The Deepwater Horizon (DWH) oil spill was the largest in U.S. history. When final capping was completed on August 4, 2010, an estimated 4.9 million barrels of oil had been spilled. The challenges associated with containment, mitigation and remediation of such spills are enormous. The ability to contain such spills is a complex problem, requiring critical input and ideas from a very broad range of scientific experts coming from varying backgrounds.

This Consortium reflects an extremely focused effort to understand the role of dispersants and related chemical compounds in mitigating the effects of deep-sea hydrocarbon releases, and in designing the next generation of dispersants. The overriding objective of the research is to address the question "What needs to be done if a Deepwater Horizon type spill happens again?" It is clear that for a spill of the magnitude of the DWH, surface collection of the oil will be effective for just a very small fraction of the spill. The use of dispersants becomes absolutely necessary to break up the oil into droplets that are dispersed in the water column facilitating oil biodegradation. Motivation for a focus on dispersants also lies in the fact that they were widely used in the DWH incident, but were developed some five decades ago, and were intended for surface application rather than for deep-sea application.

The following are key questions to be addressed in the research of the Consortium:

1. What are the fundamental thermodynamic and interfacial phenomena based criteria necessary to rapidly produce droplets of optimum size right at the hydrocarbon discharge location so that the droplets will be sustained in the water column and be dispersed over a wide volume allowing biodegradation to take place effectively?
2. How can dispersant formulations be designed to minimize oil-water interfacial tension as well as stabilize droplets against coalescence, especially over the range of pressures and temperatures that they will encounter?
3. What are the fate and transport characteristics of oil/dispersant droplets generated at subsea conditions and how do the droplets move through the water column?
4. How can synthetic chemistry and physiochemical understanding of droplet behavior and dispersant droplet interactions be combined to lead to the next generation of highly effective, environmentally benign dispersants?

From the thematic perspective of the GRI, the Consortium is fully invested in the topics of Research Theme 4 (fundamental science and technology development for remediation associated with oil spills and gas releases). The consortium involves eight institutions from the five Gulf of Mexico states with twenty two participants, and fourteen institutions from the other states with 20 participants. The Consortium has an Advisory Board with distinguished representatives from industry and federal laboratories.

A key aspect of the Consortium's activities will be a coordinated education and outreach program. This will involve research experiences for undergraduates, a teacher training program that will bring knowledge of dispersant technology to K-12 education, and strong efforts for community outreach to inform local communities about the science and implications of dispersant use. A coordinated summer research program will be implemented that is modeled after the Louis Stokes Alliance for Minority Participation in Research Program.