**Environmental Factors Affecting Abiotic and Biotic Transformation of Deepwater Horizon oil Sorbed to Sand Particles**

**Hypothesis**: dispersed oil, aggregated crude oil, and weathered crude oil (tar ball) interact with sand particles differently, resulting in different transformation rates. Various environmental factors may affect the transformation of sand particles-associated oil.

**Objectives:**

1. To study the sorption of different forms of oil to sand particles
2. To investigate the mineral surface catalyzed transformation of oil sorbed to sand particles
3. To study the environmental factors such as sunlight, redox conditions, and salt concentrations on mineral surface catalyzed oil transformation.
4. To understand the response & role of microbial communities on transformation of oil sorbed to sand particles.

**Approaches:** it is an interdisciplinary study involving collaborative efforts from Dr. Kang Xia, an environmental chemist, and Dr. Mark Williams, an environmental microbiologist. Dr. Xia has extensive experience on studies of interactions between organic contaminants and minerals surfaces and mineral surface catalyzed transformation pathways for organic contaminants. Dr. Mark Williams currently has an ongoing Phase I study with the NGI to investigate how the bacterial community structure and functioning are altered due to the influx of oil into dune and intertidal ecosystems of the barrier islands of Mississippi. For Objective 1, sorption capacities and kinetics of different forms of oil to sand particles will be characterized through batch experiments. For Objective 2, mineral surface catalyzed transformation of oil sorbed to sand particles will be investigated by testing the degradation of parent compounds and monitoring formation of transformation products using gas chromatography-mass spectrometry (GC/MS) and liquid chromatography-mass spectrometry (LC/MS). Results from Objective 2 will be used to design experiments for Objective 3. Environmental factors such sunlight, redox conditions, and salt concentrations on mineral surface catalyzed transformation of oil will be evaluated using batch experiments. Transformation kinetics and products will be evaluated. The preliminary results from Dr. Williams’ current NGI project on microbial community structure and function will be used to design the experiments for Objective 4. Microbial communities that are dominant for the oil impacted sand will be selected to study the microbial impact on transformation of oil sorbed to sand particles.

**Budget:** This is a one-year project requiring effort from a full time postdoctoral research associate.

* 1-year postdoctoral researcher salary + fringe = $65,000
* Materials and Supplies = $5,000
* Sample analysis cost = $10,000

Total budget: **$80,000**