



# 2015 ITRC PROJECT PROPOSAL

## Passive Sampling of Sediment Porewater and Surface Waters: How to use Results to Support Risk Assessment, Remedial Decision-Making and Monitoring

**PROPOSAL DATE: May 6, 2014**

### Proposal Contact

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### Proposals Topical Area

CHAR – Site characterization, sampling and monitoring

CONT – Soil, groundwater, and sediment contamination (advanced characterization and monitoring approaches (including passive sampling methods))

### Proposal Summary

Contaminated sediment within our aquatic ecosystems is recognized as an issue of national concern that has the potential to affect both wildlife and human health. Contaminated sediment impacts the uses of many water bodies and is a major contributing factor in the many fish and shellfish consumption advisories in place across the country. Significant advances have been made over the last forty years regarding the understanding of contaminants in sediments and their impact on porewater and surface water chemistry, and the biological significance of known contamination on aquatic systems.

As a result, the regulatory and scientific communities' knowledge of the major exposure routes of infaunal and epibenthic organisms to sediment-related impacts has increased substantially over the last two decades. Many sampling and bioassay methods have been, and continue to be, developed to help better characterize and assess sediment quality to support decisions regarding the direct impact on benthic life as well as the indirect impact on higher trophic level organisms. Given the cost implications of remedial decisions, the regulatory and scientific communities are beginning to rely on bioavailability data to reduce uncertainty in risk characterization studies, including such things as pore water chemistry and the use of passive sampling methods (PSMs).

The concept of passive sampling in the environment was first developed in the 1980's in laboratory settings. Field research studies were initiated in the 1990's, which was the first introduction of this technology for monitoring contaminant concentrations in the interstitial waters of sediment (i.e., porewater). As a result, a growing amount of scientific study and documentation has occurred on the use of PSMs as a measurement tool that can more accurately predict the amount of dissolved contaminant in sediment porewater and overlying surface water that is bioavailable to aquatic organisms.

The ITRC Contaminated Sediments Bioavailability Team's guidance document discusses the use of porewater sampling as a tool to assess bioavailability and briefly discusses the advantages and disadvantages of the major tools, including passive sampling techniques. In November 2012, the Society of Environmental Toxicology and Chemistry (SETAC) issued a summary on a Technical Workshop designed to promote the understanding of PSMs and to provide recommendations for current and future use in contaminated sediment management decisions. SETAC identified that despite all the advances in development and application of passive sampling methods, broader regulatory acceptance and use of passive sampling technologies is necessary. The results of the SETAC workshop, six journal articles, were recently published as a Special Series in Integrated Environmental Assessment and Management, Volume 10, Number 2, April 2014.

Additionally, in December 2012, the USEPA released a Sediment Assessment and Monitoring Sheet (SAMS), which provided an introduction on the use of PSMs at Superfund sediment sites contaminated with hydrophobic organic contaminants. The document briefly outlined the use of passive samplers. However, the document further identified a need for a guidance document that outlines the specific protocols on deployment and recovery.

As noted in the SETAC and USEPA documents, the *applicability of porewater sampling for sediment quality assessments is of critical importance for environmental assessment and monitoring programs throughout the U.S. and elsewhere*. While intensive research has been conducted on various issues related to passive sampling of sediments and surface waters in recent years, several issues associated with these procedures and their applications in State regulatory programs have yet to be fully resolved. To reach US audiences ITRC has been identified as an authoritative and respected outlet to encourage adoption of new environmental technologies and tools. As such, and as published in Integrated Environmental Assessment and Management, "ITRC should be encouraged to develop a guidance document on the use of PSMs and hold training sessions, as has been done for their bioavailability guidance." Already, USEPA and SERDP-ESTCP are funding efforts to produce a passive sampling user's manual (with case studies) and an application guideline. An area where ITRC can complement these other documents, however, is related to passive sampling data utilization in State regulatory programs and in accordance with varying State regulatory requirements.

For this reason, a Passive Sampling of Sediment Porewater and Surface Water Technical and Regulatory Guidance is proposed to: 1) compile and review the existing applications associated with sediment porewater and surface water sampling and testing using passive sampling methods and 2) develop guidance on how measures of freely dissolved metals and organic compounds measured by passive samplers can be used to support risk assessment, remedial decision making, remedial design, and long term performance monitoring programs in State regulatory programs. Another goal of this team will be to facilitate the identification of future actions needed to ensure that State regulatory programs are equipped to interpret and utilize results from passive sampling at contaminated sediment sites.

The objective of the technical and regulatory guidance document is to inform the regulatory and scientific communities on the applicability, value and use of passive sampling data as a tool in assessing and managing risks associated with contaminated sediment investigations. Ultimately, the guidance document will serve as a resource to the user that encompasses the following:



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- a brief summary on the concept of contaminant partitioning and the importance of the environmental phases in aquatic environments,
- the types of regulatory frameworks in which sediment and surface water passive sampling data is suitable,
- the role that passive sampling evaluations may play in the assessment of ecological risk, remedial decision making and post-remedial performance monitoring of sediment in State regulatory contexts,
- biological, chemical and ecological considerations for passive sampling and testing, and
- consensus recommendations based on the most current available science on the most appropriate and reliable uses and applications of passive sampling and testing at contaminated sediment sites.

### Proposed Project Schedule

- 2015 – Team building, collecting data and information to identify and evaluate advantages and limitations of passive sampling data, means and rationale by which porewater and surface water data is being assessed, considered, and evaluated within sediment characterization and remediation projects and long-term performance monitoring studies, and differing State regulatory frameworks associated with contaminated sediment management.
- 2016 – Use this information and data to evaluate and provide an overview of how passive sampling data is utilized and incorporated into risk management decisions within various regulatory frameworks.
- 2017 - Develop a Tech-Reg guidance document and associated internet-based training curriculum that describes the use of passive sampling data to evaluate and monitor risks associated with contaminated sediment management.

### Proposed Personnel

**Personnel: Team Leaders:** Not yet identified

#### **Supporting State Members:**

- **Oregon** – Jennifer Sutter (Sediment Cleanup Sites PM); **New Jersey** (Greg Neumann (Research Scientist/Risk Assessor); **South Carolina** (Gregory Simmons (PG, Risk Assessor, Federal remediation Section); **New Hampshire** – Lori Siegel (PhD, PE, Ecological Risk Assessor); **Delaware** – John Cargill (PG, Hydrologist/Environmental Scientist)

#### **Following States have possible members if funded:**

- Alabama, Connecticut, New York, Florida, California, New Hampshire, Washington

### **Skill mix of Team Members**

- Scientific and Engineering – Biologists (marine and freshwater), Ecologists, Sedimentary Geologists, Hydrogeologists, Biogeochemists, Wetland Scientists, Environmental Engineers, Analytical Chemists
- Regulatory – Ecological Risk Assessors, Reviewers of Ecological Evaluations, Superfund Site Coordinators, Site Coordinators overseeing Sediment Investigation and Cleanup Sites

### **Sectors of Team Members (e.g., federal, state, community, regulated, regulator, etc.)**

- SERDP and ESTCP Sediment Expert Panel – Industry reps. RETEC and Alcoa
- USACOE – Sediment Experts, EPA Superfund and Brownfields Divisions, EPA Great Lakes Sediment Committee, NOAA, USGS, Army Corp of Engineers, Navy, GORE, Community Stakeholders – Great Lakes Area, Tribal Communities

### **Summary of Deliverables (primary project product(s))**

#### **Targeted Users (who will use products generated by this project?)**

Primary Products of this project includes

1. Technical & Regulatory Guidance document
2. Internet Based Training

Primary audience Includes:

State and federal regulators, practitioners, and other environmental and natural resource professionals engaged in contaminated sediment investigation, remediation and restoration activities. Emphasis will be placed on State regulatory frameworks.

Secondary audience includes:

Community stakeholders and members of the general public concerned with exposures to contaminated sediment, water resource agencies, state and federal fish and wildlife agencies, resource management agencies (mineral, wildlife and fisheries, forest and rangeland management).