

## Session H6: Deepwater Horizon Spill Monitoring

Room C120-122

8:00 – 9:30 am

**0434**

**H6-1**

### Throwing a Scientist to the Wolves: Lesson Learned by a Scientist During the Deepwater Horizon Response

Wade Bryant

*US Geological Survey, Norcross, Ga., USA*

As part of the Deepwater Horizon MC-252 oil spill response, the Federal On-Scene Coordinator assembled an interagency team of scientists to “provide situational data and analysis for use in directing the on-going operational response activities”. The Operational Science Advisory Team (OSAT) was formed as a small, interagency team to assess near real-time data collected by the response relative to specific indicators and to identify sampling gaps as part of an adaptive sampling strategy for the assessment of the distribution of actionable (i.e. amenable to removal actions) oil and dispersant-related chemicals. This presentation provides an overview from a scientist perspective on the development and communication of recommendations to decision makers. For this process to be effective, science information must be: timely, prioritized, the product of consensus, transparent, and well communicated, giving the “bottom line up front.” In addition, lessons learned from presenting these recommendations to the public will be discussed with specific focus communicating the results of Net Environmental Benefit Analyses.

**0118**

**H6-2**

### Organic Contaminants and Trace Elements in Water and Sediment Sampled in Response to the Deepwater Horizon Oil Spill

Lisa Nowell<sup>1</sup>, Amy Ludtke<sup>2</sup>, Dave Mueller<sup>2</sup> and Jon Scott<sup>3</sup>

<sup>1</sup>*US Geological Survey, Sacramento, Calif., USA*, <sup>2</sup>*US Geological Survey, Lakewood, Colo., USA*, <sup>3</sup>*US Geological Survey, Oklahoma City, Okla., USA*

Beach water and sediment samples were collected along the Gulf of Mexico coast to assess differences in contaminant concentrations before and after landfall of oil released from British Petroleum Corporation’s Macondo-1 well following the sinking of the Deepwater Horizon drilling platform. Samples were collected at 70 sites during May 7-July 7, 2010, to document “pre-landfall” conditions. A subset of 48 sites was re-sampled during October 4-14 (“post-landfall”) to determine if actionable concentrations of oil were present along shorelines.

Few organic contaminants were detected in water; their detection frequencies were generally low. One compound, toluene, had significantly higher concentrations in post-landfall than pre-landfall water samples. No samples exceeded any human-health benchmarks and one post-landfall sample exceeded an aquatic-life benchmark. In sediment, several polycyclic aromatic hydrocarbons (PAH) were detected at over 20 percent of sites. Concentrations of three parent PAHs and 17 alkylated PAH groups were significantly higher in post-landfall than pre-landfall samples. Empirical upper screening-value benchmarks were exceeded in 37 percent of post-landfall samples and 22 percent of pre-landfall samples. Five of the seven sites that had the largest concentration differences between post-landfall and pre-landfall samples were identified on the basis of diagnostic geochemical biomarkers as containing Macondo-1 oil in post-landfall sediments and(or) tarballs.

For trace elements in water, 93 percent of post-landfall samples exceeded one or more aquatic-life benchmarks, compared to 22 percent of pre-landfall samples. The elements responsible for exceedances in post-landfall samples included boron, copper, and manganese. USEPA specifically identified nickel and vanadium as relevant to the oil spill, but these elements exceeded a benchmark in only 1 of the 52 post-landfall samples with exceedances. Benchmark exceedances for trace elements in water could be substantially underestimated because some samples had reporting levels higher than the applicable benchmarks. For trace elements in sediment, empirical upper screening-value benchmarks were exceeded in 57 percent of post-landfall samples and 40 percent of pre-landfall samples, indicating these samples are in the probable-effect range. There was no significant difference between paired pre-landfall and post-landfall sediment samples in the proportion of samples exceeding one or more trace element benchmarks.

**0201**

## H6-3

### **An Investigation of the Relationship Between Contamination in Sediments and the Water Column Following the 2010 Deepwater Horizon Gulf of Mexico Oil Spill and Hydrocarbons Sampling Distribution in Subsurface Sediment and Water Samples**

Chelsea Spier<sup>1</sup>, William Stringfellow<sup>1,2</sup>, Terry Hazen<sup>2</sup> and Mark Conrad<sup>2</sup>

<sup>1</sup>*Ecological Engineering Research Program-Univ. of the Pacific, Stockton, Calif., USA*, <sup>2</sup>*Earth Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, Calif., USA*

The explosion of the Deepwater Horizon oil platform on April 20, 2010 resulted in the third largest oil spill in history. An estimated 172 to 200 million gallons of oil was released over an 85 day period. We investigated the hypothesis that the distribution of hydrocarbons found in deepwater sediments months after a spill could be predicted by the distribution of hydrocarbons within the water column during the spill. A complete set of hydrocarbon data collected from subsurface water samples and sediments were acquired from NOAA. A geo-spatial analysis was completed to determine the hydrocarbon distribution in sediment and water samples. All sediment samples with total polycyclic aromatic hydrocarbons (PAHs) concentrations exceeding chronic toxicity limits were located less than 3.2 km from the wellhead. The mean concentration of PAHs found in deep Gulf of Mexico surveys in 2006 and 2009 conducted by the Minerals Management Service was 596 µg/kg, with a range of 0 to 23,840 µg/L. All sediment samples with concentrations above the mean pre-spill PAH levels (> 600 µg/kg) were found within 12 km of the wellhead. After extensive investigation, no significant correlations were found between the location of hydrocarbons found in sediments and the location of hydrocarbons in the water column. This lack of correlation may be due to a directional sampling bias. For example, 24% of sediment samples and 33% of water samples were collected southwest of the wellhead, comprising only 12.5% of the radial area surrounding the well. Of 126 deepwater sediment samples collected, only 20 of were within 3.2 km of the well, and 33 were within 12 km of the wellhead. Sampling over such a wide area conclusively shows the localization of the deepwater sediment contamination. However, the small number of samples taken within the area of contaminated sediments makes difficult to draw any conclusive observations on the directional distribution of sediment contamination. In preparation for another deepwater oil spill, sampling plans should be established which ensure a statistically rigorous sampling plan is followed. Based on this study, sediment sampling in the case of a similar spill should focus on the area in proximity to the spill site.

## 0102 H6-4

### **Response to an Oil Spill: USGS Protocols and Procedures for Shoreline Sampling Under Potentially Hazardous Conditions**

Franceska Wilde and Stan Skrobialowski

*US Geological Survey, Reston, Va., USA*

On April 20, 2010, the Deepwater Horizon Oil well explosion caused the release of about 185 million gallons of oil to the Gulf of Mexico, seriously threatening the natural, social, and economic resources of the 5-State coastal region. The USGS mobilized an immediate and coordinated response for (A) characterizing chemical, toxicological, and biological conditions in shoreline water and sediments that would represent ambient environmental conditions before landfall of the oil, (B) sampling a subset of the pre-landfall sites to document the occurrence and effects of oiling on coastal water and sediments, and (C) developing the protocols and procedures by which such sampling was to be conducted, communicated, and documented in a systematic and consistent manner.

This presentation focuses on (1) the development of scientifically sound sampling protocols (requirements and procedures) that adhere to strict industry standards for field safety, (2) the support and communications network needed to implement these protocols, and (3) lessons learned from the Deepwater Horizon experience that can be applied to future similar emergency-response conditions involving potential contact with hazardous substances.