FIU | Applied Research Center
FLORIDA INTERNATIONAL UNIVERSITY

U.S. DEPARTMENT OF ENERGY

FIU-DOE COOPERATIVE AGREEMENT - FIU'S CONTINUED RESEARCH SUPPORT FOR DOE EM

ARC's applied research, technology development, demonstration and testing, information technology, and workforce development covers five major areas of environmental cleanup operations at DOE facilities across the U.S. ARC is currently executing applied research in the following technical areas: environmental remediation; radioactive waste processing; facility deactivation and decommissioning (D&D); knowledge management and other information technology (IT) applications/tools for environmental management; and training and mentoring the next generation of scientists and engineers that will continue addressing DOE-EM environmental restoration technical challenges into the future.

Objectives

The overall objective of the Cooperative Agreement is to develop technical solutions for the environmental challenges faced across the DOE complex at sites such as Hanford, Oak Ridge, Savannah River (SRS), and Idaho. ARC technical staff, DOE Fellows, and other students work closely with DOE-HQ, DOE sites, DOE contractors and technical support groups.

Research Areas

Environmental Remediation: ARC scientists/engineers collaborate with DOE Hanford and SRS scientists in developing strategies to improve the efficiency of uranium stabilization in the subsurface, model the migration and distribution of natural organic matter in the subsurface, model the fate and transport of mercury and tin in sediments and surface water, and develop sustainability plans for remediation systems at DOE facilities.

High-Level Radioactive Waste/Waste Processing: ARC is conducting applied research to investigate a better final disposal path for millions of gallons of high-level radioactive waste stored at DOE facilities, including Hanford, SRS, and Idaho. Scientists and engineers at ARC conduct experimental research, computational modeling, and technology development or prototyping in support of these efforts.

D&D & IT: ARC's technical staff contribute toward the development of new technologies and methodologies for the deactivation and decommissioning of legacy facilities throughout the DOE Complex. In addition, ARC's staff have developed knowledge management and information tools for DOE-EM and the community of D&D practitioners. These web-based systems collect, maintain, preserve, and disseminate D&D knowledge across the DOE Complex, commercial nuclear utility companies, and government and research institutions across the globe.

STEM Workforce Development & Training: The DOE Fellows Program is an innovative workforce development and training program designed to create a "pipeline" of minority engineers specifically trained and mentored to enter the DOE workforce in technical areas of need. The students (DOE Fellows) conduct applied research for EM at ARC and DOE facilities as part of DOE-FIU cooperative agreement.

Accomplishments

Accomplishments for the applied research being performed under the Cooperative Agreement are available on a centralized portal at http://doeresearch.fiu.edu and include technical reports, quarterly progress reports, end of year reports, presentations, journal articles, conference papers, and more.

ABOUT

Since 1995, the Applied Research Center (ARC) at Florida International University (FIU) has provided critical support to the Department of Energy's Office of Environmental Management (DOE-EM) mission of accelerated risk reduction and cleanup of the environmental legacy of the nation's nuclear weapons program. ARC's applied research is performed under the DOE-FIU Cooperative Agreement (under Contract # DE-EM0000598) and provides technical support to DOE EM in the area of environmental remediation and STEM workforce development and training.

Principal Investigator:
Dr. Leonel Lagos
Ph: (305) 348-1810
Email: lagosl@fiu.edu
10555 W. Flagler Street, EC 2100
Miami, FL 33174
arc.fiu.edu

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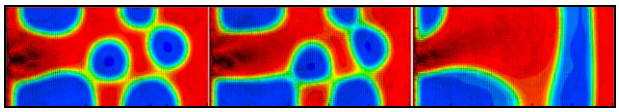
Environmental Remediation:

- Performing research of variables that affect the binding and release mechanisms of uranium in soil in support of the Hanford Site 200 & 300 Areas including the use of facultative bacteria, ammonia gas injection, and aqueous bicarbonate solutions.
- Researching transport parameters via column and batch sorption studies for modeling the migration and distribution of humate injected into the subsurface as a means of remediating uranium contamination at SRS.
- Modeling the fate and transport of mercury, tin and sediments for the Tims Branch ecosystem at SRS.
- Performing sustainability analyses of the SRS A/M Area groundwater remediation system to identify opportunities for improvement in system performance, increased contaminant recovery, and decreased energy consumption.


ARC soil/groundwater analytical laboratory, & Tims Branch

High-Level Radioactive Waste/Waste Processing:

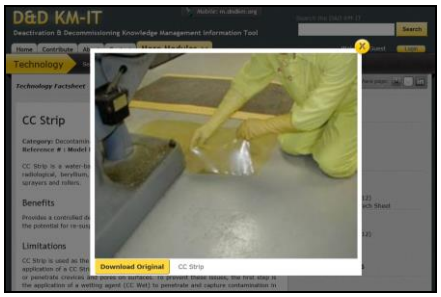
- Developed two technologies for unplugging high-level waste transfer pipelines at Hanford and SRS (peristaltic pipe crawler and asynchronous pulsing system).
- Developed two sensors to assist Hanford in the management and transfer of tank waste.
- Developed computational fluid dynamics codes to assist in the modeling of mixing processes in Hanford tanks that include Newtonian and non-Newtonian fluids.
- Developed estimates of the remaining useful life of waste transfer system components via analysis of ultrasonic thickness measurements of the components.



Bubble interface displacement in a Newtonian fluid

Deactivation & Decommissioning (D&D) & IT:

- Technology innovation, development, evaluation, and deployment, including a decision model for contamination control products, organic superconductor thin films, and incombustible fixatives.
- The Waste Information Management System (WIMS) is deployed at http://www.emwims.org with the latest set of DOE waste forecast data.
- The D&D Knowledge Management Information Tool (D&D KM-IT) captures and shares D&D knowledge in the U.S. and internationally (https://www.dndkm.org).



Strippable coating technology as shown in D&D KM-IT

STEM Workforce Development & Training:

- News and accomplishments of the FIU-DOE Science and Technology Workforce Development Program are available at http://fellows.fiu.edu/.

Summer 2014 interns with program director Dr. Lagos and DOE Fellow presenting EM research at WM14

- 108 FIU STEM students (graduates and undergraduates) have been inducted as DOE Fellows and completed 80 internships at DOE sites, national laboratories, and private industry.
- DOE Fellows have given over 120 poster & oral presentations at national & international conferences (e.g., WM, ANS, and ICEM) and won awards for Best Student Poster at WM09, WM10, WM11, WM14 and Best Professional Poster at WM09.
- Eight (8) DOE Fellows have been hired by DOE-EM HQ (3), DOE national laboratories (2), and DOE contractors (3). In addition, 13 Fellows have been hired by other federal, state or local governments including: Dept. of Defense, NASA, Dept. of Commerce, Florida Dept. of Env. Protection, DERM, Dept. of the Navy (NAVSEA). Over 41 DOE Fellows graduated FIU with BS or MS degrees and obtained employment in STEM industry, including: Florida Power & Light, GE, Lockheed Martin, Raytheon, Texas Instruments, etc. Hiring rate for DOE Fellows is over 99%.
- 35 Fellows have obtained Master's or PhD degrees.