Title: **WATERSHED CONTROLS ON URANIUM CONCENTRATIONS TIED INTO NATURAL ORGANIC MATTER AND IRON INTERACTIONS IN STREAMBEDS AND WETLANDS**

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BER Program: EES

Project: **Collaborative Research: Watershed Controls On Uranium Concentrations Tied To Natural Organic Matter In Streambeds And Wetlands**

Project Abstract:

To address this hypothesis, we are first addressing the following set of questions through field-oriented studies at the Argonne Wetland Hydrobiogeochemistry SFA field site (a U-contaminated wetland of the Savannah River Site) and accompanying laboratory experiments: 1) What is the optimal method(s) to differentially extract stable (immobile) versus mobile natural organic matter (NOM) from the same sedimentary or aquatic sample? We developed a method capable of differentially extracting immobile and mobile NOM fractions (high-molecular-weight and low-molecular-weight components for each) that are suitable for molecular-level chemical characterization via Fourier-transform ion cyclotron resonance mass spectrometry (FTICR-MS). 2) How does NOM composition impact the physical properties (e.g., hydrophobicity) underlying their aggregation/disaggregation behavior? How do diagenetic processes affect the massive occurrence of flocs in the gaining stream and the scavenging of U? We observed NOM concentrations (as calculated as the sum of carbohydrates and proteins in mg-NOM/g-particles) increasing in the order of floc > suspended particulate matter (SPM) > bottom sediment; whereas, the protein-to-carbohydrate ratio (an index for stickiness for aggregation) was in the order of SPM > flocs > bottom sediment. Flocs contained 4 to 5-fold higher U than the stream bottom sediment. 3) What is U distribution in a dynamic watershed with relevance to groundwater-surface exchange? 4) What role does sedimentary phosphorus speciation play in U distribution in this watershed? Information from this project will identify and quantify important hydrologically driven biogeochemical processes impacting uranium at this SFA.