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Thank you, Mr. Chairman and members of the Committee, for the opportunity to testify about the National Oceanic and Atmospheric Administration's (NOAA's) role in oil spill research and development. I am Doug Helton, Incident Operations Coordinator for the Emergency Response Division in NOAA's Office of Response and Restoration.

OVERVIEW

Our marine transportation system is an integral part of the U.S. economy. According to a recent report from the Bureau of Transportation Statistics, our marine transportation system conveys as much as 78 percent of U.S. international merchandise trade by weight and 44 percent by value through our nation's ports each year, far more than any other mode of transportation . Every day vessels containing large quantities of oil — some up to 50 million gallons — travel through our waterways to their destinations. These vessels include not only oil tankers but also container ships, fishing vessels, ferries, and other public and private vessels that carry millions of gallons of fuel oil and some of which may carry hazardous materials as cargo.

Over the past fifty years, ships have doubled in length, width, and draft, and seagoing commerce has tripled. The Department of Transportation projects that by 2020 the volume of maritime trade will more than double from 1998 levels, particularly in international container traffic[1]. Wherever these vessels travel on our waters, there is an associated risk that oil may spill and/or there may be a release of hazardous cargo (if present) into the water or the atmosphere. While vessels take every precaution to avoid these situations, they do happen and when spills occur, they can cause widespread environmental, economic, and social impacts. For example, if an oil spill were to disrupt the movement of commerce at the Port of Los Angeles, it could have economic impacts across the entire country due to the volume of commercial items that come through that port every day. Effective spill response keeps commerce moving and reduces clean-up costs and environmental impacts.

[1] USDOT Freight Analysis Framework National Summary: 1998, 2010, 2020.

Although our nation's energy policy likely will incorporate more alternative energy sources in the future, the U.S. will continue to rely on oil for years to come. Oil spills are an unfortunate but unavoidable consequence of using oil to fuel our transportation system and meet our domestic energy needs.

The nation is also facing new challenges from a changing climate. The summer melting of Arctic sea ice has opened up shipping channels and energy exploration options that were inaccessible just a few years ago. The resulting increase in vessel traffic and exploration activities will increase the potential for oil spills to occur in the Arctic. We have learned that many of today's standard approaches to oil spill clean-up and restoration do not apply in the cold Arctic waters, and there is a need for improved understanding and better methods to clean up and restore this fragile environment. In other areas of the country, aging oil infrastructure in coastal areas will be susceptible to sea level rise and more frequent and violent storms in U.S. coastal areas.

The best action to take is to prevent oil spills from occurring. However, despite our best prevention efforts and advances that have been made over the past twenty years, there are still thousands of spills every year. Most are small spills less than 100 gallons. However, the DM932 barge spill in the Mississippi River in 2008 is a stark reminder that large spills still occur, and the 2007 Cosco Busan incident in San Francisco Bay reminds us that large volumes of oil do not have to be spilled for an incident to cause significant regional impacts. Once oil is released into the marine environment, our goal is to quickly and effectively mitigate and restore any harmful effects. An effective response, based on solid science and smart decision making, reduces environmental and socioeconomic impacts as well as clean-up costs.

NOAA'S ROLE IN RESPONSE

While several other agencies, including the Department of Homeland Security, the Department of the Interior, and the Environmental Protection Agency, have important roles in oil spill clean-up and oil spill research, my testimony will focus specifically on NOAA's roles. When oil is spilled into the marine environment, NOAA has three critical roles mandated by the *Oil Pollution Act* and the National Contingency Plan:

1. Serve as a single conduit for scientific information to the Federal On-Scene Coordinator to provide trajectory predictions for spilled oil, overflight observations of oil on water, identification of environmental areas that are highly valued or sensitive, and shoreline surveys of oil to determine clean-up priorities.
2. Conduct a natural resource damage assessment with the goal of restoring any ocean resources harmed by the spill. This includes fulfilling the role of Natural Resource Trustee for impacted marine resources.
3. Represent Department of Commerce interests in spill response decision making activities through the Regional Response Team.

NOAA serves the nation by providing expertise and a suite of products and services critical for making science-based response decisions that prevent further harm, restore natural resources, and promote effective planning for future incidents. Federal, state, and local agencies across the

country called upon NOAA's Office of Response and Restoration for scientific support 169 times in 2008. Most of these calls were related to oil spills.

NOAA's Scientific Support Coordinators are located around the country in U.S. Coast Guard (USCG) Districts, ready to respond around the clock to any emergencies involving the release of oil or hazardous materials into the oceans or atmosphere. During an oil spill, the Scientific Support Coordinator delivers scientific support to the USCG in its role as Federal On-Scene Coordinator. Using experience, expertise, and state-of-the-art technology, NOAA forecasts the movement and behavior of spilled oil, evaluates the risk to resources, conducts overflight observations and shoreline surveys, and recommends protection priorities and appropriate clean-up actions. NOAA also provides spot weather forecasts, emergency coastal survey and charting capabilities, aerial and satellite imagery, and real-time coastal ocean observation data to assist response efforts. Federal, state, and local entities look to NOAA for assistance, experience, local perspective, and scientific knowledge.

Effective spill response also depends on effective planning and preparation, which is how NOAA responders spend the bulk of their time between spills. NOAA promotes preparedness by representing the Department of Commerce on the National Response Team and working closely with regional response teams and local area committees to develop policies on dispersant use, best clean-up practices, communications, and ensuring access to science-related resources, data and expertise. In addition, NOAA enhances the state of readiness by conducting training for the response community and developing better response tools including trajectory models, fate models, and integrating improved weather and ocean observing systems data into spill trajectory forecasts.

NOAA'S ROLE IN DAMAGE ASSESSMENT AND RESTORATION

Oil spills affect our natural resources in a variety of ways. They can directly impact our natural resources, such as the oiling of marine mammals. They can also diminish the ecological services provided by these natural resources, such as when oil degrades a coastal marsh that provides habitat for fish and wildlife. Oil spills may also diminish how we use these resources, by affecting fishing, boating, beach going, and wildlife viewing opportunities.

As the lead federal trustee for marine resources, NOAA is mandated by the *Oil Pollution Act* (*OPA*) to achieve full compensation for the public for injuries to natural resources resulting from an oil spill. *OPA* encourages compensation in the form of restoration and this is accomplished through the Natural Resource Damage Assessment process — by assessing injury and then developing a restoration plan that appropriately compensates the public for the injured resources. NOAA scientists and economists provide the technical information for natural resource damage assessments and work with other trustees and responsible parties to restore resources injured by oil spills. To accomplish this effort NOAA experts collect data, conduct studies, and perform analyses needed to determine whether and to what degree coastal and marine resources have sustained injury from oil spills. They determine how best to restore injured resources and develop the most appropriate restoration projects to compensate the public for associated lost services. Over the past 20 years, NOAA and other natural resource trustees have recovered over $440 million from responsible parties for restoration of wetlands, coral reefs, oyster reefs, and other important habitats.

The successful recovery of injured natural resources depends upon integrated spill response and restoration approaches. The initial goals of a response include containment and recovery of floating oil because recovery rates for floating oil can be quite high under certain conditions. As the oil reaches the shoreline, clean-up efforts become more intrusive and oil recovery rates decline. At this point it becomes important to recognize that further spill response can cause additional harm to natural resources and actually slow recovery rates. Such decision points need to be understood so that cost effective and successful restoration can take place. Further research on clean-up and restoration techniques and the recovery of environmental and human services after spills can improve such decision-making.

NOAA'S ROLE IN OIL SPILL RESEARCH

Strong science is critical to effective decision-making to minimize the economic impacts and mitigate the effects of oil spills on coastal and marine resources and associated communities. Continued use of science, through robust research and development program, can improve the effectiveness of spill response efforts and habitat restoration.

In 1990, the *OPA* recognized the need for research by creating the Interagency Coordinating Committee on Oil Pollution Research to establish a coordinated effort among industry, universities, and agencies to address oil pollution research and development. While some funding has been provided through various state and federal agencies and industry, the comprehensive research and development envisioned by *OPA* has not been achieved. Oil spill research in the private and public sectors has declined over the years in part because larger spills have become less frequent. While research has resulted in advancement in some technologies, our nation's capabilities can be strengthened.

OPA does grant NOAA the authority to carry out research and development. NOAA's most recent effort in oil spill research was through a partnership with the Coastal Response Research Center (CRRC) at the University of New Hampshire. Research at the CRRC focused on improving decision-making capabilities for dispersant use on oil spills, improving predictive and response capabilities for deepwater well blowouts, and improving response in cold-water environments through national and international collaborations. This research also included collaboration with government, industry and international partners to identify plausible disaster scenarios facing the Arctic, outlined how NOAA and its partners would respond, and determined response and research needs. We have worked with our partners to address other pressing issues including submerged oil, human dimensions of spills, assessment and restoration of ecosystem services, environmental tradeoffs, integrated modeling, and methods associated with in-situ burning approached in coastal marshes to minimize further injury to resources.

PRIORITY RESEARCH AREAS FOR THE NATION

NOAA has seen the value of a strong and successful partnership with the academic community to focus on priority program-driven oil spill research areas. Future research activities that would benefit NOAA oil spill response and restoration include:

- Improved oil spill modeling to better predict where the oil will go in the environment. We currently lack the modeling capability to determine how oil will behave in icy

environments or when it sinks below the surface. Improving our fate and trajectory models even a small amount may result in improved response efficiency and considerable reduction in spill costs. The FY 2010 President's Request includes resources to address modeling needs, with a particular focus on three-dimensional models.

- Better response methods and improved capabilities for response in cold water spills, and baseline understanding of Arctic resources for conducting injury assessments and developing restoration strategies. This is important as Arctic development leases are issued and marine transportation increases.

- Better understanding of climate change on existing ecosystems and how this will directly affect long-term restoration options.

- Better use of remote-sensing technologies, Unmanned Aerial Vehicles, and an improved ability to access and use real-time observation systems to optimize clean-up operations. For example, when oil spreads across the water it does not do so in a uniform manner. Oil slicks can be quite patchy and vary in thickness. The effectiveness of response options the booms, skimmers, and dispersants – depends on whether they are applied in the areas of the heaviest oil. NOAA's trajectory modeling and visual observations though overflights can help direct the application of spill technologies, but remote sensing technology could be used to more effectively detect oil, determine areas of heaviest amounts of oil, and then use this information to direct oil skimming operations and increase the recovery of spilled oil. Remote sensing technology could have also assisted in the *Cosco Busan* oil spill. Traditional methods of visual observation can be difficult at night or in low visibility conditions, as was the case in the *Cosco Busan* response.

- Improved use of real time data on currents, tides and winds in driving oil predictions models. As the Integrated Ocean Observing System generates more data from technological advances like high frequency radar, oil location predictions can be improved by pulling these observations into trajectory models in real time. To accomplish this will require research to work out effective protocols and procedures.

- Improved understanding of the long-term effects of oil on sensitive and economically important species.

- Incorporation of impacted communities into the preparedness and response processes to address the human dimensions of spills, including social issues, community effects, risk communication methods, and valuation of natural resources.

EXAMPLES OF THE IMPORTANCE OF RESPONSE, RESTORATION, AND RESEARCH

I would like to illustrate some examples of two significant oil spills (*Athos I and M/V Selendang Ayu)*, NOAA's role in these responses, and the issues and challenges encountered during the response to these oil spills.

M/V Selendang Ayu

On December 7-8, 2004, the cargo vessel *M/V Selendang Ayu* lost power, ran aground and broke in half on the shore of Unalaska Island, Alaska, losing her 60,000 ton cargo of soybeans and spilling approximately 335,000 gallons of fuel oil. During the response, NOAA participated in aerial observations and mapping of floating and beached oil, provided trajectory analysis, conducted shoreline assessments to determine the magnitude and extent of the contamination, as well as provided on-scene weather information, including the establishment of an emergency remote weather station and the provision of a dedicated on-scene meteorologist. Since the initial response NOAA has continued to work with the other natural resource trustees and the responsible party to conduct a natural resource damage assessment, and evaluate restoration alternatives.

The remote location of the spill along with the difficult conditions (e.g., weather, cold water, etc.) posed many challenges to the response. These challenges are similar to ones we may face in the future in responding to spills in the Arctic. The issues encountered in the *Selendang* spill response demonstrate the importance and need for sustained oil spill research. The Port of Dutch Harbor on Unalaska Island is the largest fishing port in the United States and has the largest Alaskan native subsistence community in the Aleutians. NOAA, U.S. Fish and Wildlife Service, and the State of Alaska worked with the local community to address subsistence and seafood safety concerns. Any real or perceived contamination of fisheries products with oil has the potential to disrupt both the local community and worldwide markets. Better knowledge and understanding of the short-term and long-term potential impacts of both floating oil and submerged oil on fisheries would have been beneficial in the response and the injury assessment decision-making.

Due to the severe winter weather conditions, the response was halted during the winter. The USCG continued to conduct periodic overflights to monitor the wreck. The vessel was in poor condition and was still carrying a large quantity of oil, and had the vessel lost that oil it may have taken 24 hours or more before that was detected through overflights. Improved remote sensing technologies could have helped monitor the wreck and detect any spilled oil.

The Scientific Support Coordinator provided input on environmental issues to the Unified Command, including technical matters related to potential dispersant use. While dispersants were readily available, the Unified Command decided not to use dispersants because of uncertainty about the effectiveness of the available dispersants on the type of oil spilled, and the potential environmental impacts. Dispersants are rarely used in spill response, mainly due to our lack of understanding of the environmental impacts of dispersants. While there have been advancements in the application of dispersants and their efficacy of dispersion once applied, there is still a gap in research to determine the long-term fate and effects of dispersants on marine life.

Another issue that arose was the fate of residual oil. This is a common issue with large oil spills, and has certainly been the case with the Exxon Valdez oil spill. Twenty years after the *Exxon Valdez* spill there is still residual oil remaining on the Alaskan shoreline. When oil is spilled into the water, a goal is to minimize the environmental impacts. One method to do this is through

rigorous clean-up techniques to remove oil from the shoreline. However, some of these techniques can actually do more environmental harm than leaving the oil in place. We need to better understand the fate of lingering oil — where will it persist, in what types of environments, what are the impacts to the environment from this remaining oil, as well as the effects of low-level chronic exposure on birds and mammals. This type of information is critical as decisions are made in the clean-up operations and to determine the potential trade-offs in using one clean-up technique versus another. This information is also critical to how we assess the injury to natural resources from the spill and restoration options. Further research in this area to improve decision making can reduce the overall environmental impacts and clean-up costs.

M/T Athos I

On November 26, 2004, the *M/T Athos I*, a 750-foot tanker, hit a submerged object in the Delaware River near Philadelphia, PA, spilling approximately 265,000 gallons of heavy oil. The oil spread down river, ultimately oiling 57 miles of Pennsylvania, New Jersey, and Delaware shorelines. In addition to surface and shoreline oiling, a portion of the oil migrated below the water surface, complicating response and assessment efforts. During the response, NOAA provided its traditional support: oil trajectory analysis, weather forecasts, identification of sensitive resources at risk, coordination of shoreline impact assessment, recommendations on environmentally appropriate clean-up techniques, and seafood safety consultation.

The spill closed the Delaware River to commercial vessel traffic for over a week. The submerged oil resulted in contamination of water intakes and the closure of the Salem Nuclear Power Plant. The detection of submerged oil was a critical economic issue in this case, essential to the reopening of the port and the reactivation of the power plant.

The *Athos I* incident is a reminder that there is still a need to sustain an integrated spill response and restoration research program. NOAA's response to the *Athos I* spill highlighted the need for improved understanding of the transport and fate of submerged oil, and the need to develop more efficient technologies for submerged oil detection, tracking, and modeling. The *Athos I* response also highlighted the need for additional research on ways to collect submerged oil and/or protect locations from it. Without reliable technologies for prediction and detection, the Federal On-Scene Coordinator and his science staff are placed in the position of "proving a negative" to the public in order to ensure no continued threat. Such "proof" adds time and expense to the response and can substantially raise the overall costs of clean-up. NOAA's research efforts continue to address these concerns. Better modeling and understanding of submerged oil behavior could have prevented the plant closure.

CONCLUSION

Thank you for the opportunity to discuss with you NOAA's important role in oil spill response and resource restoration. NOAA's expertise is critical to prevent further harm, restore natural resources, and aid planning and response decision-making associated with oil spills. Sound science is the foundation for effective spill response and restoration decision-making. It is critical that we continue to invest in high priority scientific research to develop the methods and techniques necessary to improve the effectiveness of spill response and restoration. I am happy to answer any questions that you may have.