bottom so that materials flowing up from the broken well pipe will be caught. Since oil has a lower density than water, the oil will float up into the tank and float up to the inside top of the tank. There will be a separation of the oil and the water as the oil forms a thick layer in the top of the tank. Since the gas is lighter than the oil, it will form a gas layer above the oil. Gas vent pipes allow the gas to escape. Float valves below the bottom of the vent pipes control the thickness of the gas layer in the tank. The hydrate slush will not have a chance to plug vent pipes, because the gas layer prevents the slush from reaching the pipe openings. That is, the pipe opening is next to the top of the tank, but the float that controls the opening is below the opening so that the slush cannot reach the opening.

The gas will provide buoyancy to the tank so that extra mass may need to be added to the tank to prevent its rising. Cables with anchors or weights could be attached from the tank to the seafloor.

A pump above the tank pumps the oil out of the tank into a large hose that transports the oil to an oil tanker. When the tanker is full, it can transport the oil to a shore where the oil can be processed and sold. The oil pipe that extends from the pump down into the tank should extend down below the gas layer into the oil. To prevent rising slush from entering the oil pipe, there can be a U-shaped curve in the pipe at its bottom.



The tank should be high enough above the well so that equipment may move below the tank to perform work on the well without interference from the tank. The drawing is not to scale. The tank may be 100 feet in diameter and 30 feet tall.

To get the tank from the shore to the leaking well, the tank can be towed from the shore to the leaking well by a ship. By having air in the top part of the tank, it will be buoyant and will float as it is towed. When it reaches the destination, the air can be drained so that the tank will sink while it is supported by cables from the ship. The gas vents will need to be closed until the tank reaches its destination.

This method of oil collection can be used for the Gulf oil spill, or if there are future similar oil leaks on the bottom of the ocean, it can be used for those.

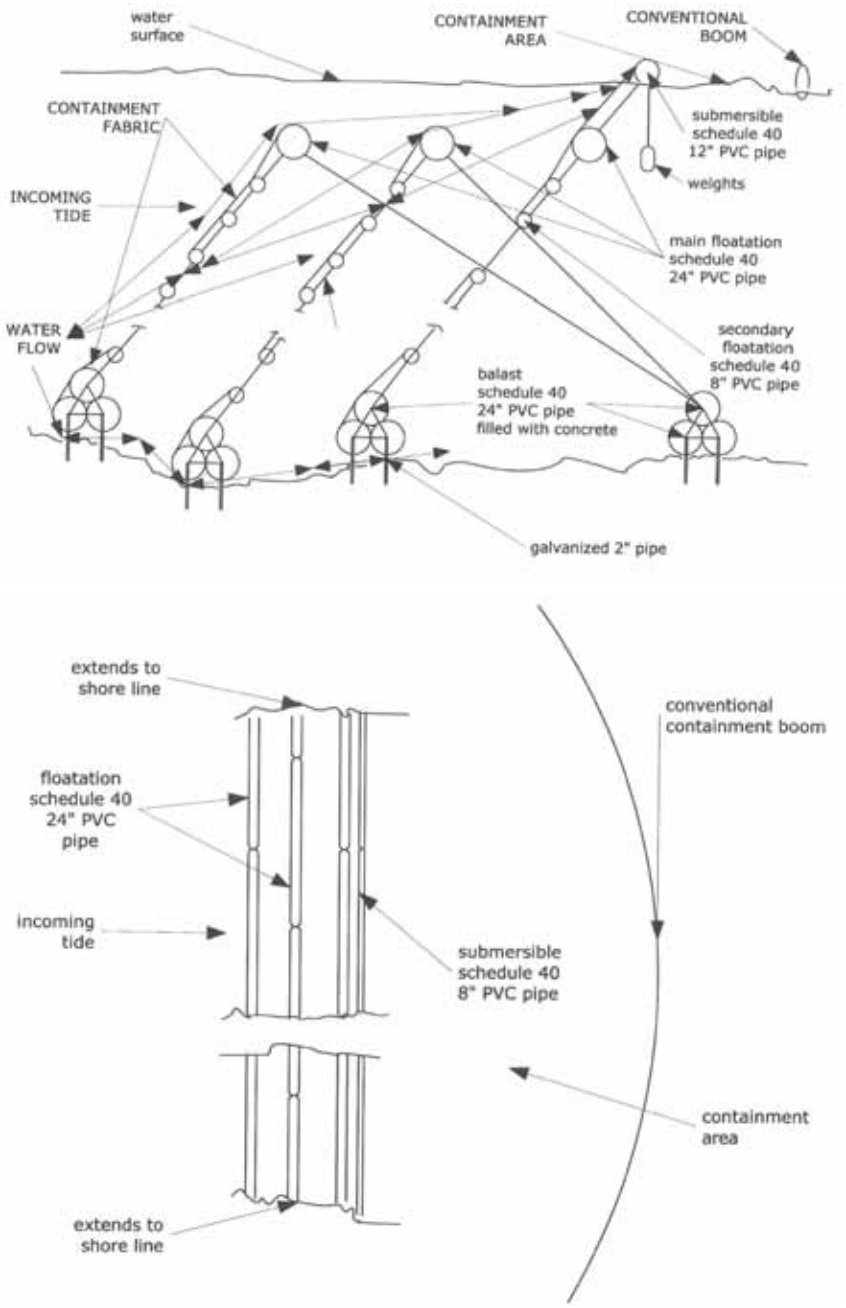
This paper does not cover all the details.

If there are questions, please call Melvin Prueitt.

This paper is non-proprietary.

ROM

The cost of constructing and installing the large tank and collecting oil will depend on the speed with which the work is done. By collecting and selling the oil, revenue will be provided so that the total cost of the operation may be negative.



Senator UDALL. And I'd also like to highlight the contributions of New Mexico's national laboratories, both Sandia National Laboratory and Los Alamos, which are both in New Mexico, and the

other national security laboratory, Livermore in California, have dedicated over 200 scientists to this oil-spill cleanup effort.

And they have not all been down in Houston. Some of them have. One of the national directors has been down there, and these scientists have been very actively involved in overseeing what BP is doing in making sure that they have the very, very best science.

These scientists have contributed modeling, simulation, engineering and complex risk analysis of the oil spill on various attempts to contain the spill.

Now, one of the things, Mr. Jones, I wanted to ask you about, you, in one of your slides I saw you had a comparison of cleaning up one mile of shoreline, and I think you had a cost of $5.1 million per mile, is that correct?

Mr. YELLOWHORSE JONES. Yes, Senator.

Senator UDALL. Tell me how that compares with other cleanup materials that do the same thing that are bioremediation, not only do they clean up, but then they have microbes that organically get rid of the toxics.

Mr. YELLOWHORSE JONES. Well, from what I have been told by people that work for me who has done some comparison studies, we're economically and viable and competitive in doing this.

And depending on the different areas that we would be looking at, that scale could go down or in—That was probably like the worst-case scenario, doing 20-feet wide, five miles long, and we made notations in our supplemented material that that can be adjusted accordingly.

But from what I've been told, the comparison to the SR 200s and some of the other things that's out there—and this is just what I've been told by the people that work for me—that our product is very competitively priced.

Senator UDALL. Great. Well, thank you very much.

And thank you, Madam Chair, for holding this hearing and being such an advocate for our oceans. Thank you.

Senator CANTWELL. Thank you. I was wondering if you were joining the Coastal Caucus with New Mexico. So thank you.

[Laughter.]

Senator UDALL. Well, all we really have is ancient oceans over a million-years old, and so we're a little bit dry right now as a desert. So if I qualify, I would love to join——

Senator CANTWELL. Absolutely. And we need all the advocacy we can get.

So that's all the questions we have. I thank the witnesses for their testimony and for their actions in this area. It's very helpful to us.

I can see, if we had this panel engaged on an ongoing basis about the latest and important technology investments we should be making, and we had the resources to be making them, we would be further ahead. So, obviously, we will be pushing legislation to do so. Hopefully, you can review that legislation and give us feedback on it.

So thank you very much. The hearing is adjourned.

[Whereupon, at 11:58 a.m., the hearing was adjourned.]

A P P E N D I X

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARIA CANTWELL TO DOUGLAS HELTON

Question 1. NOAA's 2011 budget request for the Office of Response & Restoration is the lowest that it has been in the past 6 years. This office is responsible for modeling oil spill movements and tracking the slick based on satellite data. Under the proposed 2011 budget, will your office within NOAA have the resources to:

- Completely eliminate the multi-year backlog of outdated oil spill Environmental Sensitivity Index (ESI) maps?
- Conduct advanced three-dimensional modeling of deep-water releases of oil into the water column?
- Conduct a thorough program of research to study the effects of oil and dispersants on open-ocean species and ecosystems?

Under the proposed 2011 budget, what are some of the "lower-priority" oil spill efforts that will not be funded?

Answer. The President's FY 2011 Budget Request includes $19.5M for the Office of Response and Restoration (OR&R). This level of funding would allow OR&R to conduct priority response and restoration activities (pending final appropriations) and would allow NOAA to update at least one Environmental Sensitivity Index (ESI) map (however this will not eliminate the backlog of outdated ESI maps). OR&R has already begun to develop three-dimensional modeling and this effort will also continue in FY 2011.

OR&R does not currently have a formal research program to study the effects of oil and dispersants on open-ocean species and ecosystems. However, NOAA and co-trustees (Department of the Interior (DOI) and states of Texas, Louisiana, Mississippi, Alabama, and Florida) have been collecting data across the Gulf of Mexico that will be useful to determine what natural resources have been injured due to the BP *Deepwater Horizon* oil spill. Several technical working groups composed of state and Federal natural resource trustees and representatives from BP are gathering historical information and developing and implementing baseline (pre-spill) and post-impact field studies for multiple resource categories. Open-ocean resources being assessed include fish and shellfish, bottom dwelling biota, birds, marine mammals, turtles, and the water column, including bottom sediments. In addition, other Federal agencies (*e.g.,* the National Science Foundation, Environmental Protection Agency) support research with respect to the effect of oil and dispersants.

Question 2. As a result of the threat of the oil spill to the Gulf of Mexico ecosystems, there has been and will continue to be an increase in scientific research, both government and non-government (academic, private, etc.), in order to assess the full environmental damage and the steps to recovery. This event will also be highly litigated, both by the government and private entities. I am concerned that these scientific data, which will be needed to direct recovery efforts, may get caught up in judicial tape and not be publicly available. What is the Administration's current policy for sharing and disseminating scientific data that may be used by the Department of Justice in litigation? What are the mechanisms currently in place for the Department of Justice to interact and coordinate with NOAA and other scientific agencies, in regards to scientific data and information on the oil spill that might be used in criminal or civil prosecution of the responsible parties? What efforts will NOAA make to ensure that these data remain publicly available for review and for use in the recovery efforts?

Answer. As the response to the BP *Deepwater Horizon* oil spill and the natural resource damage assessment (NRDA) continue, NOAA is honoring our commitment to openness and transparency, both with our co-trustees and other Federal and state agencies, and externally with the American public, the media, and our various partners and stakeholder groups. For example, through ERMA®, a web-based GIS platform developed by NOAA and the University of New Hampshire, we are working

to make information available to the public as quickly as possible in an accessible and user-friendly format at www.geoplatform.gov/gulfresponse. Additionally, with our partners and co-trustees, we are developing new policies to make our NRDA data available to the public. As of July 8, the Federal trustees agreed to make public NRDA "pre-assessment" science data—once collected, analyzed, and properly quality checked—available in the interest of transparency. Releasing NRDA "pre-assessment" science data is rarely done in the NRDA process, but it was decided in the interest of transparency, and because of the heightened interest in this particular spill, that this information would be made public. Initial data has already been made available to the public.

We recommend referring the question mechanisms currently in place to interact and coordinate with NOAA and other scientific agencies, in regards to scientific data and information on the oil spill that might be used in litigation to Department of Justice who can provide information on this topic.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. OLYMPIA J. SNOWE TO DOUGLAS HELTON

Question 1. How would you characterize the current state of collaboration between NOAA's Office of Response and Restoration (ORR) and your partners in the Integrated Ocean Observing System (IOOS) office? How has the data gathered by the system and its regional component, the Gulf of Mexico Coastal Ocean Observing System, enhanced your ability to respond to, track, and clean up this spill? As NOAA–ORR is likely to see more responsibilities during oil spill responses in the future, what enhancements to the current IOOS system would improve the amount, type, or quality of data you receive from the system?

Answer. NOAA's Integrated Ocean Observing System (IOOS) Office works closely with NOAA's Office of Response and Restoration (OR&R). An example of past collaboration between the two offices includes the Safe Seas Exercise in San Francisco Bay in August 2006. This exercise established data formats and data exchange between high frequency radar data providers and OR&R trajectory modelers. This was then used in the actual San Francisco Cosco Busan spill in November 2007. IOOS and OR&R continue to coordinate during other oil spill exercises. In addition, IOOS coordinates with OR&R to provide additional observational and modeling capabilities. IOOS identified an on-staff expert to coordinate between the IOOS Regional Associations and OR&R to allow for quick coordination of modeling, imagery, observation platforms, and products to be made available quickly and used effectively.

In the wake of the BP *Deepwater Horizon* oil spill, the framework and communication was in place so that high frequency radar data was automatically ingested into OR&R trajectory models. During the BP *Deepwater Horizon* spill response effort, OR&R used data from IOOS assets including high frequency radar, drifters and other data collection devices like Airborne Expendable Bathy-Thermograph sensors (AXBTs). These assets are used to understand the large scale circulation patterns in the Gulf of Mexico to inform our understanding of where the oil is and where it is going to aid response efforts. Models from Texas A&M, University of South Florida and the University of North Carolina were also incorporated into the information evaluated to develop the daily spill trajectory model provided by OR&R and used in planning response activities. Imagery was also made available from Center for Southeastern Tropical Advanced Remote Sensing at the University of Miami. These entities are a part of IOOS' partners, the Gulf of Mexico Coastal Ocean Observing System (GCOOS) and the Southeast Coastal Ocean Observing Regional Association (SECOORA). This imagery was used by OR&R, as well as the U.S. Geological Survey and the National Geospatial Intelligence Agency.

NOAA envisions a national network that delivers high-frequency radar data as an important step in enhancing the Nation's response capabilities. Because we cannot predict where a spill will occur, data delivery from high-frequency radars is envisioned to be part of a seamless national system that will ensure observational information is available. To detect the presence of subsurface oil and estimate its movement beneath the surface, one needs a suite of observing assets combined with three-dimensional ocean circulation models. In addition to the high-frequency radars to monitor the surface currents, high-resolution circulation models informed by three-dimensional fields of temperature and salinity are needed. While ship surveys have been the conventional method for observing three-dimensional fields of temperature, salinity, and other properties, such as chlorophyll and nutrients, this method is slow and costly.

Question 2. Despite NOAA being the Nation's primary oceanographic research agency, there is no official NOAA role in approving use of dispersants, nor any man-

date for EPA to consult with NOAA before approving the novel use of dispersants in subsea applications. To what degree has NOAA been involved in conversations with EPA or other agencies regarding the use of dispersants, including subsea applications, and the amount, duration, and frequency of their use? What specific testing has NOAA carried out regarding the potential impact of the 1.8 million gallons of dispersant will have on the living marine resources of the Gulf of Mexico? What tests can NOAA continue to do in the wake of this disaster to help us better understand the impact of these unprecedented volumes of chemical dispersants on the environment?

Answer. The National Contingency Plan (NCP) establishes the framework for use of dispersants in an oil spill response. The NCP requires the Regional Response Teams (RRT) and Area Committees to plan for the use or non-use of dispersants in advance of spills. This collaborative process, which brings together expertise from both Federal agencies and state governments, ensures that the tradeoff decisions between water column and surface/shoreline impacts are deliberated. The RRT consists of designated representatives from each Federal agency participating in the National Response Team (NRT), including NOAA as a representative of the Department of Commerce, and state representatives.

NOAA does not have a regulatory role in approving dispersant products, but NOAA has three main roles with respect to dispersant use: (1) NOAA serves on behalf of the Department of Commerce in spill response preparedness and decision-making activities through the NRT and RRT. As a trustee agency on the RRT, NOAA must approve any preauthorization for the use of dispersants in that region; (2) as a trustee agency on the RRT, NOAA must be consulted by the Federal On-Site Coordinator (FOSC) on any incident-specific use of dispersants within the region; and (3) NOAA participates in monitoring for the efficacy of dispersants via the Special Monitoring of Applied Response Technologies (SMART) program. NOAA's Scientific Support Team is designated as a special team by the National Contingency Plan and provides a broad array of scientific services to the response, including recommendations to the FOSC on the appropriate use of dispersants. NOAA is also a member of the SMART program, an interagency, cooperatively designed program, which includes the U.S. Environmental Protection Agency (EPA), the U.S. Coast Guard, and other agencies, to monitor the efficacy of dispersant and in situ burning operations. SMART relies on small, highly mobile teams that collect real-time data using portable, rugged, and easy-to-use instruments during dispersant and in situ burning operations. Data are channeled to the Unified Command to help address critical questions. NOAA also uses SMART data to inform 24, 48 and 72 hour oil fate and trajectory models as dispersants can affect the behavior of the spilled oil.

EPA has conducted studies to determine the toxicity of different dispersant products. On June 30, 2010, EPA released the results of initial screening tests to assess cytotoxicity (cell death), endocrine activity, and acute toxicity of eight available dispersants.

The second phase of EPA's testing, released on August 2, 2010. The dispersant-oil mixtures can be generally categorized in the moderately toxic range.

On June 30, 2010, EPA released the results of initial screening tests to assess cytotoxicity (cell death), endocrine activity, and acute toxicity of eight available dispersants. The second phase of EPA's testing, released on August 2, 2010 demonstrated that the dispersant-oil mixtures can be generally categorized in the moderately toxic range.

Research on the effectiveness and effects of dispersants and dispersed oil have been underway for more than three decades, but vital gaps still exist. The Supplemental Appropriations Act of 2010 provides EPA with an investment of $2 million to study the potential human and environmental risks and impacts of the release of crude oil and the application of dispersants, surface washing agents, and other mitigation measures listed in the National Contingency Plan Product Schedule and directs EPA to coordinate with the Secretary of Commerce and the Secretary of the Interior. One area of focus has been on determining the toxicity and long-term effects of dispersants and dispersed oil on sensitive marine life. It is now clear that effectively dispersed oil declines rapidly in concentration due to ocean mixing, and degrades faster than untreated surface or shoreline oil.

NOAA is currently undertaking testing of the uptake and depuration, or cleansing, of dispersants in Gulf species, including fish, shrimp, and oysters. The results from these studies will guide any further testing of the toxicity of dispersant and dispersant plus oil.

NOAA continues to evaluate whether dispersants are bioavailable (physiologically absorbed) in different marine species, environments and conditions. In addition,

NOAA continues to evaluate whether exposure to the combination of oil and dispersants affects toxicity in a range of species relative to exposure only to oil.

The effects of the dispersed oil on marine life depend on concentration and duration of exposure of organisms to the dispersed oil. At the sea surface, early life stages of fish and shellfish are much more sensitive than juveniles or adults to dispersants and dispersed oil. This increased sensitivity coupled with the fact that these organisms reside just below the surface of the ocean where concentrations of the dispersed oil are initially greatest means that these organisms are most likely to be impacted. There are no data on the toxicity of dispersed oil to deep-sea biota at any life stage, so we have to extrapolate based on existing knowledge. However, at both the surface and subsurface level, modeling and monitoring is confirming that dispersed oil concentrations decline rapidly with distance from the well head as the oil mixes with sea water and, with the currents, moves away from the treatment areas.

Under the Oil Pollution Act of 1990 (OPA), state and Federal Natural Resource Trustee agencies are responsible for assessing the injury, loss or destruction of natural resources due to spills—including ecological services and lost human uses of those resources. The trustees are also assessing impacts from the response, including burning, and dispersant use at the surface and at bigger depths. While it is still too early in the process to know what the full scope of the damage assessment will be, NOAA and co-trustees continue to collect data in the Gulf and across the five affected states. These data will be used to determine what natural resources have been injured and what human uses have been diminished or lost due to the spill.

Question 3. The IATAP process has unfortunately made only a few new technologies operational during this spill response. Given the fragile nature of much of this shoreline, for example, extensive wetlands, and beaches with sensitive bird and turtle nests, development of new, environmentally sensitive restoration methods and technologies will be vital to the longterm success of this effort. How can NOAA and the Coast Guard adapt the IATAP process to avoid the delays and duplication that has resulted in approval of so few new response technologies?

Answer. This question is outside NOAA's area of expertise as NOAA's role in the BP *Deepwater Horizon* oil spill is to provide scientific support to the Unified Command and National Incident Commander, to conduct a natural resource damage assessment pursuant to the Oil Pollution Act with co-trustees to assess and restore natural resources injured by the oil spill, and to represent the Department of Commerce in spill response decision-making activities through the National Response Team. We recommend the Committee contact the Coast Guard for a response to this question.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. ROGER F. WICKER TO DOUGLAS HELTON

Question 1. In your written testimony you speak at length about the activities to improve future response efforts by NOAA to future oil spills, including new technologies to study the movement of oil subsurface. What resources are available to NOAA through partnerships with the private sector and academic institutions to enhance response activities to future oil spills?

Answer. NOAA has built strong relationships with the academic sectors, which prove to be a valuable resource in quickly leveraging expertise and resources in response to environmental disasters. Currently, NOAA supports 18 Cooperative Institutes consisting of 42 universities and research institutions across 23 states and the District of Columbia. Because many Cooperative Institutes are co-located with NOAA research laboratories, there is a strong, long-term collaboration between scientists in the laboratories and in the university. Cooperative Institute scientists in all of NOAA's scientific mission areas can be quickly mobilized through cooperative agreements. NOAA's National Sea Grant Program also awards grants to state Sea Grant College programs which are co-located at universities in coastal states. In addition, NOAA also supports the Undersea Research Program (NURP), which is comprised of six regional Centers and one National Institute, all located at universities. NURP provides NOAA with the unique ability to access the undersea environment, either directly with submersibles and technical diving, or virtually using robots and seafloor observatories.

The use of the U.S. Integrated Ocean Observing System (U.S. IOOS), a Federal, regional, and private-sector partnership working to enhance our ability to collect, deliver, and use ocean information, was successfully demonstrated in the response effort to the BP *Deepwater Horizon* oil spill. Information on surface currents of the ocean is a key input to the models that generate estimates of the extent and trajec-

tory of an oil spill. This information is provided from the Gulf of Mexico Coastal Ocean Observing System (GCOOS) and the Southeast Coastal Ocean Observing Regional Association (SECOORA), regional associations that are part of U.S. IOOS.

NOAA also partnered with several private firms (*e.g.,* Roffers Ocean Fishing Forecasting Service, WET Labs, and Turner Designs) to provide rapid, high-tech solutions to detect, monitor, and analyze the presence of oil in the Gulf.

NOAA was able to provide rapid response to the oil spill through academic and private sector partnerships. These collaborations leveraged personnel, research vessels and ship time, aircraft, cutting-edge technology, and other resources to:

- Conduct multiple research cruises to:
  - Collect and analyze water and tar ball samples
  - Study the physical properties of the Gulf and
  - Catalog impacted organisms
- Better understand and monitor the Gulf's circulation in order to predict the surface and subsurface oil movement
- Monitor oil plumes in the water column
- Develop new sensors for detecting oil in the water column
- Fund rapid response projects to study impacts of the oil spill on marine and coastal ecosystems
- Fund community extension activities, including:
  - Identifying and communicating crucial stakeholder needs to authorities and researchers
  - Providing guidance and coordination regarding seafood safety, fisheries closures and approaches to re-opening closed fisheries
  - Explaining the types of legal claims available to the public
- Model air quality impacts from the oil burning and evaporation
- Provide surface current data for NOAA's spill trajectory models
- Assist with collecting data below the surface of the water through autonomous underwater vehicles, or gliders

Within the NMFS, limited resources are available under NMFS Product Quality and Seafood Safety Program for partnerships on oil spill response for seafood safety. NMFS does work with many partners to rescue, study, and respond to injured or health-impaired marine mammals and sea turtles. NMFS Southeast Region has a close relationship with the Northern Gulf Institute (NGI), a NOAA Cooperative Institute with five university partners along the northern Gulf of Mexico. NGI has a formal relationship with the Institute for Marine Mammal Studies, one of the participants of the Marine Mammal Stranding Network. NGI partners perform postmortem analyses and NGI-member universities have the capability and capacity to collaborate and participate in a NOAA-led stranding and response network.

Question 2. Has NOAA identified areas in response to this spill where services provided by private sector operations or academic institutions could be further utilized?

Answer. NOAA has always utilized private sector services for response and assessment activities, and has standing working relationships with academic institutions, such as Louisiana State University and University of New Hampshire. These are key members of our team who participate in regular meetings and trainings to be ready to respond. NOAA welcomes the opportunity to continue to work with the private sector and academic institutions in the future.

Question 3. What makes the IOOS partnership work successfully? What is the potential for more specific partnerships between NOAA and the private sector, such as that of IOOS?

Answer. The IOOS partnership is successful because it is a collective partnership between the Federal Government and non-Federal partners collecting and managing ocean, coastal and Great Lakes data. A key element of this partnership is using ocean, coastal and Great Lakes data that both meets regional needs and supports national priorities. This regional component, known as the Regional Coastal Ocean Observing System (RCCOS) structure has matured over the last 3 years under the U.S. IOOS office in NOAA. This arrangement positions the United States to take advantage of a coherent collection, management and open availability of data in usable formats to support the development of a variety of products and services to assist coastal managers and decisionmakers in need of information.

Industries participate in and benefit from IOOS in a number of ways:

- As providers of observing system components (for example, design and manufacture of ocean sensors, instruments, buoys and satellites);
- As providers of observing system data and communications infrastructure (for example, designing and building data assembly, data analysis and data/information dissemination systems);
- As operators of some system components and infrastructure providing maintenance and support functions (For example, maintaining buoy systems and hosting data systems);
- By providing privately funded data/information to the IOOS endeavor;
- As intermediate service providers who use IOOS data/information as an input to the creation of value added products for use in specific applications;
- As end-user beneficiaries whose business operations and business decisions benefit directly or indirectly from IOOS data, which includes quality controlled, real time hourly observations.

Question 4. Is there capacity for more seafood testing to be performed in Pascagoula?

Answer. Capacity in Pascagoula, Mississippi has been expanded to increase timely sample processing and sensory testing of seafood in order to reopen areas to fishing when it is shown that seafood is not exposed to oil at levels that are of concern to human health. In addition, NOAA is currently adding capacity in Pascagoula to allow for additional chemical testing for both the seafood safety program and for future monitoring of the Gulf of Mexico in the aftermath of the BP *Deepwater Horizon* oil spill.

Question 5. Can the NOAA facility in Pascagoula perform chemical testing?

Answer. The National Seafood Inspection Laboratory in Pascagoula is currently establishing the capacity to perform the chemical screening test recently developed by the Food and Drug Administration, in addition to the chemical test for polycyclic aromatic hydrocarbons. Analytical chemical testing requires both specialized equipment and staff with a high level of analytical chemical expertise and experience with oil spills. This specialized expertise and equipment currently exists at the Northwest Fisheries Science Center laboratory in Seattle and the scientists there have been involved in multiple oil spill events starting with the *Exxon Valdez* spill. Moreover, staff from Seattle have been on rotational assignments to assist the Pascagoula lab to meet the demands of this spill of national significance. NOAA is evaluating the chemical testing capacity in Pascagoula to determine the appropriate expansion to increase efficiency and complement existing capacity in Seattle.

Question 6. What seafood tests related to this oil spill are being performed at other NOAA facilities outside the Gulf Coast region that could be performed at the Pascagoula facility?

Answer. There are no other seafood tests currently being conducted at other facilities that can be carried out in Pascagoula. As noted above, NOAA is currently establishing chemical seafood testing capacity in Pascagoula based on what exists in Seattle.

Question 7. How much time would be saved if this testing was performed by the locally-equipped and capable NOAA facility?

Answer. Currently, all samples are prepared for both sensory and chemical testing in Pascagoula, but the chemical analyses is done in Seattle. The sensory tests are performed on-site in Pascagoula the same day the samples are prepared. Once the samples are prepared they are then shipped overnight to Seattle for chemical analyses, thus the savings in time of having capacity in Pascagoula would be 1 to 1.5 days. The advantage of chemical testing capacity in Pascagoula would not necessarily reduce the time required for analysis, but would increase the capacity for additional samples to be analyzed on a weekly basis.

Question 8. What steps is NOAA implementing to increase seafood testing capabilities along the Gulf Coast?

Answer. NOAA is confident in the sensory and chemical testing currently being conducted to detect possible contamination in seafood. In response to ongoing public concerns about seafood safety and dispersants, we have been working together with our scientific partners at FDA to develop a chemical test to detect dispersant in seafood. This test, once validated, will provide additional public confidence in the safety of Gulf seafood. NOAA is also evaluating the efficacy of establishing the comprehensive analysis method which is currently used in Seattle in Pascagoula. This requires more sophisticated equipment and analytical chemistry expertise.

Question 9. Is the speed of testing holding up the re-opening of fishing grounds?

Answer. The reopening of fishing grounds is not being delayed by NOAA's capacity to conduct both the sensory and chemical testing required. Capacity to both process and conduct sensory analysis has been increased and additional chemical testing capacity is being implemented currently.

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