

Session:

Deepwater Horizon Oil Spill: Exposure, Risk, Injury, and Baseline Issues

Abstract Title:

Analysis of PAHs 9500 from MC-252 in whole blood and RBCs from live-captured birds using ultra performance liquid chromatography (UPLC): Method development and assessment.

Authors:

C. Perkins, A. Provatas – The Center for Environmental Sciences and Engineering, University of Connecticut, Storrs, CT

W. Seegar, M. Yates, G. Doney – Earthspan, Chincoteague Island, Chincoteague, VA

D. Evers – BioDiversity Research Institute, Gorham, ME

The explosion of the Deepwater Horizon oil platform on April 20, 2010 resulted in an unprecedented release of crude oil in the Gulf of Mexico. Much of the oil and the dispersants used impacted salt marshes and beaches around the Gulf, with numerous species of birds documented as being exposed. While the use of dispersants in an oil spill response involves tradeoffs between effects to the shoreline and effects to pelagic and deep-sea environments, relatively little is known on the effects that the oil-associated polycyclic aromatic hydrocarbons (PAHs) have upon the health of avian populations. Circulating blood-borne, parent PAHs can provide a direct link for exposure assessment and reconstruction since they are not as affected by differences in metabolism and excretion. There are a couple of challenges in analyzing whole blood and red blood cells (RBCs) from live-captured birds that make quantitation more difficult; minimal sample volume (0.1- 0.5 ml) can be obtained without being detrimental and the target analytes are less abundant by volume in circulating RBCs in contrast to whole blood. We developed a novel method for the analysis of 16 PAHs utilizing ultra-performance liquid chromatography coupled to photodiode array, fluorescence, and tandem mass spectrometry detectors. This rigorous method obtained good recoveries of standard reference material (60-95%), matrix spikes (60-95%), calibration verifications (90-95%), and surrogates (85%) while obtaining good sensitivity of at least 5ng/g for PAHs. This method was developed in support of an ongoing study examining uptake and exposure in migrating peregrine falcons and other birds. Funding for a portion of this study was provided by Peter Jenny and The Peregrine Fund.