

**Research to Advance Health, Environment, and Oil System Safety in the Gulf of Mexico
and other Coastal Regions: An Update from the National Academy of Sciences**

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ABSTRACT 294314:

In 2010, the *Deepwater Horizon* explosion and fire caused the release of approximately 200 million gallons of crude oil into the Gulf of Mexico. As part of legal settlements with the companies involved, the federal government asked the National Academy of Sciences – an independent, non-profit organization chartered by Congress in 1863 to provide independent, expert, scientific, engineering, and healthcare advice to the nation – to establish a new \$500 million, 30-year research program focused on human health, environmental protection, and oil system safety in the Gulf region. The new program, called the Gulf Research Program, is directed to work in three areas: research and development, education and training, and environmental monitoring. Activities will focus on the Gulf of Mexico and other U.S. Outer Continental Shelf (OCS) regions, but work that transfers knowledge to or from other offshore U.S. or international hydrocarbon-producing regions is allowed under the mandate. The program seeks to encourage communication and collaboration among industry, academia, and government, and will emphasize innovation, education, collaboration, and cross-disciplinary work. This paper introduces the program, summarizes program planning, outlines the program's mission and goals, and highlights first-year activities.

INTRODUCTION:

In 2010, the *Deepwater Horizon (DWH)* explosion and fire caused the release of approximately 200 million gallons of crude oil into the Gulf of Mexico. The oil spill was the largest offshore spill in U.S. history and it caused significant impacts on the Gulf environment and people. For context, the second largest offshore spill in U.S. history was the 1989 spill involving the *Exxon Valdez* which spilled an estimated 11 million gallons of crude into Prince William Sound, Alaska. Other large spills in U.S. waters include the 1976 *Argo Merchant* spill (7.7 million gallons) off of Nantucket, Massachusetts, there was also a mix of spills totaling 7 million gallons with damages to boats, refineries and pipelines along the northern Gulf coast due to Hurricane Katrina, and there was the 1990 *Mega Borg* spill off of Galveston Texas that released 5.5 million gallons. One has to look abroad to find comparably-sized spills of the magnitude of the *DWH*, including the similar 1979 *Ixtoc 1* spill that involved an offshore platform and a well blowout that spilled an estimated 130 million gallons into the Gulf of Mexico.

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As part of legal settlements resolving criminal charges against the responsible parties in the *DWH* spill (BP Exploration and Production, Inc., and Transocean Deepwater Inc.), the federal government asked the National Academy of Sciences (NAS) to establish a new research program focused on human health, environmental protection, and oil system safety in the Gulf region. The new program, to be called the Gulf Research Program, will ultimately have US\$500 Million to use over 30 years toward three program objectives:

- Research and development
- Education and training
- Environmental monitoring

The settlement agreements called for a program that includes “studies, projects, and other activities that take advantage of the nation’s scientific, engineering, and health communities” and that advances “scientific and technical understanding with the objective of enhancing the safety of offshore oil drilling and hydrocarbon production and transportation in the Gulf of Mexico and on the United States’ outer continental shelf.” Activities are to be “determined solely by NAS” and “selected based on scientific merit and integrity, with emphasis on freedom of inquiry and independent nonpartisan advice and recommendations.”

Program activities will focus on the Gulf of Mexico (Figure 1) and other U.S. coastal and OCS regions where human communities, ecosystems, and energy production co-exist. Work that transfers knowledge to or from other places in the United States or other nations is included in the mandate.



Figure 1. Map of the Northern Gulf of Mexico with the U.S. states and major cities

The program will accumulate a total of US\$500 million (\$350M from BP and \$150M from Transocean) over 5 years (2013-2017). The funds will be held in a fixed term endowment that must be disbursed within 30 years. The assignment to work at the nexus of oil system safety, human health, and environmental protection over a long time horizon, with a significant pool of funds, presents an extraordinary opportunity to use science and technology to tackle large, complex safety, environmental, and health issues at the regional scale.

METHODS:

To establish the new program, the National Academy of Sciences (NAS) appointed an Advisory Group (Appendix A) and small staff to conduct a strategic planning process. The Advisory Group was appointed for the first year of the program and selected for their expertise and experience relevant to the program's objectives. The Advisory Group was charged to think carefully about vision, missions, and objectives and write a strategic plan that guides the program's initial activities. The Advisory Group hosted a series of meetings (additional details below) to interact with Gulf State agencies, universities, and organizations at the federal and state levels that are also involved in post-*Deepwater Horizon* science in the Gulf Coast region and develop an understanding of existing activities and perceived needs. Planning focused on understanding the settlement agreements, learning the landscape (understanding what others are doing), identifying perceived needs and, critical to the program's ultimate success, determining what will we do to fulfill our assigned mission and have lasting impact. At the time this paper was written, significant decisions about area of focus, portfolio balance, and other strategic issues remained to be made in the first half of 2014. The strategic plan is expected mid-2014. By late summer 2014, the Advisory Group will be replaced by a more formal Advisory Board, which may include members from the Advisory Group to insure continuity and some institutional memory.

Oversight to the Gulf Research Program is provided by the NAS, National Academy of Engineering, Institute of Medicine, and National Research Council, known collectively as "The National Academies." Activities will involve scientists, engineers, health experts, educators, and others from throughout the United States, the Gulf region, and relevant other countries in a variety of ways.

Since the *DWH* oil spill, there has been and continues to be a large influx of research funding dealing with Gulf-related research and restoration from various sources. For example, beginning in late 2010, BP committed US\$500M to create a new research program since named as the Gulf of Mexico Research Initiative (GOMRI). This program will run ten years and will investigate the impacts of the oil, dispersed oil, and dispersant on the ecosystems of the Gulf of Mexico with the overarching goal of improving fundamental understanding of the dynamics of such events and their environmental stresses and public health implications. More recently, the same Settlement Agreement that resulted in the funds for the National Academies' Gulf Research Program also funded the National Fish and Wildlife Foundation (NFWF). NFWF created the \$2.54 billion Gulf Fund as the vehicle to support a broad suite of restoration projects designed to remedy harm to natural resources in the Gulf States. The RESTORE Act (the Resources and Ecosystem Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act) was passed by the U.S. Congress on June 29, 2012 and dedicates 80

percent of all administrative and civil penalties (which are yet to be determined) related to the *DWH* spill to a Gulf Coast Restoration Trust Fund and outlines a structure by which the funds can be utilized to restore and protect the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, coastal wetlands, and economy of the Gulf Coast region.

Given these (and other) significant efforts already ongoing in the Gulf to advance understanding of the causes and impacts of the spill and use this knowledge to support a more sustainable region, the NAS's Gulf Research Program began with efforts to ensure that we understood the landscape of organizations and agencies involved in Gulf-related science and safety, what work has been done already, and what opportunities we might address. Setting realistic boundaries – defining our strategic focus and deciding what we will not do – was a critical early task because spreading \$500 million over 30 years does not allow an unlimited portfolio.

A key step in the initiation of the new program was to establish relationships with existing groups and people involved in Gulf of Mexico research. The first months of activity were devoted to engaging the Advisory Group members, external relationship-building, understanding the existing research landscape, determining perceived needs, and program planning. The Advisory Group held two orientation meetings, July 23-25 in New Orleans, LA, and August 28-30 in Washington, DC. The Advisory Group also held monthly teleconferences to advance its information-gathering and deliberations.

Teams of Advisory Group members and staff held a series of input meetings (one in each of the five Gulf States and two virtual meetings, including one with more than 100 participants), with the twin goals of introducing our organization and engaging the stakeholders of the Gulf region. As part of the settlement agreements, the Gulf Research Program is required to meet at least annually with Gulf State agencies involved in the post-*DWH* restoration efforts as well as those agencies responsible for environmental protection and natural resource management.

These “listening meetings” provided the Advisory Group and staff an opportunity to better understand the programs, policies and missions of these agencies that may overlap with those of the Gulf Research program. These meetings also provided insights into the challenges, needs, and issues that the states and the region face as they move forward following the *DWH* oil spill. In addition to meeting with state officials, the members and staff met with the relevant academic researchers and administrators, non-governmental organizations, public and environmental health experts, community organizations and others who helped articulate details of the Gulf States' plans and efforts to recover from the spill. These meetings included representatives from each of the Gulf State's Sea Grant programs, Departments of Natural Resources (Louisiana), Environmental Quality (Louisiana, Florida, and Mississippi), Louisiana's Coastal Protection and Restoration Authority, Florida's Department of Environmental Protection, Mississippi Department of Marine Resources, Alabama's Department of Conservation and Natural Resources, and the Gulf States Marine Fisheries Commission. NGO, business, and community representatives included staff from four of the Nature Conservancy state offices in the Gulf; the Gulf of Mexico Foundation; The American Red Cross, The Episcopal Diocese of Louisiana, National Wildlife Federation; Mississippi Center for Justice; and the Surfrider Foundation. Health experts were primarily from University health or medical centers such as Florida State University College of Medicine, the National Institute of Environmental Health Science's *DWH*

research Consortium, and Texas A&M's Health Science Center. Researchers and administrators in attendance came from most of the major universities with Ph.D.-granting programs in the medical, environmental and engineering sciences. These included the University of Alabama (Tuscaloosa and Birmingham campuses), Alabama State University, Auburn University, Jackson State University, LSU, Tulane, Nicholls State, Xavier, University of Florida, Florida State University, University of Miami, Florida A&M, Texas A&M (College Station, Galveston, and Corpus Christi campuses), University of Texas, Austin; University of Houston; University of Mississippi; Mississippi State University, University of Southern Mississippi, and the Dauphin Island Sea Lab.

The settlement agreements also require that the program begin interactions at the federal level with relevant groups such as The Interagency Coordinating Committee on Oil Pollution (ICOPR), as well as with the Department of the Interior's Bureau of Safety and Environmental Enforcement (BSEE) and Bureau of Ocean Energy Management (BOEM). Discussions with these and other state and federal agencies are underway and will be important to the success of the program.

Communications activities are and will be critical to program planning and, ultimately, implementation. The program developed a number of initial communications tools (website, program description flyer, e-newsletter, etc.) to provide information and ensure transparency of operations. Program metrics are in development such as multi-year program assessments and reviews. As part of the outreach efforts to stakeholders and the public, the program will produce an Annual Report that will be available on our website.

DISCUSSION:

Careful thought is needed to design a focused and, ultimately, effective program – especially one that capitalizes on the opportunity presented by a 30-year time horizon. What can we do that leaves a true, lasting impact? How can we facilitate innovation, education, and collaboration? The Advisory Group is in the process of formulating a strategic vision for the new Gulf Research Program. It will make recommendations to the leadership of the National Academies about the future directions of the program. Although subject to revision over the next months of program planning, the Advisory Group's initial thoughts about the program's overarching mission and goals are as follows:

Mission:

The NAS-NAE-IOM-NRC Gulf Research Program fosters innovative, collaborative, and cross-cutting approaches to research, education, and monitoring at the nexus of oil system safety, environmental quality, and public health in the Gulf of Mexico and other coastal regions.

Goals:

1. Support research, technology development, and information synthesis and assessment, that protects, restores, and improves environmental quality, oil system safety, public health, and community resilience in ocean and coastal oil- and gas-producing regions.

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2. Contribute to environmental protection and restoration through support of innovative and collaborative approaches to long-term environmental monitoring, including data analysis, interpretation, and application, in the Gulf of Mexico and other coastal regions.
3. Foster capacity-building and the engagement, education, and training of scientists, engineers, health professionals, and offshore industry operating personnel prepared to deal with future issues at the energy-environment- people interface.

In addition, the Advisory Group is in the process of identifying core program values that will provide direction when considering how to solicit proposals or when deciding whether a theme or activity serves the program's core mission. The Gulf Research Program aspires to:

- Be forward-looking, focused less on assessing past impacts and more on charting a sustainable and resilient future where human communities, ecosystems, and energy production co-exist.
- Bring a long-term perspective to complex problems faced by ecosystems and human communities that support or are affected by offshore oil and gas development.
- Complement the existing and foreseeable research landscape by emphasizing approaches, themes, and activities that are not addressed by other programs and by leveraging program resources in ways that increase our impact.
- Seek ways to facilitate work across boundaries (i.e., across states, disciplines, sectors).
- Use fair and credible practices to ensure excellence and openness in all program work (e.g., open solicitations, peer review, open data policies, open access to program outputs and results).
- Contribute to leadership development and community capacity building to prepare individuals, communities, and institutions for future leadership positions and to maintain improved health, ecosystem quality, and oil system safety into the future.
- Be wise stewards of program resources – use them in ways that, over time, provide benefits that might not be attained without our activities.
- Ensure that the program's activities benefit the Gulf of Mexico region and also extend beyond the Gulf to include other U.S. and international coastal and outer continental shelf regions where communities, ecosystems, and energy production co-exist.

The Gulf Research Program is expected to solicit and fund a variety of activities – at different scales, having different focus areas, and over different timescales – that accomplish program goals. Planning of these first activities (purpose, size, and methods) is underway. All activities will be steered by clear guidance and metrics, so that results can be evaluated and adapted/ended as appropriate over time. As planning proceeds, the Gulf Research Program will seek opportunities to leverage funds to facilitate collaborations and partnerships that lead to maximum results.

By building a diverse portfolio of activities, and encouraging collaboration, education, and innovation, we hope to initiate a significant program that, 30 years from now, will be judged to have provided real advances in understanding, improved capabilities to understand and solve problems, and – in short – will be judged to have had lasting impact.

ADDITIONAL INFORMATION:

More information about the NAS-NAE-IOM-NRC Gulf Research Program can be found at www.nas.edu/gulfprogram, including an opportunity to sign up to receive e-updates about program activities. Related reports can be found at the National Academies Press website, www.nap.edu, including free PDFs. Suggested titles include:

- An Ecosystem Services Approach to Assessing the Impacts of the *Deepwater Horizon* Oil Spill in the Gulf of Mexico (2013);
- Evaluating the Effectiveness of Offshore Safety and Environmental Management Systems (2012);
- Macondo Well *Deepwater Horizon* Blowout: Lessons for Offshore Drilling Safety (2011);
- Effectiveness of Safety and Environmental Management Systems for Outer Continental Shelf Oil and Gas Operations: Interim Report (2011);
- Approaches for Ecosystem Services Valuation for the Gulf of Mexico After the *Deepwater Horizon* Oil Spill: Interim Report (2011); and
- Assessing the Effects of the Gulf of Mexico Oil Spill on Human Health: Summary of June 2010 Workshop (2010).

APPENDIX A. Advisory Group members of National Academies' Gulf Research Program for 2013-2014.

Dr. Barbara A. Schaal , Washington University St. Louis, Missouri (<i>Evolutionary Biology/Molecular Genetics</i>)	Dr. Shirley Ann Jackson , Rensselaer Polytechnic Institute Troy, New York (<i>Particle Physics</i>)
Dr. Donald F. Boesch University of Maryland Cambridge, Maryland (<i>Marine Science</i>)	Dr. Ashanti Johnson Institute for Broadening Participation and University of Texas, Arlington, Texas (<i>Oceanography</i>)
Dr. Robert S. Carney Louisiana State University, Baton Rouge, Louisiana (<i>Oceanography</i>)	Dr. David M. Karl University of Hawaii, Honolulu, Hawaii (<i>Microbial Biology/ Oceanography</i>)
Dr. Stephen R. Carpenter , University of Wisconsin Madison, Wisconsin (<i>Limnology/Ecology</i>)	Ms. Molly McCammon Alaska Ocean Observing System, Anchorage, Alaska (<i>Journalism/Ocean Monitoring</i>)

2014 INTERNATIONAL OIL SPILL CONFERENCE

<p>Dr. Cortis K. Cooper Chevron Corporation San Ramon, California (<i>Oceanography</i>)</p>	<p>Dr. Linda A. McCauley, Emory University Atlanta, Georgia (<i>Nursing/ Environmental Health</i>)</p>
<p>Dr. Courtney Cowart Sewanee: The University of the South, Sewanee, Tennessee (<i>Theology/Disaster Response</i>)</p>	<p>Dr. J. Steven Picou University of South Alabama, Mobile, Alabama (<i>Sociology/ Resilience Science</i>)</p>
<p>Dr. Robert A. Duce Texas A&M University, College Station, Texas (<i>Oceanography/Atmospheric Sciences</i>)</p>	<p>Dr. Eduardo Salas University of Central Florida, Orlando, Florida (<i>Industrial Organizational Psychology</i>)</p>
<p>Dr. Deborah Estrin Cornell NYC Tech and Weill Cornell Medical College New York, New York (<i>Computer Sciences</i>)</p>	<p>Mr. Kerry Michael St. Pé Barataria-Terrebonne National Estuary Program Thibodaux, Louisiana (<i>Biology/Environmental Restoration</i>)</p>
<p>Dr. Christopher B. Field Carnegie Institution for Science Stanford, California (<i>Ecology / Climate Sciences</i>)</p>	<p>Dr. Arnold F. Stancell Mobil Oil (Retired) (<i>Chemical Engineering</i>)</p>
<p>Dr. Gerardo Gold-Bouchot Center for Research and Advanced Studies at Mérida Mérida, Mexico (<i>Marine Sciences</i>)</p>	<p>Dr. LaDon Swann Mississippi-Alabama Sea Grant Consortium Auburn University Marine Programs Auburn, Alabama (<i>Aquaculture/Education</i>)</p>
<p>Dr. Lynn R. Goldman George Washington University Washington, DC (<i>Medicine/Public Health</i>)</p>	<p>Mr. James W. Ziglar Van Ness Feldman, LLP Washington, DC (<i>Law/Public Policy</i>)</p>
<p>Dr. Bernard D. Goldstein University of Pittsburgh Graduate School of Public Health, Pittsburgh, Pennsylvania (<i>Environmental and Occupational Health</i>)</p>	<p>Dr. Mark D. Zoback Stanford University Stanford, California (<i>Geophysics /Geomechanical Engineering</i>)</p>
<p>Dr. Thomas O. Hunter Sandia National Laboratories (Retired) (<i>Mechanical and Nuclear Engineering</i>)</p>	