

## WORKFORCE DEVELOPMENT & TRAINING

**PROJECT: Long-Term Stewardship of Environmental Remedies: Contaminated Soils and Water and STEM Workforce Development**

**CLIENT: U.S. Department of Energy, Office of Legacy Management (DOE-LM)**

**LOCATION: DOE HQ, DOE LM Sites & National Labs**

**PRINCIPAL INVESTIGATOR: Dr. Leonel Lagos**

**PROGRAM MANAGER: Dr. Ravi Gudavalli**

### Description:

The Department of Energy (DOE) established the Office of Legacy Management (LM) to manage its responsibilities associated with the legacy of the Cold War. LM conducts post-closure site operations at approximately 98 sites in the United States and the territory of Puerto Rico and anticipates increasing to 128 sites by 2030. Recognizing that LM sites are driven by their unique requirements such as operation and maintenance of remedial action systems, routine inspection & maintenance, Florida International University's Applied Research Center (FIU ARC) is conducting a collaborative research and traineeship program to address LM's goals and prepare the next generation workforce that will help accomplish these goals.

FIU designed a program to create a "pipeline" of minority engineers specifically trained and mentored to help address DOE LM's research goals. FIU is engaging and mentoring future minority scientists and engineers in the research, development, and deployment of new technologies addressing DOE LM's environmental cleanup challenges. Students selected as DOE Fellows perform DOE LM-related hands-on research at FIU by working alongside FIU ARC's scientists and engineers as well as with FIU faculty.

### Objectives:

- Investigate the use of apatite injection for sequestering uranium (U) in groundwater.

- Determine the mechanism of uranium removal from groundwater by apatite.
- Study the environmental factors that influence the stability and longevity of U removal over time.
- Climate resiliency studies for long-term surveillance of DOE-LM Sites.
- Evaluate commercially available geophysical systems and state-of-the-art sensors, such as ground penetrating radar, electrical resistivity imaging (ERI) and electromagnetic/magnetic surveys.
- Compile precipitation and temperature data and parse the historical impact of this climate forcing on the hydrology of DOE-LM sites across the US.
- Train FIU minority students by involving them in high priority technical topics relevant to LM's mission and create a talent pool to join the future LM workforce.



DOE LM Fellows with Mrs. Jalena Dayvault and Bill Frasier at the Grand Junction Disposal site

### Benefits:

- Addresses the environmental legacy of defense-related uranium mining and milling sites.
- Fulfills the Department of Energy's post-closure responsibilities and ensures the future protection of human health and the environment, which poses a considerable long-term challenge.

### ABOUT

Since 1995, the Applied Research Center at Florida International University has provided critical support to the Department of Energy's mission of accelerated risk reduction and cleanup of the environmental legacy of the nation's nuclear weapons program. ARC's research performed under the DOE-FIU Cooperative Agreement (Contract# DE-EM0005213) can be classified as fundamental/basic, proof of principle, prototyping and laboratory experimentation.

### Project Contact:

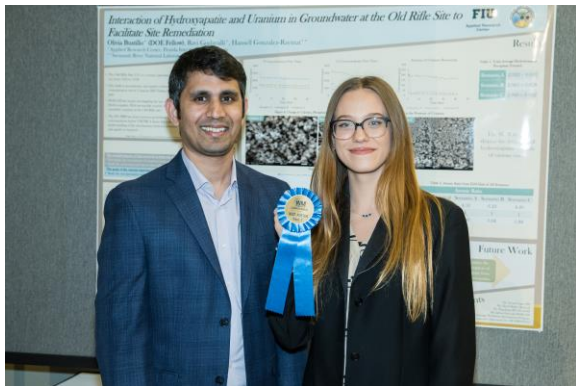
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- Students gain professional development and work experience through hands-on research conducted alongside ARC and FIU scientists.
- 8-week internships at DOE LM sites and field offices.
- Students attend national conferences such as the Waste Management Symposia and the American Geochemical Union conference.
- Students develop presentation skills by highlighting their research via oral and poster presentations.
- Opportunities for students to seek employment with DOE, DOE national labs, and DOE contractors.

### Accomplishments:

- Conducted experiments to study the effect of environmental factors in uranium by hydroxyapatite.
- Presented oral presentations and posters at Waste Management Symposia 2023. Poster titled "Interaction of Hydroxyapatite and Uranium in Groundwater at the Old Rifle Site to Facilitate Site Remediation" won best in Track 7.



DOE Fellow Olivia Bustillo and Dr. Ravi Gudavalli (Mentor and Program Manager) with best in Track 7 poster.

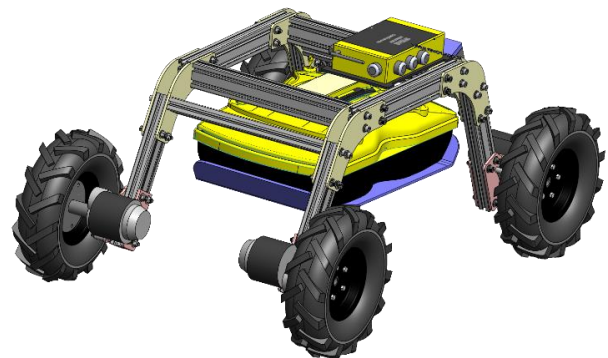
- Conducted case studies of remote sensing strategies and applications suitable for long-term monitoring of DOE-LM sites.

- DOE Fellows visited the Old Rifle Site, the Grand Junction Disposal Site, and the Rocky Flats site to gain insight and knowledge on DOE-LM's mission.
- DOE Fellows participated in site inspections as well as surface and groundwater sampling activities.



DOE Fellow Shawn Cameron testing the GPR at FIU

- DOE Fellows learned about different characteristics and factors of disposal sites and learned about the different materials used for construction of the cell.
- DOE Fellows assisted LM hydrogeologists and principal research scientists in performing sampling at the Old Durango Processing Site from both wells and surface water.
- Evaluated the viability of using a Ground-Penetrating Radar (GPR) sensor for cost-effective site characterization and monitoring existing subsurface conditions of LM's disposal cells.



GPR ground robotic platform CAD design by FIU