

Opportunity Title: Using Passive Samplers to Measure Metal Levels in Fish and Aquatic Organisms

Opportunity Reference Code: DOE-MSIPP-16-28-SRNL

Organization U.S. Department of Energy (DOE)

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How to Apply A complete application must include the following to be considered:

- Completion of all required fields in the application
- Undergraduate transcripts
- One Recommendation (minimum)

If you have questions, send an email to Elizabeth Nelson at Elizabeth.Nelson@oraui.org . Please include the reference code for this opportunity in your email.

Application Deadline 3/16/2016 11:59:00 PM Eastern Time Zone

Description The Minority Serving Institutions Partnership Program (MSIPP) Internships is a new program to promote the education and development of the next generation workforce in critical science, engineering, technology, and math (STEM) related disciplines that complement current and future missions of DOE national laboratories. The MSIPP Internship program is designed to provide an enhanced training environment for next generation scientists and engineers by exposing them to research challenges unique to our industry.

MSIPP Interns will be given the opportunity to complete Summer Internships aligned with ongoing U.S. Department of Energy Office of Environmental Management (DOE-EM) research under the direction of a host national laboratory. The internship will be performed at the host national laboratory, utilizing their facilities and equipment under the guidance of a research staff member.

Minority Serving Institutions are institutions of higher education enrolling populations with significant percentages of undergraduate minority students.

Traditional environmental monitoring programs require collecting, processing, and analyzing samples from a variety of environmental media. Interpretation of the data can be difficult because of differences in sample size, heterogeneity within and among media, and failure to measure the chemical species that are bioavailable and toxic. Recently, passive samplers have gained acceptance as efficient and cost-effective alternatives to traditional methods. They are based on the flow of analyte molecules from the sampled medium to a receiving medium in the sampling device as a result of differences in concentration. Passive samplers can be viewed as “virtual organisms” that absorb contaminants in a manner analogous to living organisms.

Diffusive Gradient in Thin films (DGT) is a passive sampling technology that consists of a collection gel-layer with a medium that selectively binds to the contaminant of interest and a diffusion gel-layer that selectively admits analyte molecules (Davison and Zhang 1994). DGT devices employ Frick’s law to calculate the time-averaged, mean concentration of a variety of



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elements based on the measured concentration in the absorbent gel, device configuration, analyte diffusion coefficients, deployment time, and other factors (Davison and Zhang 1994, Van der Veeken et al. 2010). DGT can measure heavy metals and other elements in surface water, ground water, submerged sediments, and saturated soils.

The successful candidate will participate in an investigation of the potential of DGT for environmental monitoring by helping with the following tasks:

Laboratory Assays

Subtask 1: Surface waters of two types (relatively high and low pH and hardness) will be collected from uncontaminated locations and spiked with heavy metals (e.g., As, Cd, Co, Cu, Cr, Ni, Se, Pb, Zn) to produce several levels of contamination. Each level (plus controls) will be represented by replicate aquaria.

Subtask 2: A model fish (e.g., *Gambusia holbrooki*) and/or invertebrates such as clams will be added to each aquarium for a 28 day exposure period.

Subtask 3: Metal levels will be measured in the water using DGT water samplers and conventional methods for assessing toxic metals including analysis of total metals and dissolved metals.

Subtask 4: Organisms will be harvested and analyzed for body burdens of all metals.

Subtask 5: Statistical comparisons will be conducted to determine how DGT measurements compare with measurements made by the established methods, how heavy metal measurements made by all methods compare with biological uptake by fish, and how water chemistry affects the performance of DGT.

Field Deployment

Subtask 1: Identify SRS surface waters with measurable amounts of heavy metals.

Subtask 2: Deploy fish and invertebrates in cages to field locations for at least four weeks.

Subtask 3: Measure metal levels in water and sediments using DGT methods plus established methods for measuring metals in sediment and water.

Subtask 4: Harvest fish and invertebrates, analyze them for body burdens of metals, and conduct appropriate statistical comparisons.

Qualifications The successful candidate will be studying environmental sciences, biology, wildlife/fisheries science, chemistry, or a related scientific field. Applicant should have an interest and willingness to conduct laboratory and field work, work with aquatic organisms, and perform chemical analyses and procedures under the direction of a senior scientist. Applicant may be asked to assist with data entry and analysis in EXCEL under the supervision of a senior scientist.

Eligibility Requirements:

1. Be currently enrolled as a full-time undergraduate or graduate student at an accredited Minority Serving Institution *see criteria for Minority

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Serving Institutions here <http://srnl.doe.gov/msipp/internships.htm>

2. Be working towards a science, technology, engineering, or mathematics (STEM) degree
3. Have an undergraduate cumulative minimum Grade Point Average (GPA) of 3.0 on a 4.0 scale
4. Be a United States citizen
5. Pass a drug test upon selection to participate in the MSIPP *The process and timing for drug testing varies from lab to lab. Use of Marijuana/Cannabis or its derivatives if prescribed is legal in some states. However, having these drugs in your system is NOT legal at United States Federal Contractor sites and National Laboratories.
6. Reference must be received by March 6, 2016 at 11:59 PM ET

For more information about The Minority Serving Institutions Partnership Program (MSIPP) Internships, please visit <http://srnl.doe.gov/msipp/internships.htm>

To see all MSIPP position postings visit: www.orise.orau.gov/MSIPP

- Eligibility Requirements**
- **Citizenship:** U.S. Citizen Only
 - **Degree:** Bachelor's Degree or Master's Degree.
 - **Overall GPA:** 3.00
 - **Discipline(s):**
 - **Chemistry and Materials Sciences** ([12](#) )
 - **Computer, Information, and Data Sciences** ([16](#) )
 - **Earth and Geosciences** ([21](#) )
 - **Engineering** ([27](#) )
 - **Environmental and Marine Sciences** ([14](#) )
 - **Life Health and Medical Sciences** ([45](#) )
 - **Mathematics and Statistics** ([10](#) )
 - **Physics** ([16](#) )
 - **Science & Engineering-related** ([1](#) )

Affirmation I certify that I am pursuing or have completed coursework towards a degree in science, technology, engineering, mathematics, or a related field.