

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.
- Investigate LM site-specific needs for remote sensing data collection from site manager questionnaires, site visits, existing publicly available aerial photography from LM, and on-demand aerial in-house site surveys.
- Evaluate robotic systems and state-of-the-art sensors that mainly focus on photogrammetry and LiDAR remote sensing techniques using UAVs and UGVs.
- 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.

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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 synthesis of apatite mineral by mixing solutions with different stoichiometric ratios of calcium, phosphate and citric acid to find optimum concentrations for apatite formation.
- Presented posters at Waste Management Symposia 2021 student poster session titled “Interaction of Hydroxyapatite and Uranium in Groundwater at the Old Rifle Site to Facilitate Site Remediation” and “Remote Sensing Technology Characterization for LM Sites”.
- Four surface-level soil samples were characterized by XRD, BET, and SEM-EDS to determine the chemical composition, structure, and surface area of the soil.
- 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.
- Observed and participated in site inspections as well as surface and groundwater sampling activities.
- Met with personnel involved in the Old Rifle pilot study, thereby acquiring knowledge of the site history and how the technology works.



DOE Fellow Olivia Bustillo conducting an alkalinity test at the Rocky Flats site during groundwater sampling

- Fellow learned about different characteristics and factors of disposal sites and learned about the different materials used for construction of the cell.
- Assisted Hydrogeologist and Principal Research Scientist, performing sampling at the Old Durango Processing Site from both wells and surface water.
- Prepared extensive Aviation plan learning about the importance of risk mitigation and project management logistics.



DOE Fellow Eduardo Rojas successfully conducted his first drone baseline survey of the Rifle Disposal Site as the remote pilot in command