**COMMITTEE ON SCIENCE AND TECHNOLOGY**
**Subcommittee on Energy and Environment**
**U.S. HOUSE OF REPRESENTATIVES**
**HEARING CHARTER**

***Deluge of Oil Highlights Research and Technology Needs for Oil Recovery and Effective Cleanup of Oil Spills***

Wednesday, June 9, 2010
10:00 a.m.
2318 Rayburn House Office Building

## Purpose

On Wednesday, June 9, 2010 the House Committee on Science and Technology, Subcommittee on Energy and Environment will hold a hearing entitled "***Deluge of Oil Highlights Research and Technology Needs for Oil Recovery and Effective Cleanup of Oil Spills.***" The purpose of this hearing is to explore the research, development, and technology needs for the recovery of oil and effective cleanup of oil spills. The Committee will examine federal agency roles in oil spill response research, the activities and programs federal agencies have pursued since the passage of the Oil Pollution Act of 1990, the current gaps in spill response research and technology development, and what is needed to improve the coordinated federal response going forward.

In addition, the Committee seeks to understand how oil interacts with the natural environment, the extent to which oil can be bioremediated through natural processes, the ecosystem effect(s) of chemically dispersed oil and of natural biodegradation, and the effectiveness of currently deployed technologies such as booms, skimmers, and *in situ* burns. The Committee also seeks to identify the barriers to the development and use of transformational technologies for oil spill cleanup.

## Witnesses

Panel I

- **Mr. Douglas R. Helton,** Incident Operations Coordinator, Office of Response and Restoration, National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce.
- **Captain Anthony Lloyd**, Chief, Office of Incident Management and Preparedness, United States Coast Guard.
- **Ms. Sharon Buffington**, Chief, Engineering and Research Branch, Offshore Energy and Minerals Management, Minerals Management Service (MMS), U.S. Department of the Interior.
- **Dr. Albert Venosa**, Director, Land Remediation and Pollution Control Division, National Risk Management Research Laboratory, Office of Research and Development (ORD), U.S. Environmental Protection Agency (EPA).

Panel II

- **Dr. Jeffrey Short**, Pacific Science Director for Oceana. Dr. Short was the lead government chemist for the natural resource damage assessment and restoration of the Exxon Valdez oil spill and led numerous studies on the distribution, persistence, and effects of the oil.
- **Dr. Samantha Joye**, Professor of Marine Sciences, University of Georgia. Dr. Joye studies the biogeochemical cycling of nutrients and organic materials in coastal environments, ecosystem and geochemical modeling, and microbial ecology. She has been aboard the Walton Smith research vessel in the Gulf of Mexico as a member of a multidisciplinary science team, whose objectives are to conduct a comprehensive study of the deepwater plumes, including the plume's distribution, microbial activity, and geochemical constituents.
- **Dr. Richard Haut**, Senior Research Scientist, Houston Advanced Research Center. HARC is a non-profit based in the Woodlands, Texas that is dedicated to improving human and ecosystem well-being through the application of sustainability science and principles of sustainable development. Dr. Haut serves as the team lead for the Environmentally Friendly Drilling program.
- **Dr. Nancy Kinner**, Professor of Civil and Environmental Engineering, University of New Hampshire and Co-Director of the Coastal Response Research Center (CRRC). CRRC is a partnership between NOAA's Office of Response and Restoration (ORR) and the University of New Hampshire. Dr. Kinner is a Response Technology Engineer who works to transform research results into practice and conducts research on bioremediation of contaminated subsurface environments.
- **Mr. Kevin Costner**, Partner, Ocean Therapy Solutions (OTS). Mr. Costner's firm developed a device that separates oil from water that is currently being tested by BP in the Gulf of Mexico.

## Background

Oil spills are reported every day in the United States. Few spills are environmental disasters of national or global significance; most of the three million gallons of oil[1] that is spilled into U.S. waters each year goes unnoticed by the public. Regardless of the level of public awareness in each case, natural resources such as fish, corals, marine mammals, sea turtles, birds, beaches, coastal habitats, and water quality are often negatively affected, as are the businesses and industries which depend on the immediate and long-term health of these resources.

The United States has incorporated lessons learned from past spills into federal law[2] and relevant response readiness practices. We now have response tools and trained personnel at ports and aboard vessels across the nation. Oil recovery and clean up techniques, including *in situ* burns, chemical dispersants, skimmers, and floating oil-capturing barriers called "booms" have changed little since the Exxon Valdez oil spill of 1989.

[1] Oil and refined petroleum product

[2] The federal government's oil spill response framework is found in the National Contingency Plan (40 CFR Part 300). Congress first established the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) in 1968, after U.S. policymakers observed the response to a 37-million-gallon oil tanker spill (*Torrey Canyon*) off the coast of England. Subsequent laws have amended the NCP, including the Clean Water Act in 1972; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) in 1980; and the Oil Pollution Act (OPA) in 1990.

## Learning from the Past

The Exxon Valdez oil spill occurred in Prince William Sound, Alaska on March 24, 1989, when the *Exxon Valdez* oil tanker hit Bligh Reef and spilled at least 11 million gallons of crude oil, which eventually covered 1,300 miles of coastline[3] and 11,000 square miles of ocean.[4] The Exxon Valdez oil spill is considered to be one of the most devastating human-caused environmental disasters in U.S. history.[5]

The Exxon Valdez spill became a learning opportunity for spill responders and scientists from industry, government, academia, and the private sector. For example, although over 10,000 people contributed to the recovery effort, standard response technologies were largely ineffective due to weather conditions and properties of the spilled oil and the local environment. Response equipment was in short supply and inaccessible, and the remote location of the spill (accessible only by helicopter, plane and boat) strained government and industry response efforts. In addition to these constraints, the predominant scientific advice and public pressure at the time was to clean up one-hundred percent of the oil, which in some cases had adverse consequences. For example, shoreline cleanup methods such as the application of high-pressure hot water displaced and destroyed microbial populations; many of these organisms are the basis of the coastal marine food chain, and others (certain bacteria and fungi) are capable of facilitating the biodegradation of oil.

Despite the magnitude of the cleanup response, oil from the Exxon Valdez spill has left a lasting impact on Prince William Sound. Less than 10% of the oil was recovered from this spill, and a NOAA study determined that as of early 2007, more than 26,000 gallons of oil remained in the sandy soil of the contaminated shoreline, declining at a rate of less than 4% per year.[6] In addition to the long term ecological consequences of the Exxon Valdez oil spill, some important commercial fisheries have yet to recover in the region.[7]

## Legislative Response

The Oil Pollution Act (OPA) was signed into law, P.L. 101-380 (8-18-1990), in August 1990, largely in response to rising public concern following the Exxon Valdez oil spill. The intent of OPA was to improve the nation's ability to prevent and respond to oil spills by establishing provisions that expand the federal government's ability, and provide the funding and resources necessary, to respond to oil spills. In addition, OPA created the national Oil Spill Liability Trust Fund, which is available to provide up to one billion dollars per spill incident.

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[3] Questions and Answers. Exxon Valdez Oil Spill Trustee Council. http://www.evostc.state.ak.us Accessed 05 June 2010.

[4] The Exxon Valdez Spill is All Around Us. March 2009. Wired Science. http://www.wired.com/wiredscience/2009/03/valdezlegacy/ Accessed 05 June 2010.

[5] Oil Spill Facts. Exxon Valdez Oil Spill Trustee Council. http://www.evostc.state.ak.us Accessed 07 June 2010.

[6] Short JW, Irvine GV, Mann DH, Maselko JM, Pella JJ, Lindeberg MR, Payne JR, Driskell WB, and Rice SD. 2007. Slightly weathered Exxon Valdez oil persists in Gulf of Alaska beach sediments after 16 years. Environmental Science and Technology. 41: 1245-1250.

[7] Brown ED, Norcross BL, and Short JW. 1996a. An introduction to studies on the effects of the Exxon Valdez oil spill on early life history stages of Pacific herring, *Clupea pallasi*, in Prince William Sound, Alaska. Canadian Journal of Fisheries and Aquatic Science 53: 2337-2342.

OPA also mandated new requirements for contingency planning both by government and industry. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP)[8] was expanded under OPA in a three-tiered approach: the federal government is required to direct all public and private response efforts for certain types of spill events; Area Committees—composed of federal, state, and local government officials—must develop detailed, location-specific Area Contingency Plans; and owners or operators of vessels and certain facilities that pose a serious threat to the environment must prepare their own Facility Response Plans. Lastly, OPA increased penalties for regulatory noncompliance, broadened the response and enforcement authorities of the federal government, and preserved State authority to establish law governing oil spill prevention and response.

***Key Provisions of the Oil Pollution Act for Oil Spill Response and Cleanup***

- **Section 4202** Strengthens planning and prevention activities by: (1) providing for the establishment of spill contingency plans for all areas of the United States; (2) mandating the development of response plans for individual tank vessels and certain facilities for responding to a worst case discharge or a substantial threat of such a discharge; and (3) providing requirements for spill removal equipment and periodic inspections.

  — The planning and prevention activities conducted under this provision enables and guides the on-site response to the BP Deepwater Horizon oil spill in the Gulf of Mexico.

- **Section 2761** Establishes an Interagency Coordinating Committee on Oil Pollution Research (hereafter, ``Interagency Committee'') to coordinate a comprehensive program of oil pollution research, technology development, and demonstration among the federal agencies, in cooperation and coordination with industry, universities, research institutions, state governments, and other nations, as appropriate, and to foster cost-effective research mechanisms, including the joint funding of research. Fourteen federal partners are named as members of the Interagency Committee, and a representative of the Coast Guard serves as Chairman.

  This program provides for research, development, and demonstration of new or improved technologies which are effective in preventing or mitigating oil discharges and which protect the environment, including oil pollution technology evaluation, oil pollution effects research, marine simulation research, demonstration projects, simulated environmental testing, and regional research programs. In carrying out the regional research programs, the members of the Interagency Committee may enter into contracts and cooperative agreements and make grants to universities, research institutions, and other relevant entities in order to address regional research and technology needs.

  — The Interagency Committee produced the first Oil Pollution Research and Technology Plan in 1992 and, after consulting with the National Academy of Sciences, submitted a second

[8] The NCP provisions specific to oil spill response are codified in 40 C.F.R. Part 300, Subpart D. As the primary response authority in coastal waters, the U.S. Coast Guard On-Scene Coordinator (OSC) has the ultimate authority to ensure that an oil spill is effectively removed and actions are taken to prevent further discharge from the source. The OSC is broadly empowered to direct and coordinate all response and recovery activities of federal, state, local and private entities (including the responsible party), and will draw on resources available through the appropriate Area Contingency Plans and Regional Response Teams.

plan in 1997. The plans identified and prioritized twenty research and development program areas. These areas focused on spill prevention; spill response planning, training, and management; spill countermeasures and cleanup; fate and transport; and effects, monitoring, and restoration. The plans also assigned research and development focus areas to ten member agencies. The plan was last updated in 1997.

— Despite the Interagency Committee's detailed research plan, only modest technological advances have been made in oil spill cleanup technology since 1990. For example, the Interagency Committee reported that, as late as 1997, "most of the technology and information gaps of 1990 remain," due to a failure to appropriate sufficient funds for oil pollution technology programs.[9]

— Of the fourteen members of the Interagency Committee, NOAA, EPA, MMS, and the Coast Guard have conducted the majority of oil pollution research. Funding levels have been far lower than the $28 million per year originally authorized for the program.

BP Deepwater Horizon Oil Spill

On April 20, 2010, an explosion and fire occurred on the BP[10] Deepwater Horizon drilling rig in the Gulf of Mexico. This resulted in the death of eleven workers, a massive oil release, and a national response effort in the Gulf of Mexico region by the federal and state governments as well as BP.

Estimates of the flow reveal that this spill is projected to be much larger than that which occurred in the Exxon Valdez spill. The flow rate from the damaged well head is the subject of much scientific debate. The Flow Rate Group led by the U.S. Geological Survey (USGS) recently estimated that oil is flowing out of the damaged well head at a rate of 12,000 to 19,000 barrels per day.[11] To put these flow rate estimates into perspective, USGS's low estimate is equivalent to an oil spill the size of Exxon Valdez every 21 days and the high estimate is equivalent to an Exxon Valdez spill occurring every 13 days in the Gulf of Mexico. June 9, 2010 will be day 51 of the BP Deepwater Horizon oil spill.

The response to the BP Deepwater Horizon oil spill is the largest operation of its kind in U.S. history. Vast quantities of boom and chemical dispersant have been mobilized and deployed, and more *in situ* burns have been conducted than ever before for a single incident. A disaster of this magnitude forces decision makers to evaluate the tradeoffs and the net long-term environmental benefits of each response strategy. Despite the scale of the BP Deepwater Horizon response, efforts to mitigate the tremendous flow of oil have had limited effect. Thus far, the spill has damaged natural resources in the area and impacted the regional economy.

[9] Interagency Coordinating Committee on Oil Pollution Research (1997) *Oil Pollution Research and Technology Plan.*
[10] Formerly British Petroleum
[11] U.S. Geological Survey. May 27, 2010. Updated June 3, 2010. Flow Rate Group Provides Preliminary Best Estimate of Oil Flowing from BP Oil Well. News Release. http://www.doi.gov/news/pressreleases/Flow-Rate-Group-Provides-Preliminary-Best-Estimate-Of-Oil-Flowing-from-BP-Oil-Well.cfm# Accessed 06 June 2010.

### *Economy and Environment*

Oil spills can harm living organisms that inhabit ocean and coastal areas and may result in significant costs to businesses and the public. Coastal areas can be especially vulnerable because of oil stranding in wetlands and other coastal ecosystems. Oil coating, absorption, or ingestion can result in direct mortality and sub-lethal effects that reduce the fitness of regional organisms. When natural resources are affected by oil spills, services that benefit the public may be damaged.

To date, crude oil has been washing into marshes and estuaries and onto beaches and affecting wildlife in states including Louisiana, Mississippi, Alabama, and Florida. Underwater plumes of oil have been confirmed by independent and federal scientists. Wildlife has been killed and efforts are underway to save oil-coated birds and sea turtles. The most immediate economic impact of the oil spill has been on the Gulf fishing industry. Gulf fisheries, including seafood processing and related wholesale and retail businesses, support over 200,000 jobs with related economic activity of $5.5 billion annually.[12]

[12] Hagerty CL and Ramseur JL. 27 May 2010. Deepwater Horizon Oil Spill: Selected Issues for Congress. Congressional Research Service. http://crs.gov/ReportPDF/R41262.pdf Accessed 07 June 2010.