YEAR-END TECHNICAL REPORT
September 29, 2017 to September 28, 2018

DOE-FIU Science & Technology Workforce Development Initiative

http://fellows.fiu.edu/

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FIU | Applied Research Center
FLORIDA INTERNATIONAL UNIVERSITY

Addendum:

This document represents one (1) of four (4) reports that comprise the Year End Reports for the period of September 29, 2017 to September 28, 2018 prepared by the Applied Research Center at Florida International University for the U.S. Department of Energy Office of Environmental Management (DOE-EM) under Cooperative Agreement No. DE-EM0000598.

The complete set of FIU's Year End Reports for this reporting period includes the following documents:

Project 1: Chemical Process Alternatives for Radioactive Waste
Document number: FIU-ARC-2018-800006470-04b-262

Project 2: Environmental Remediation Science and Technology
Document number: FIU-ARC-2018-800006471-04b-261

Project 3: Waste and D&D Engineering and Technology Development
Document number: FIU-ARC-2018-800006472-04b-251

Project 4: DOE-FIU Science & Technology Workforce Development Initiative
Document number: FIU-ARC-2018-800006473-04b-281

Each document will be submitted to OSTI separately under the respective project title and document number as shown above. In addition, the documents are available at the DOE Research website for the Cooperative Agreement between the U.S. Department of Energy Office of Environmental Management and the Applied Research Center at Florida International University: http://doeresearch.fiu.edu

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PROJECT 4 OVERVIEW

There is a national need for more careers in science, technology, engineering and mathematics (STEM). This shortage is felt not only in the private industry sector but also across many federal agencies. Across the U.S. Department of Energy (DOE) and within DOE Environmental Management (EM), there is a similar critical shortage of entry-level STEM personnel. Only 1% of DOE-EM's workforce is younger than 30 years old. The effects are already being felt across DOE EM and new ways to stimulate interest in STEM are being initiated by the federal government. If this shortage is not addressed, the risks include knowledge gaps (discontinuity of lessons learned) within the department and a lack of skilled personnel to carry out its cleanup mission effectively.

Florida International University (FIU), the largest Hispanic serving research-extensive institution in the continental United States, is one of the nation's leading producers of scientists and engineers from underrepresented groups. In 1995, DOE created a unique partnership with FIU to support environmental cleanup technology development, testing and deployment at DOE sites. This partnership spawned a research center at FIU dedicated to environmental research and development (R&D). The center, now known as the Applied Research Center, has tackled and helped solve problems at many DOE sites.

The DOE-FIU Science and Technology Workforce Development Program (also known as the DOE Fellows Program) was established in 2007 to create a pipeline of minority engineers specifically trained and mentored to enter the DOE workforce in technical areas of need. This innovative program was designed to help address DOE's future workforce needs by partnering with academic, government and DOE contractor organizations to mentor future minority scientists and engineers in the research, development, and deployment of new technologies addressing DOE's environmental cleanup challenges. The main objective of the program is to provide interested students with a unique opportunity to integrate course work, DOE field work, and research work at FIU into a well-structured academic program that leads to entry into DOE EM or other career opportunities. Students selected as DOE Fellows perform research at FIU and at DOE sites, national laboratories, and DOE contractors. Upon graduation and completion of this fellowship, the students are encouraged to submit an application to join the DOE federal internships programs, apply to DOE contractors, pursue post master or postdoctoral positions at DOE national laboratories, or apply to private industry in their field of study.

The DOE Fellows Program has inducted a total of 142 minority FIU STEM students from program inception in 2007 through the induction ceremony in November 2017. DOE Fellows Induction Ceremonies have been attended by DOE EM officials each year, including Mr. Mark Gilbertson in 2007 all the way to Mr. Kurt Gerdes in 2017. Major key accomplishments of this program to date are included as Appendix B.

RESULTS AND DISCUSSION

1.0 DOE FELLOWS ENTERING THE WORKFORCE

FIU continued working with DOE Fellows interested in federal jobs. FIU supports our Fellows with identifying federal entry-level career opportunities within DOE and other federal agencies with a particular emphasis on federal positions within DOE EM, the national labs, or DOE tier-1 contractors. FIU also continues to identify those DOE Fellows who are preparing to transition from academia to the workforce within the next year for conducting focused mentoring sessions with those Fellows on resume preparation and the USA Jobs application process.

FIU is proud to announce the transition of our DOE Fellows into the workforce, completing the pipeline of minority scientists and engineers specifically trained and mentored to enter the environmental workforce in technical areas of need. During FIU Performance Year 8, the following DOE Fellows completed the DOE-FIU Science and Technology Workforce Development Program and accepted positions at federal and local governments as well as private industry.

- **DOE Fellow Kiara Pazan** (Class of 2014) began a federal government position with the U.S. Corps of Engineers' Coastal and Hydraulics Laboratory.
- **DOE Fellow Alexis Smoot** (Class of 2015) graduated from FIU with a bachelors' degree in environmental engineering and accepted an Engineer I position with Nexant in Chicago, IL.

Figure 1. Alexis Smoot at DOE-HQ during her 2016 summer internship with Sarah Bird (left) and at ARC laboratory (right).

- **DOE Fellow Mohammed Albassam** (Class of 2016) accepted a job offer from the City of Coconut Creek as an Engineer I. Mohammed will also continue his masters' thesis based on the research being conducted to develop a hydrological model to predict contaminant

transport at the Savannah River Site and will defend his thesis in the summer of 2018. DOE Fellow Mohammed Albassam (Class of 2016) successfully passed his master's thesis defense at FIU on June 15. His masters' thesis is based on the research being conducted to develop a hydrological model to predict contaminant transport at the Savannah River Site. Mohammed has started his career as an Engineer I with the city of Coconut Creek, FL.

Figure 2. Mohammed Albassam at DOE-HQ during his 2017 summer internship with his mentor Kurt Gerdes and DOE Fellow Juan Morales (left) and presenting poster at WM2018 (right).

- **DOE Fellow Maximiliano Edrei** (Class of 2014) has accepted a position as an Engineer II from Huntington Ingalls Newport News Shipbuilding Company in Newport News, Virginia. He will be aiding the design and construction of aircraft carriers and submarines. Max graduated with a masters' degree in mechanical engineering, his thesis is titled *CFD Evaluation of Mixing Processes Using Forced Air Sparging* and based on DOE-EM research.

Figure 3. Maximiliano Edrei with his summer mentor during his 2016 summer internship (right).

- Upon graduating with a bachelors' degree in mechanical engineering, **DOE Fellow Jesse Viera** (Class of 2014) joined the federal government workforce with the U.S. Marine Corps as second Lieutenant within the Department of Defense.

Figure 4. Official commissioning of Second Lieutenant Jesse Viera into the U.S. Marine Corps on March 3, 2018 (left) and with Dr. Inés Triay (Executive Director, FIU ARC) and Mr. Joseph Sinicrope.

- **DOE Fellow Christine Wipfli** (Class of 2014) joined the Department of Defense, working as an entry-level nuclear engineer at the Pearl Harbor naval shipyard in Hawaii. The position begins with 18 months of nuclear engineering and radiological controls training. Ms. Wipfli will oversee the operations and maintenance of the nuclear propulsion vessels such as aircraft carriers and submarines.

Figure 5. Christine Wipfli during her 1 year internship at IAEA (right) and during poster presentation at WM 2017 (left).

- DOE Fellow Hansell Gonzalez-Raymat successfully passed his dissertation defense for a Ph.D. in chemistry and accepted an exciting employment opportunity at the Savannah

River Site as a Senior Scientist with Savannah River Nuclear Solutions to continue solving DOE EM remediation challenges. The research Hansell conducted as a DOE Fellow at FIU and during his two SRS summer internships allowed him to develop the dissertation for his Ph.D. degree. In fact, the original idea for his dissertation research came from the first internship that he had at SRS where he studied the influence of humic substances on uranium migration. After the end of his first internship at SRS, he continued the research work at FIU and successfully integrated it into his dissertation research. His research focused on an innovative remediation technique which uses a low-cost unrefined humic substance known as Huma-K to enhance the removal of uranium from groundwater. During his second internship at SRS, he was able to further expand his dissertation research to include the interaction of Huma-K with other heavy metals. DOE is responsible for clean-up of several large groundwater contamination plumes containing uranium and other radionuclides and finding efficient low cost remedies is a high priority. Hansell's mentor from his internships at SRS, Dr. Miles Denham, further engaged with Hansell's academic and professional success by participating on his Ph.D. dissertation committee at FIU.

Figure 6. DOE Fellow Hansell Gonzalez performing laboratory research (left) and with his summer internship mentor, Miles Denham (right), at Savannah River National Laboratory.

2.0 INCREASING THE RETENTION OF MINORITY STUDENTS IN SCIENCE, TECHNOLOGY, ENGINEERING, AND MATH (STEM) DISCIPLINES

A total of **51 DOE Fellows** are currently pursing or have pursued/completed master's or Ph.D. STEM degrees at FIU and other institutions. Most of these DOE Fellows started the DOE-FIU Science & Technology Workforce Development Program as undergraduates and were successfully encouraged and prepared to continue on to graduate studies at FIU. The research conducted at ARC, DOE sites, DOE national laboratories, and DOE private contractors serve as the basis for their master's thesis or Ph.D. dissertation topics. Table 1 below shows the DOE Fellows who pursued or completed graduate level work during this performance year. Appendix B includes a list of all past DOE Fellows who pursued graduate level work. In addition, several undergraduate

DOE Fellows incorporated their EM applied research into their Senior Design or Capstone Projects at FIU.

Table 1. DOE Fellows in STEM Graduate Programs During Performance Year 8

DOE Fellow	Discipline	Degree	Research Topic Based on DOE EM Projects	Year of Graduation
Claudia Cardona	Environmental Engineering	Ph.D.	Remediation of the uranium-contaminated subsurface in the deep vadose zone via NH_3 gas injection	2017
Maximiliamo Edrei	Mechanical Engineering	Master	Investigation of Mixing Times of Sparged Bingham plastic type fluids as applied to the Pulse Jet Mixing Process	2017
Sebastian Zanlongo	Computer Science	Ph.D.	Multipurpose All-Terrain Robotic Platform for D&D	2018
Silvina Di Pietro	Chemistry	Ph.D.	Ammonia Gas Treatment for Uranium Immobilization at DOE Hanford's Site	2019 (anticipated)
Hansell Gonzalez-Raymat	Chemistry	Ph.D.	Unrefined humate solution as a potential low-cost remediation method for groundwater contaminated with heavy metals	2018
Alejandro Garcia	GeoScience	Master	The influence of biofilm formation on the SIP response of Hanford vadose zone sediment	2018
Alejandro Garcia		Ph.D.	Note[1]	
Alejandro Hernandez		Ph.D.	Note[1]	
Mohammed Albassam	Water resource Engineering	Master	Effect of Frequent Atmospheric Events on Flow Characterization in Tims Branch and its Major Outfalls	2018
Ron Hariprashad	GeoScience Hydrogeology	Master	Modeling of Surface Water Flow and Contaminant Transport in the Tims Branch Ecosystem	2019 (anticipated)
Juan Morales	Public Health	Ph.D.	Accumulated Metalloestrogens Analysis for Health Risk Assessment and Watershed Toxicology Management in Tims Branch, SRS	2019 (anticipated)
Joseph Coverston	Mechanical Engineering	Master	Evaluation of Pipeline Flushing Requirements for HLW at Hanford and Savannah River	2019 (anticipated)
Joshua Núñez	Mechanical Engineering	Master	Applications of intumescent technologies in support of D&D across the DOE complex	2019 (anticipated)
Tristan Simoes-Ponce	Mechanical Engineering	Master	D&D Technology Demonstration & Development and Technical Support to SRS's 235-F Facility Decommissioning	2019 (anticipated)
Ryan Cruz	Cyber Security	Master	Non-Thesis Option	2019 (anticipated)

[1]Note: Student is pursuing graduate level degree at another academic institution/department.

3.0 DOE FELLOWS RECRUITMENT & SELECTION

DOE Fellows spring recruitment efforts were initiated on April 9, 2018. Recruitment campaigns were conducted by placing recruitment tables at the College of Engineering and at the main FIU campus in the physics, chemistry and computer science buildings. A signup sheet was used to collect contact information from interested students and emails were sent out with information on requirements and components of the program along with application instructions and a checklist. The deadline for FIU students to submit applications for DOE Fellowships was May 11, 2018, and a total of 17 applications were received. The DOE Fellows selection committee, comprised of ARC researchers and staff, reviewed the applications and recommended FIU students for formal interviews. Dr. Leonel Lagos (Program Director) subsequently asked for the committees input and recommendations to make the final selections and complete the recruitment process. Three (3) students from the spring recruitment were selected to join the program as DOE Fellows Class of 2018.

The fall recruitment efforts for new DOE Fellows were initiated on August 27, 2018 and the deadline for FIU students to submit applications for DOE Fellowships was September 26, 2018. Twenty-one (21) applications were received and reviewed by ARC researchers and staff. The DOE Fellows selection committee recommended FIU students for formal interviews. Seven (7) additional students were selected to join the program as DOE Fellows Class of 2018.

Table 2. DOE Fellows Class of 2018

Recruitment Period	First Name	Last Name	Major	Degree
Spring	Jorge	Montesino	Civil Engineering	BS
	Alexis	Vento	Environmental Engineering	BS
	Alex	Rivero	Computer Science	BS
Fall	Roger	Boza	Computer Science	BS
	David	Mareno	Computer Engineering	BS
	Jose	Rendon	Mechanical Engineering	BS
	Jason	Soto	Mechanical Engineering	MS
	Alexis	Suarez	Environmental Engineering	BS
	Patrick	Uriarte	Mechanical Engineering	BS
	Amanda	Yancoskie	Environmental Engineering	BS

Each new DOE Fellow was assigned to an ARC staff member to act as their mentor and supervise their EM research work. Orientation for the new DOE Fellows was conducted and the new Fellows completed the FIU's Environmental Health & Safety courses required by the university and ARC prior to conducting any work in ARC's lab facilities. The new DOE Fellows also created a brief bio to include on the DOE Fellows website.

4.0 DOE FELLOWS INTERNSHIPS

The DOE Fellows program director completed coordination for placement of DOE Fellows for summer internships. During summer 2018, seventeen (17) DOE Fellows participated in 10-week internships as part of the DOE-FIU Cooperative Agreement including three were being co-sponsored by other organizations (i.e., CMU, LANL, and FIU McNair). An additional two DOE Fellows conducted summer internships at SRNL as part of the DOE EM's MSIPP summer internship program. The summer 2018 internships and technical report titles are provided below.

Table 3. Summer 2018 Internships

DOE Fellow	Internship Location	Internship Mentor(s)	Report Title
Joshua Núñez	DOE HQ (EM 3.2)	Rod Rimando	Support to the Technology Development Office
Alejandro Koszarycz	DOE HQ (EM 4.11)	Andrew Szilagyi	DOE EM Web Refresh Project and LLNL Building 280
Silvia Garcia	DOE HQ (EM 4.12)	Skip Chamberlain	Assisting DOE EM 4.12, Office of Groundwater and Subsurface Closure
Juan Carlos Morales	DOE HQ (EM 4.31)	Robert Seifert	Contrast of Cultures in Interagency Radiological Management Involving Human Health Reference Dose and Risk
Ximena Lugo	DOE HQ (EM 4.31)	Robert Seifert	Regulatory Reform: A Summer Experience
Tristan Simoes-Ponce	SRNL	Connor Nicholson	Characterizing the Mechanical Properties of Polyurethane Foams
Katherine De La Rosa	SRNL	Brian Looney	Mercury Speciation via Direct Mercury Analyzer
Ryan Cruz	SRNL	Richard Poland	Authentication Protocol for Industrial Control Systems without Encryption
Silvina Di Pietro	PNNL	Jim Szecsody	Iodate Reduction and Dissolution by Dithionite of Hanford Sediments
Clarice Davila	WRPS	Ruben Mendoza	Utilizing OSIsoft Visualizing PI Data System for Tank Level Data
Joseph Coverston	WRPS	Karthik Subramanian	Double Shell Tank Visual and Non-Destructive Evaluation Program Plan
Anibal Morales-Zambrana	ANL	Young Soo Park	Performance Evaluation of Augmented Teleoperation of Contact Manipulation Tasks
Christopher Excellent	DOE HQ (EM 3.2) / CMU	Rod Rimando, Red Whittaker	Pipe Crawling Activity Measurement System (PCAMS)
Michael DiBono	CMU	Rod Rimando, Red Whittaker	Deployment of the Pipe Crawling Activity Measurement System (PCAMS)
Frances Zengotita	LANL ACRSP	Don Reed, Julie Swanson	Potential for Transport of Cesium as Biocolloids in a High Ionic Strength System
Sebastian Zanlongo	SRNL/MSIPP	Timothy Aucott, Robin Young	Informative Path Planning for Mapping Radiation
Manuel Losada	SRNL/MSIPP	Jean Plummer	IMU Integration into Sensor Suite for Inspection of H-Canyon

Highlights from the internship assignments in the DOE Fellows' own words are included in Appendix D. Additional highlights are provided below.

Figure 7. Summer 2018 Interns (DOE Fellows) with program manager Dr. Ravi Gudavalli (left) and program director Dr. Leonel Lagos (right).

- The high point for many of the interns was the opportunity to engage in high priority EM challenges and technology deployments, including the final preparation of the RadPiper technology from the Robotics Institute at CMU and deployment at the Portsmouth former uranium enrichment plant as well as a cold (non-radioactive) onsite demonstration of an intumescent coating technology at SRNL. Two DOE Fellows have assisted with the intumescent coating technology research and pre-testing at FIU, which is being deployed during a hot (radioactive) demonstration at the SRS 235-F PuFF facility.

Figure 8. FIU DOE Fellow students (Michael DiBono, Christopher Excellent, Joshua Nunez, and Juan Morales) interning at DOE HQ.

- DOE Fellow Silvina DiPietro participated in a very valuable experience at PNNL with senior scientist Dr. Jim Szecsody, performing batch experiments with contaminated Hanford Site soils. This research assists PNNL scientists in monitoring the long-term stability of iodine. Spectroscopic instrumentation (Fourier-Transform Infrared spectroscopy or FTIR) was used to analyze clean mineral samples previously treated with ammonia gas and U at FIU for her dissertation while also investigating iodine interactions with Hanford sediments. She also had the opportunity to participate in several informative tours including the B-Reactor tour located in the Manhattan Project National Historic Park and the Environmental Molecular Sciences Laboratory (EMSL) tour (PNNL's DOE scientific user facility).

Figure 9. DOE Fellow intern (Silvina Di Pietro – PhD Chemistry) at PNNL.

- Frances Zengotita, DOE and McNair Fellow, in collaboration with Los Alamos National Laboratory Carlsbad Field Office continued her investigation on how a halophilic microbe may affect the mobility of cesium (Cs) at the Waste Isolation Pilot Plant. The significance of this work can potentially be applied to the oceanic contamination from the Fukushima Daichii Nuclear Power Plant accident where large amounts of cesium-134 were released into the marine environment. Under the mentorship of Dr. Swanson and Dr. Emerson, Ms. Zengotita is observing the mobility and remobilization of Cs by microbes after sorption to WIPP-relevant minerals.

Figure 10. DOE Fellow Frances Zengotita interning at the Waste Isolation Pilot Plant (WIPP), Carlsbad NM.

- DOE Fellow Sebastian Zanlongo conducted a 10-week summer internships at Savannah River National Lab as part of DOE EM's MSIPP. Sebastian worked on a project to use portable radiation detectors and small robots to make measurements in contaminated areas. Project tasks included operating detectors and robots, combining data acquisition for the two systems, and automating the systems. The end result will be a radiation map of contaminated areas.

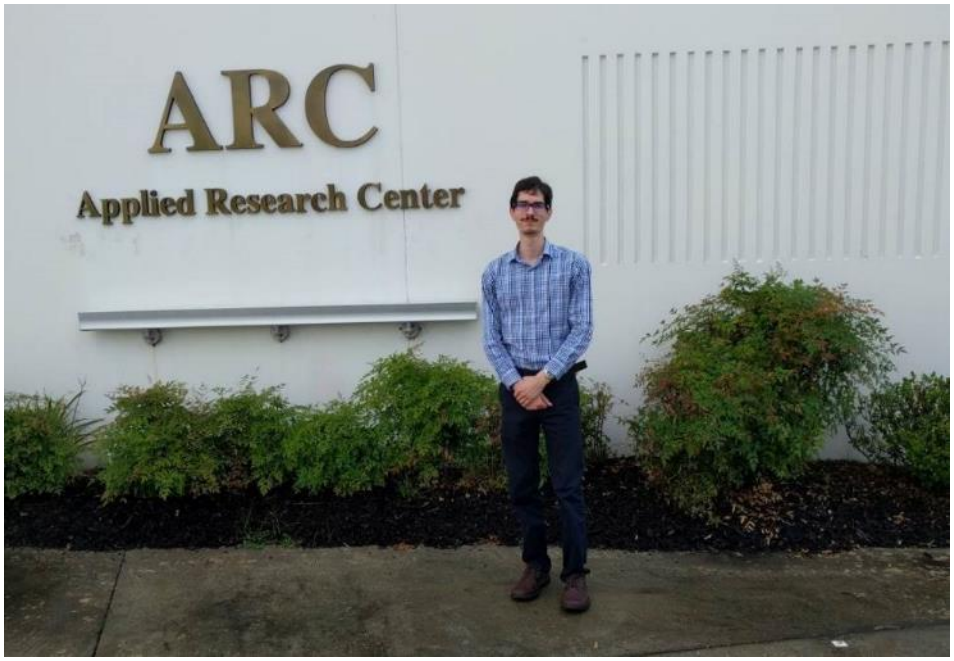


Figure 11. DOE Fellow Sebastian Zanlongo is at SRNL as part of DOE EM's MSIPP internship program.

- DOE Fellow Ryan Cruz participated in a 10 week internship at the Savannah River Site, conducting research on authentication methods for industrial control systems with the purpose of using a digital signature without encryption. This method verifies the integrity of data while also allowing deep packet inspection. Finally, infrastructure will be developed for testing the authentication method in a small network environment.

Figure 12. DOE Fellow Ryan Cruz at SRS during his summer internship.

- Dr. Leonel Lagos visited DOE's Argonne National Laboratory in Chicago on July 24-25, 2018. During his visit, he met with DOE Fellow Anibal Morales, who was completing a 10-week summer internship with Dr. Young Soo Park (ANL). Anibal is conducting his research on robotics at FIU ARC as part of the DOE-FIU Cooperative Agreement.

Figure 13. DOE Fellow Anibal Morales (middle) with Program Director Dr. Leo Lagos (left) and summer mentor Dr. Young Soo Park at Argonne National Lab.

- DOE Fellows and FIU staff visited the Savannah River Site in Aiken, South Carolina on July 17-19, 2018. Six DOE Fellows who spent their summer at DOE HQ in D.C. travelled to SRS to be a part of this visit, joining the five DOE Fellows interning at SRNL. A tour of the site was organized by DOE HQ and facilitated by SRNL to familiarize the Fellows with the lab, its history, and its purpose during and after the Cold War nuclear proliferation era.

  The site tour also included a cold (non-radioactive) demonstration of a technology being investigated at FIU in collaboration with scientists and engineers at SRNL. DOE Fellows Joshua Nunez and Tristan Simoes-Ponce assisted with the intumescent coating technology research and pre-testing at FIU, which will be deployed during a hot (radioactive) demonstration at the SRS 235-F PuFF facility. Witnessing the results of their research being applied in a real world environment was a rewarding experience and highlighted the operational difficulties of deploying environmental technologies in the field.

  The Fellows also visited other SRS areas such as the P Reactor, F Area, and the Aiken County Applied Research Center campus. While unable to tour the tank farms due to drills being performed at the same time, SRNL scientists provided presentations on site environmental restoration activities and the robotic systems that are currently being used or developed for the tank farms. Topics included the virtual-reality projects that SRNL is working on, including a virtual environment that details gloveboxes, and a virtual-reality system for workers to learn how to disassemble various mechanical items and reassemble them, using a pen to simulate the hand and a virtual-reality headset for the visuals. In return, the FIU students, along with their SRNL and DOE summer mentors, shared their summer research projects during presentations to SRS and DOE officials. Overall the Fellows found the tour and presentations very interesting and were able to gain a good understanding for both the hands-on and policy side of the site operations.

Figure 14. FIU students and staff, with University of Texas – Austin, University of Puerto Rico students and DOE EM HQ and SRNL colleagues outside of SRS 235-F.

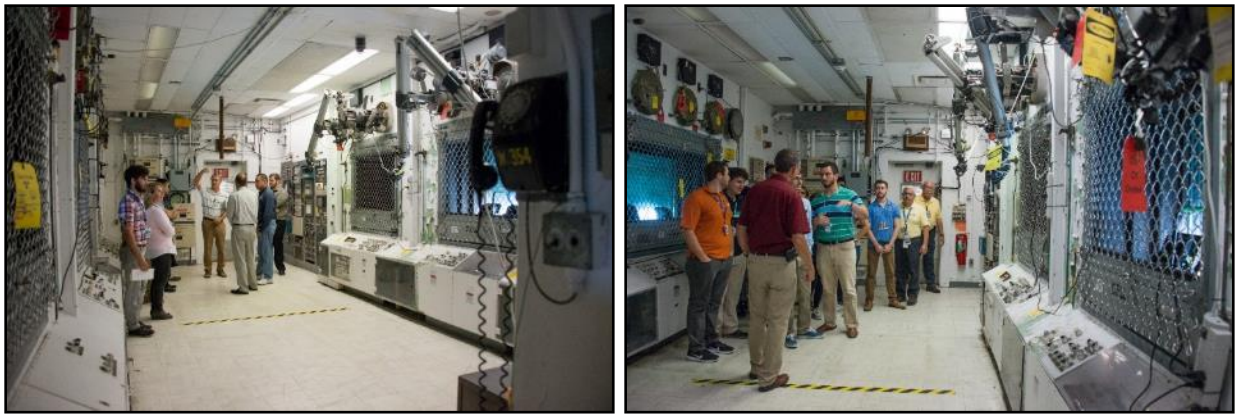


Figure 15. Touring the SRS 235-F Plutonium Fuel Form (PuFF) Facility Operator Station Base.

Figure 16. SRNL (J. Nicholson) describing the fixative application and the demonstration of the fixative sprayer at the SRS 235-F Process Cell Mock-up & Training Facility to FIU students.

Figure 17. DOE Fellows Tristan Simoes-Ponce and Joshua Nunez briefing on the fixative and intumescent coating research.

Figure 18. EM Office of Technology Development representative (JP Pabon) interacting with FIU students during briefings (left) and FIU, UT-Austin and University of Puerto Rico student interns in front of the SRS P-Reactor (right).

- DOE-EM coordinated a presentation session for all of their summer interns to share their internship experience on August 2, 2018. A total of seven (7) DOE Fellows participated in this event and presented information based on their summer internship.
- DOE Fellows interning at SRNL participated in a poster exhibition, presenting their summer research efforts, on July 25, 2018. Poster titles included the following:
  - Ryan Cruz - Authentication Protocol for ICS without Encryption
  - Tristan Simoes-Ponce - Characterizing Mechanical Properties of Polyurethane Foams
  - Katherine Delarosa - Mercury Speciation via Direct Mercury Analyzer
  - Sebastian Zanlongo - Informative Path Planning for Mapping Radiation
  - Manuel Losada - 1) Remote 3D Mapping Overview; 2) Remote 3D Mapping Sensor Suite

5.0 DOE FELLOWS POSTER EXHIBITION AND COMPETITION

FIU conducted the 11th annual DOE Fellows Poster Exhibition and Competition on November 7, 2017. The purpose of this event was to showcase the DOE Fellows' research accomplishments for the past year as a result of their participation in various DOE EM related applied research projects. A total of 17 posters were exhibited. Some of the projects showcased by the students were a result of their summer internship assignments at DOE sites, national laboratories, and DOE HQ in Washington, DC. Additional posters reflected the DOE Fellows' DOE EM applied research that they conduct at ARC as part of the DOE-FIU Cooperative Agreement sponsored research. For some of the graduate students, these projects are also a part of their thesis towards a master's or Ph.D. degree. This year's panel of judges included Ms. Genia McKinley (DOE EM 3.2), Dr. Elizabeth Hoffman (SRNL Program Manager), Mr. Gary Benda (WM Symposia Deputy Managing Director & PAC Chair), and Dr. Inés Triay (ARC Executive Director). The poster titles and DOE Fellow presenters were:

1. Understanding the Groundwater/Surface Water Interface Phenomenon and the Contaminants of the (F-Area) - Savannah River Site (SRS) Aiken, SC
   Mohammed Albassam (Environmental Engineering)
2. Utilizing Sensors to Measure Temperature & Thickness of Carbon Steel
   Clarice Davila (Mechanical Engineering)

3. VAULTBOT
   Michael DiBono (Mechanical Engineering)
4. Effects of Alkaline Treatment on Mineral Dissolution for Hanford Sediments
   Silvina Di Pietro (Chemistry)
5. Investigation on the Sparging of Non-Newtonian Fluids for the Application of Pulse Jet Mixers
   Maximiliano Edrei (Mechanical Engineering)
6. The Influence of Microbial Activity on the SIP Response of Hanford Vadose Zone Sediment Mixed with Autunite Mineral
   Alejandro Garcia (Geosciences)
7. Study of an Unrefined Humate Solution as a Possible Remediation Method for Groundwater Contamination
   Hansell Gonzalez (Chemistry)
8. Distribution and Accumulation of Oxidized Tin in Tims Branch, Savannah River Site, SC
   Ron Hariprashad (Geosciences)
9. Interaction of Technetium-99 with Fe(II)-bearing Minerals Under Reducing Conditions
   Alejandro Hernandez (Chemistry)
10. Ecological Role in Health Physics by Monitoring the Effective Dose Rates of Radionuclides in *Lepomis Auritus* Fish Species, Savannah River Site
    Juan Morales (Public Health)
11. Effect of Acidic Plume on Soil's Properties and Capacity to Retain Uranium at SRS
    Awmna Rana (Chemistry)
12. Mercury Speciation Via Diffusive Gradients in Thin-Films (DGT) Technology
    Ripley Raubenolt (Environmental Engineering)
13. Investigation on Microbial (Consortia) Meta-Autunite Interactions - Effect of Bicarbonate
    Sarah Solomon (Environmental Engineering)
14. Synergetic Interactions between Uranium, Humic Acid, Silica Colloids and SRS Sediments at Variable pH
    Alexis Smoot (Environmental Engineering)
15. Incombustible Fixatives
    Jesse Viera (Mechanical Engineering)
16. Informative Path Planning for Tank Inspection
    Sebastián Zanlongo (Computer Science)
17. Role of *Chromohalobacter* on Transport of Lanthanides and Cesium in a Dolomite Mineral System
    Frances Zengotita (Chemistry)

Figure 19. 2017 Poster Competition and Exhibition participants and judges.

6.0 DOE FELLOWS 2017 INDUCTION CEREMONY

On November 8, 2017, FIU conducted the eleventh (11^{th}) annual DOE Fellows Induction Ceremony. This year, eleven (11) FIU STEM students were inducted as DOE Fellows. Mr. Kurt Gerdes (Director, Office of Subsurface and Tank Closure, DOE EM) was one of the keynote speakers for the ceremony. Another distinguished guest from DOE EM was Ms. Genia McKinley (EM Program Manager, MSIPP). Additional distinguished guests included Dr. Elizabeth Hoffman (Program Manager, SRNL) and Mr. Gary Benda (Deputy Managing Director & PAC Chair, WM Symposia).

FIU was represented at the event by Mr. Saif Ishoof (FIU Vice President for Engagement), Dr. John Volakis (FIU Dean, College of Engineering & Computing), Dr. Inés Triay (ARC Executive Director) and Dr. Leonel E. Lagos (Principal Investigator for DOE-FIU Cooperative Agreement and Director of the DOE Fellows Program), as well as FIU faculty, staff, and students. Former DOE Fellows who participated in the event included Ms. Alessandra Monetti (VDC Manager, Moss & Associates), Mr. Ramon Colon Mendoza (Zafras Home Inspection), Ms. Elsa Cabrejo (Engineer, Miami-Dade County Division of Environmental Resources Management), and Ms. Kiara Pazan (Environmental Engineer, AECOM).

Mr. Kurt Gerdes, Ms. Genia McKinley and the other distinguished guests had the opportunity to participate in morning tours of the ARC research laboratories and listen to DOE Fellows presenting their research work. Dr. Lagos first presented a brief overview of the DOE Fellows program. DOE Fellow Michael DiBono then presented the research from his summer 2017 internship on robotics at UT-Austin; DOE Fellow Silvina Di Pietro presented her DOE EM research on uranium gas treatment for uranium immobilization at Hanford; and DOE Fellow Ron Hariprashad presented

his research related to data collection and water quality monitoring in Tims Branch Watershed at SRS. Tours of the ARC facilities included: 1) the robotics and sensors laboratory for a demonstration of the inspection tools being developed for double-shell tanks at Hanford and SRS; 2) the cybersecurity lab for a presentation on knowledge management, waste management, and fixatives mobile application; 3) the soil and groundwater laboratory for an overview of the research being performed in support of SRS and PNNL; 4) the multi-functional indoor testing facility for a demonstration of the double-shell tank test bed, the mini-rover inspection tool, and the pipeline corrosion and erosion evaluation research; and 5) the radiological laboratory.

Figure 20. Induction ceremony guests touring ARC's laboratory facilities.

Figure 21. New DOE Fellows at the 2017 Induction Ceremony.

During this year's induction ceremony, 11 new FIU STEM students were inducted as DOE Fellows:

Table 4. DOE Fellows Class of 2017 Inducted into the Program

New DOE Fellows		Degree	Major Area of Study
Joseph	Coverston	MS	Mechanical Engineering
Ryan	Cruz	BS	Information Technology
Katherine	Delarosa	BS	Environmental Engineering
Christopher	Excellent	BS	Mechanical Engineering
Silvia	Garcia	BS	Biological Sciences
Alejandro	Koszarycz	BS	Computer Science
Manuel	Losada	BS	Electrical Engineering
Ximena	Lugo	BS	Environmental Engineering
Anibal	Morales-Zambrana	BS	Mechanical Engineering
Joshua	Núñez	BS	Mechanical Engineering
Tristan	Ponce	BS	Mechanical Engineering

In addition, awards were presented to the DOE Fellows that won the DOE Fellows Poster Exhibition and Competition held on the previous day. First place was awarded to Mr. Jesse Viera for his poster titled, "Incombustible Fixatives." Second place went to Mr. Alejandro Garcia for his poster titled, "The Influence of Microbial Activity on the SIP Response of Hanford Vadose Zone Sediment Mixed with Autunite Mineral." Third place was awarded to Mr. Juan Carlos Morales for

his poster titled, "Ecological Role in Health Physics by Monitoring the Effective Dose Rates of Radionuclides in *Lepomis Auritus* Fish Species, SRS."

Figure 22. Poster competition first place award recipient Mr. Jesse Viera.

Figure 23. Poster competition second place award recipient Mr. Juan Morales.

Figure 24. Poster competition third place award recipient Mr. Alejandro Garcia.

For the ninth year, the DOE Fellow of the Year Award and the Mentor of the Year Award were presented at the ceremony. DOE Fellows were requested to nominate their ARC mentors and ARC mentors were requested to nominate the DOE Fellows. An ARC committee was established to review and select the winners from the submitted nominations. The 2017 Mentor of the Year Award went to Research Scientist Joseph Sinicrope. The 2017 DOE Fellow of the Year Award was awarded to Ms. Ripley Raubenolt (DOE Fellows Class of 2016).

Figure 25. Mr. Joseph Sinicrope, DOE Fellow mentor of the year for 2017.

Figure 26. Ms. Ripley Raubenolt, DOE Fellow of the year for 2017.

7.0 CONFERENCE PARTICIPATION

7.1 Waste Management Conference 2018

DOE Fellows completed preparation and participated in the Waste Management 2018 Symposia (WM18) in Phoenix, AZ, from March 18-22, 2018. The DOE Fellows completed technical posters, presentation materials, written biographies, and resumes for the WM conference to introduce themselves and their research. A total of eighteen (18) DOE Fellows attended WM18 and presented technical posters during Session 35 (Student Posters: The Next Generation - Industry Leaders of Tomorrow) on Monday, March 19, 2018. The posters presented the DOE-EM research that they have performed at FIU's ARC and during their summer internships at DOE sites, HQ, and national research laboratories, in the research areas of high level waste/waste processing, soil and groundwater modeling and remediation, and deactivation and decommissioning. The DOE Fellow posters presented during the Student Poster Competition at WM18 are presented below.

Figure 27. DOE Fellows at WM18

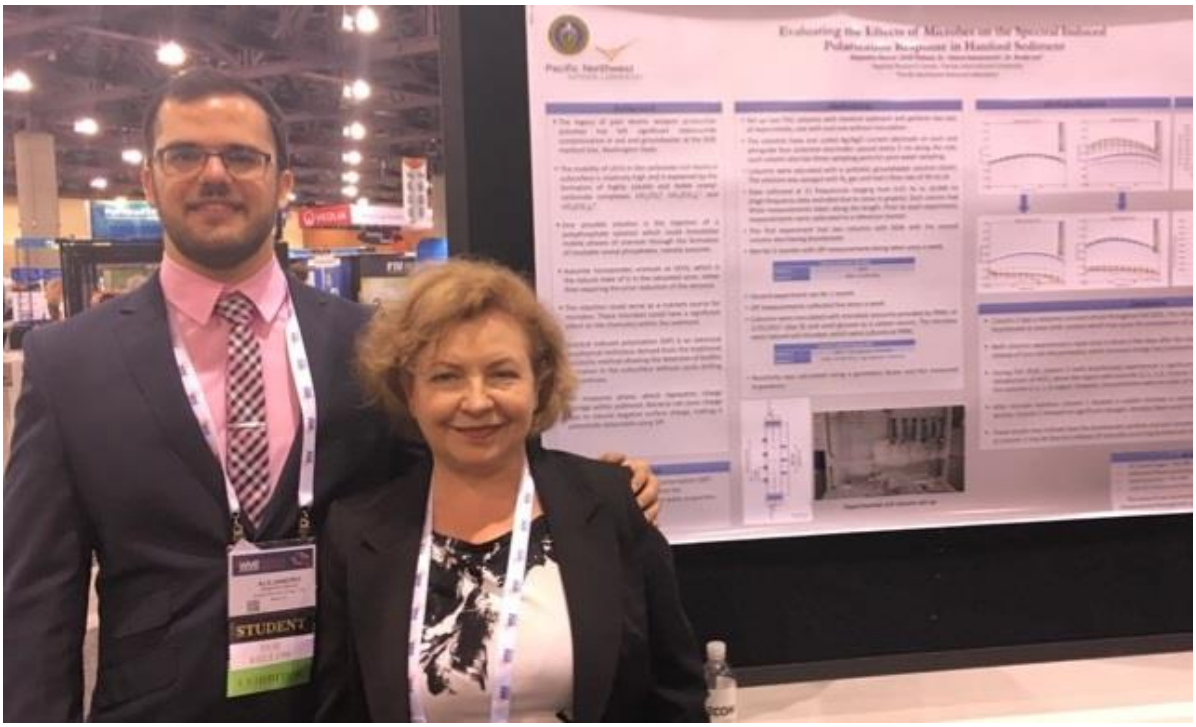


Figure 28. Alejandro Garcia - Evaluating the Effects of Microbes on the Spectral Induced Polarization Response in Hanford Sediment.

Figure 29. Alejandro Hernandez - Interaction of Technetium-99 with Fe(II)-bearing Minerals Under Reducing Conditions.

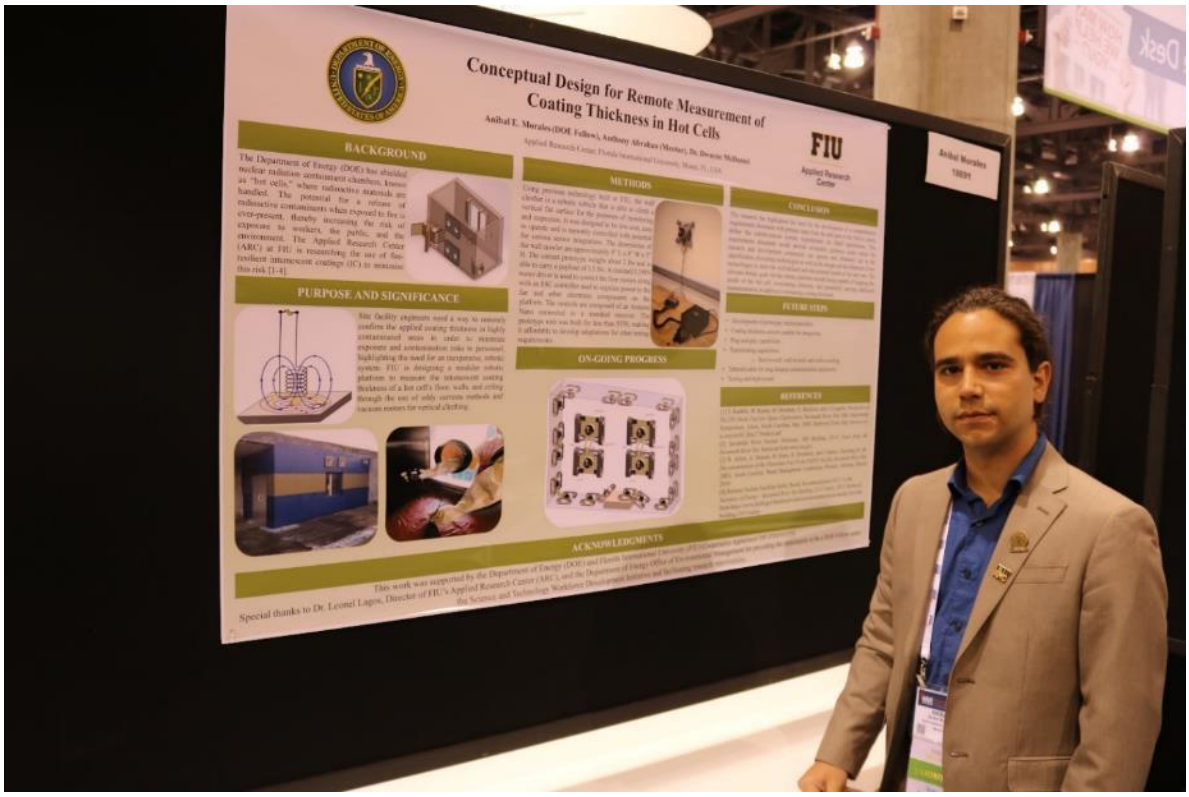


Figure 30. Anibal Morales - Conceptual Design for Remote Measurement of Coating Thickness in Hot Cells.

Figure 31. Clarice Davila - Erosion/Corrosion Detection in Carbon Steel Pipes Using Ultrasonic Sensors.

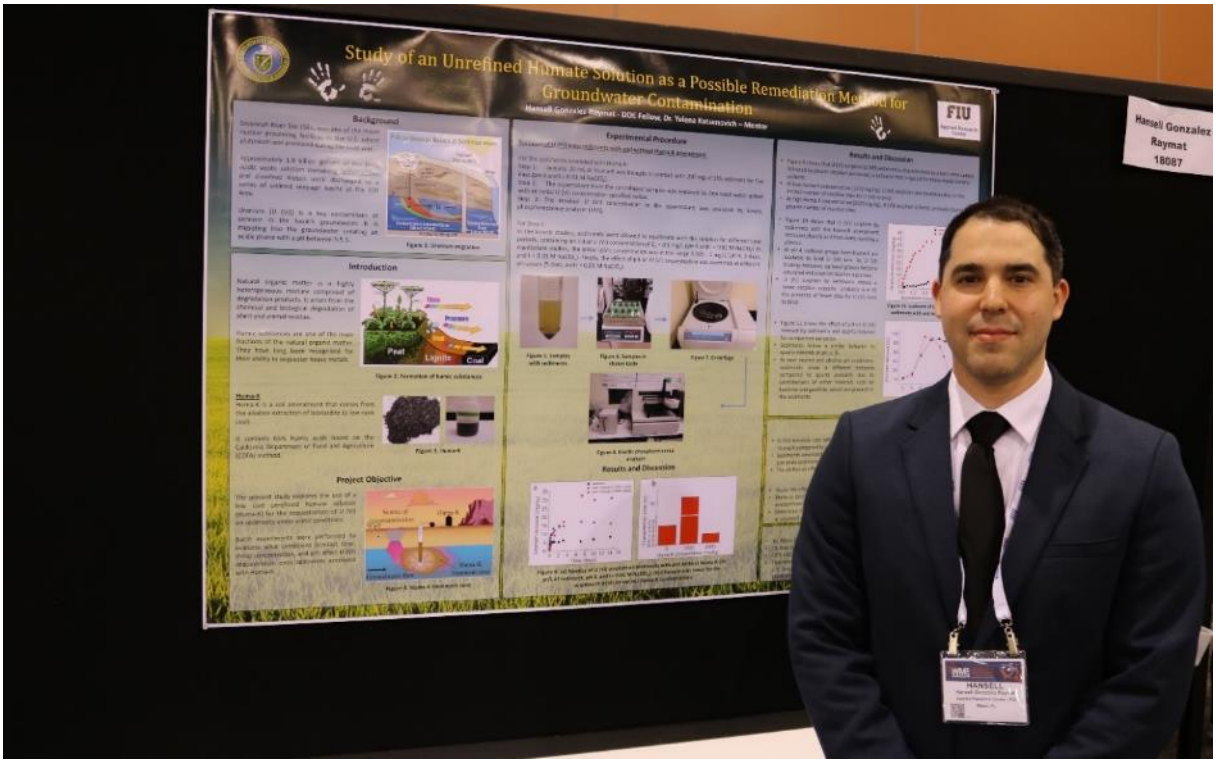


Figure 32. Hansell Gonzalez Raymat - Study of an Unrefined Humate Solution as a Possible Remediation Method for Groundwater Contamination.

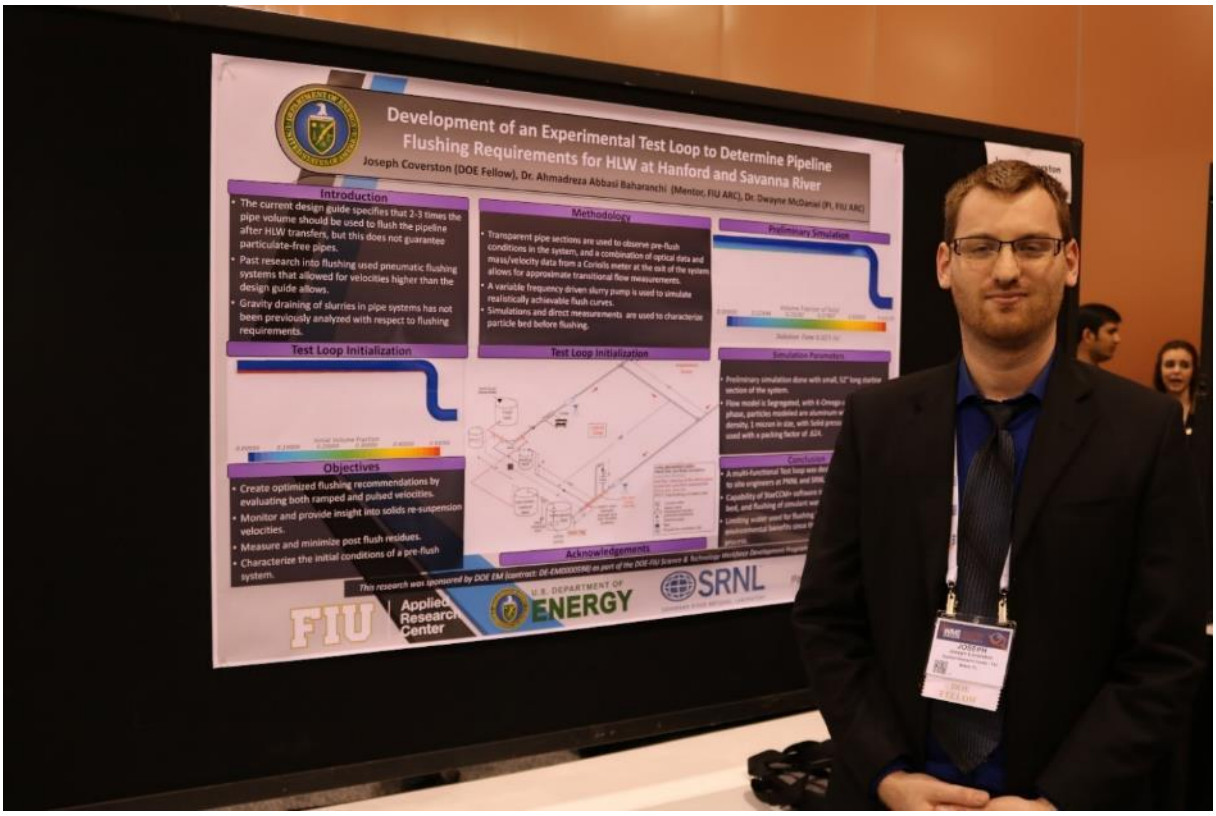


Figure 33. Joseph Coverston - Development of an Experimental Test Loop to Determine Pipeline Flushing Requirements for HLW at Hanford and Savannah River.

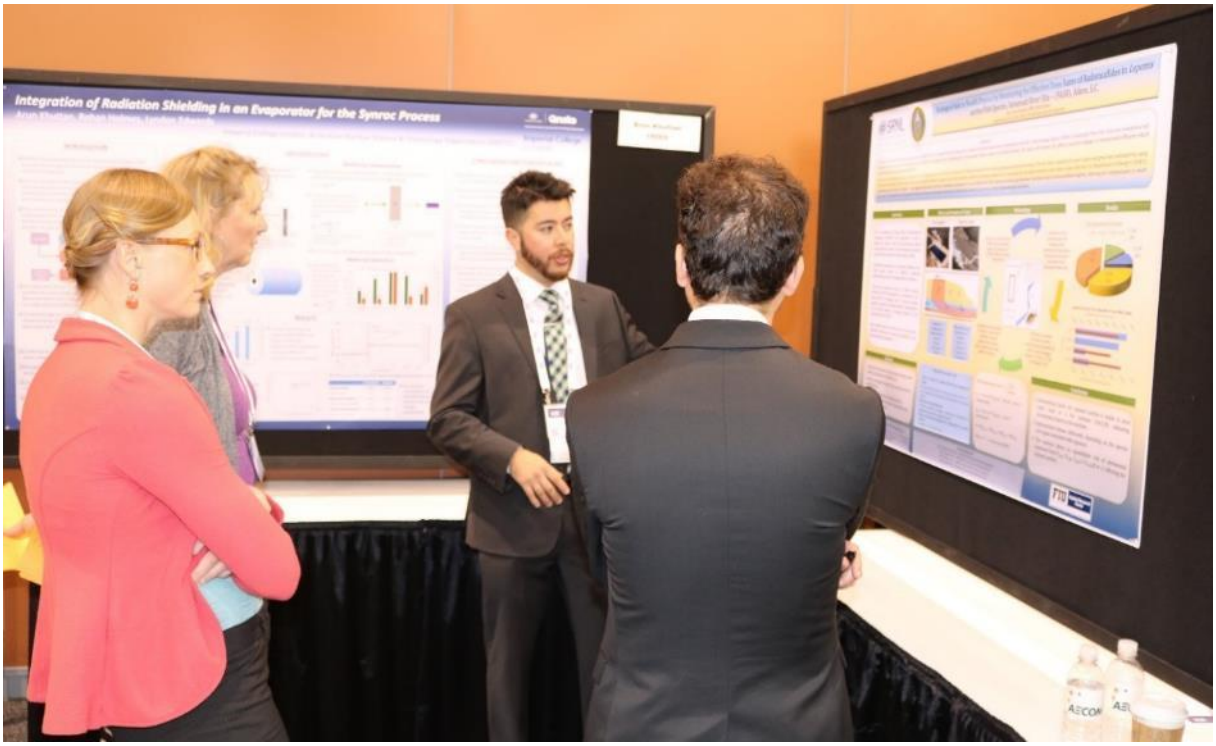


Figure 34. Juan Morales - Ecological Role in Health Physics by Monitoring the Effective Dose Rates of Radionuclides in *Lepomis Auritus* Fish Species, Savannah River Site- (FASB).

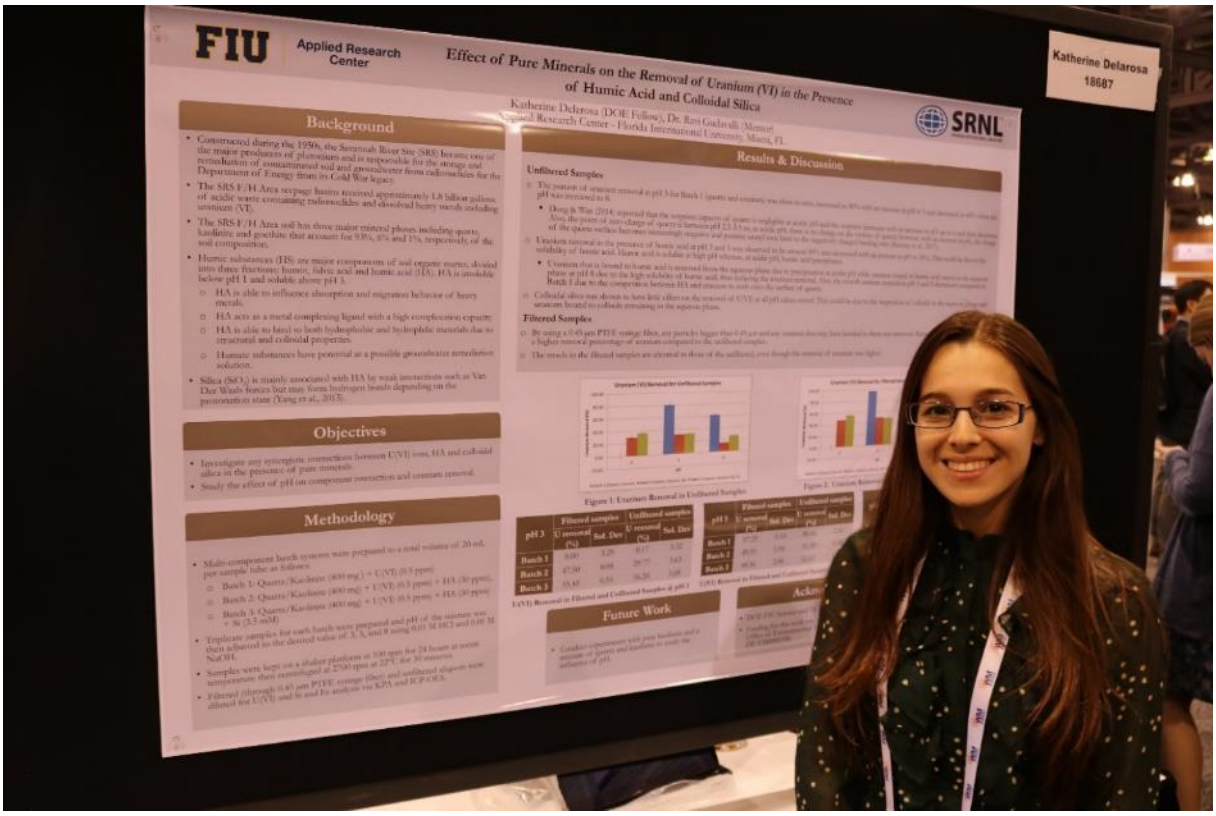


Figure 35. Katherine Delarosa - Effect of Pure Minerals on the Removal of Uranium (VI) in the Presence of Humic Acid and Colloidal Silica.

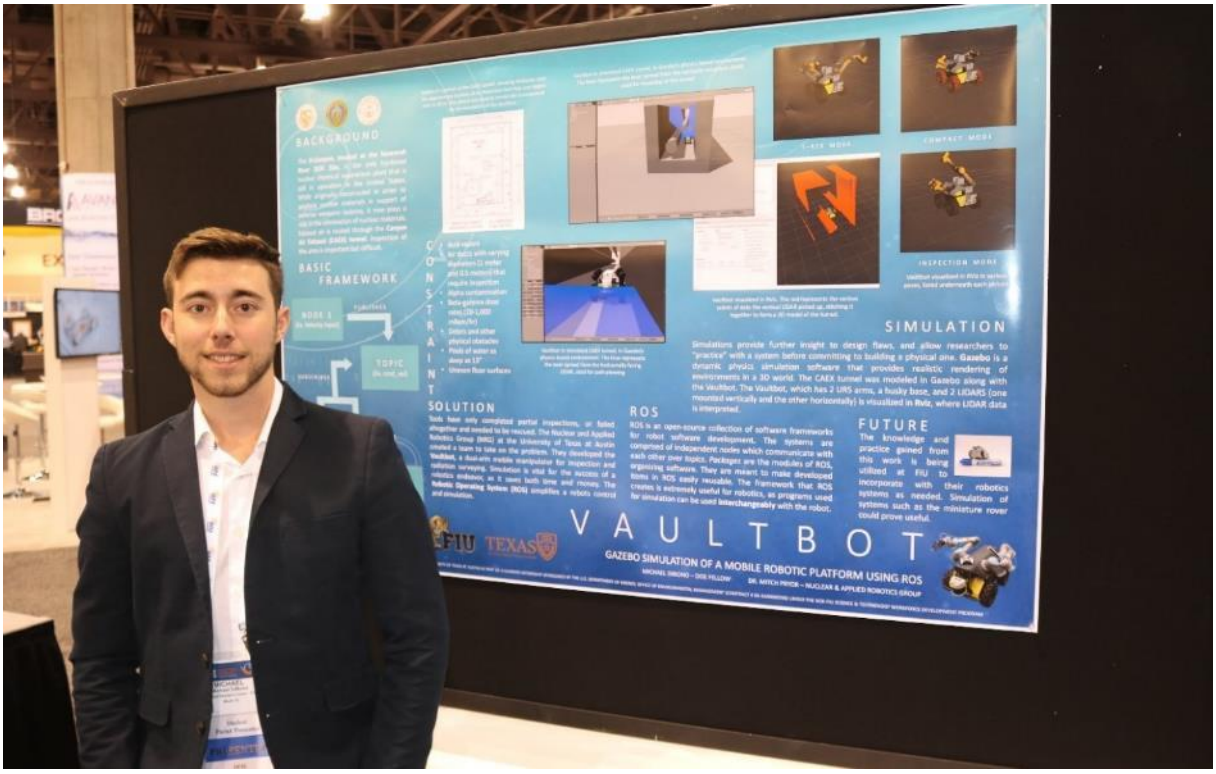


Figure 36. Michael DiBono –Gazebo Simulation of a Mobile Robotic Platform using ROS.

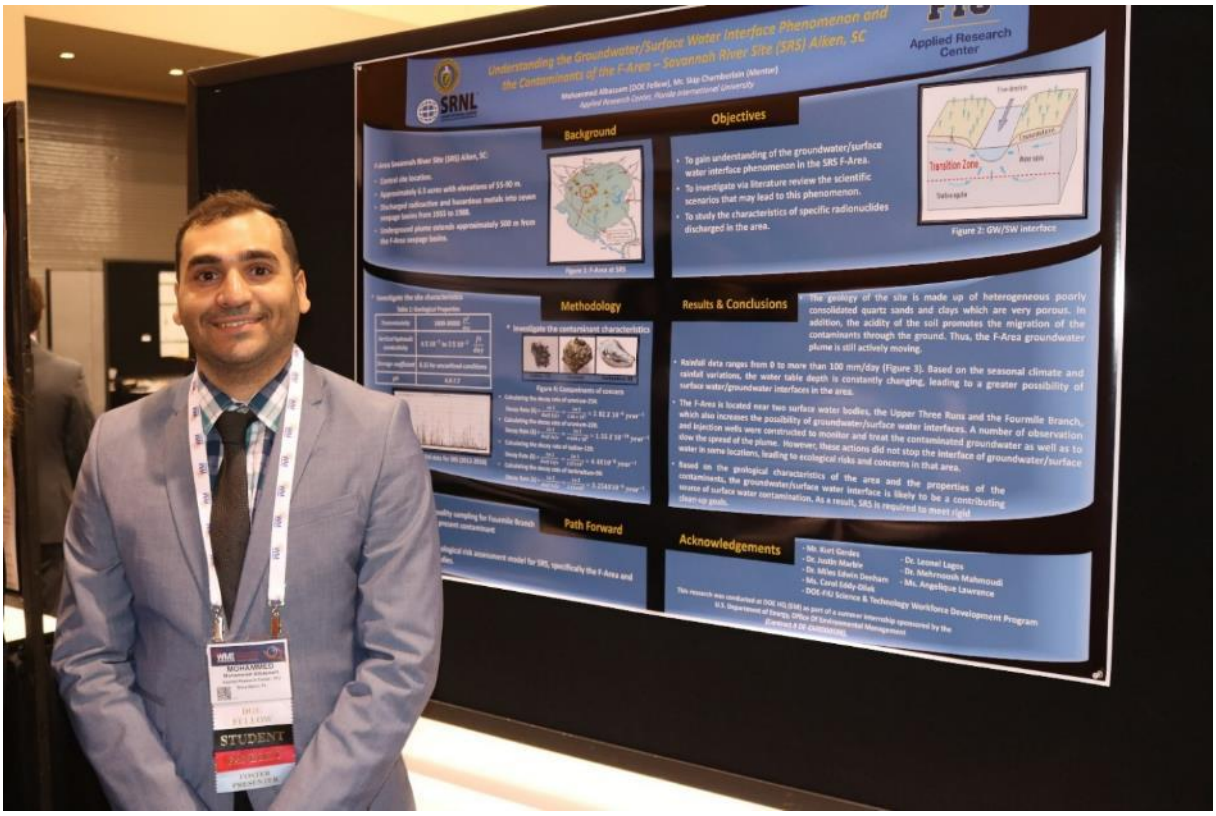


Figure 37. Mohammed Albassam - Understanding the Groundwater / Surface-Water Interface Phenomenon and the Contaminants of the (F-Area)-Savannah River Site (SRS) Aiken, SC.

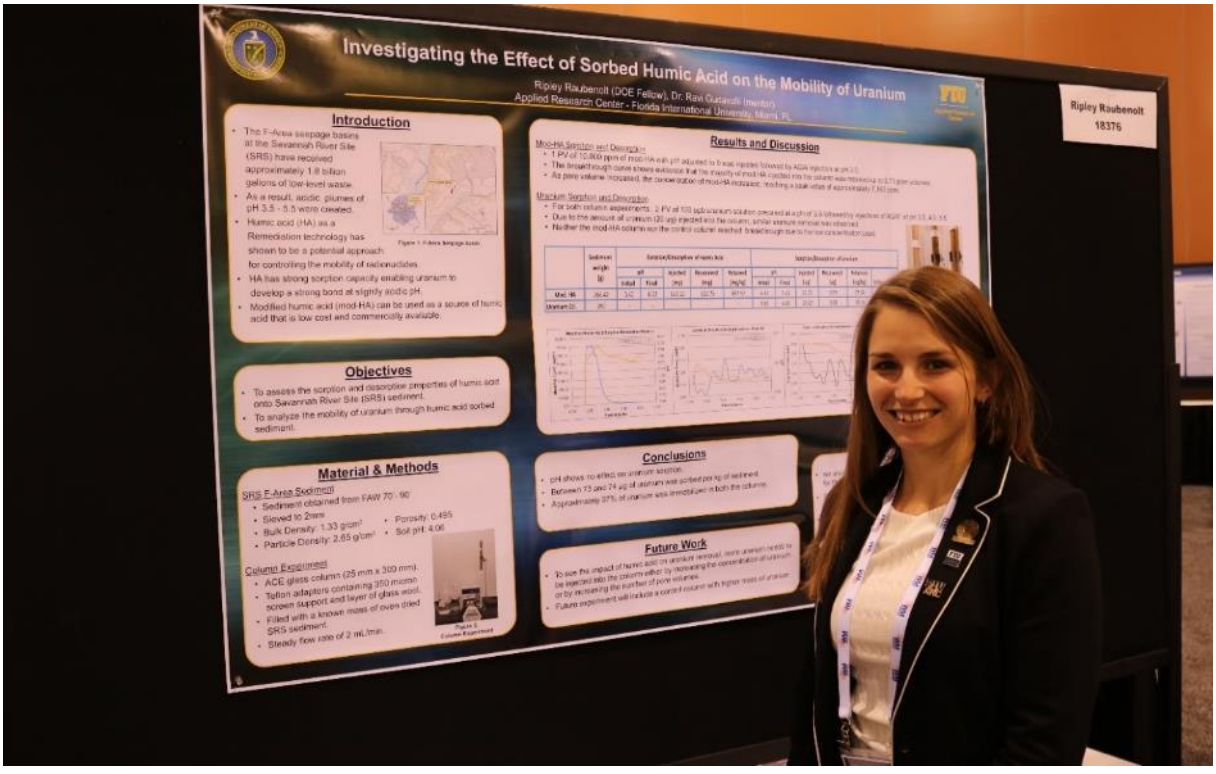


Figure 38. Ripley Raubenolt - Investigating the Effect of Sorbed Humic Acid on the Mobility of Uranium.

Figure 39. Ron Hariprashad – Distribution and Accumulation of Oxidized Tin in Tims Branch, Savannah River Site, SC.

Figure 40. Ryan Cruz - Robotics Technologies on KM-IT Platform.

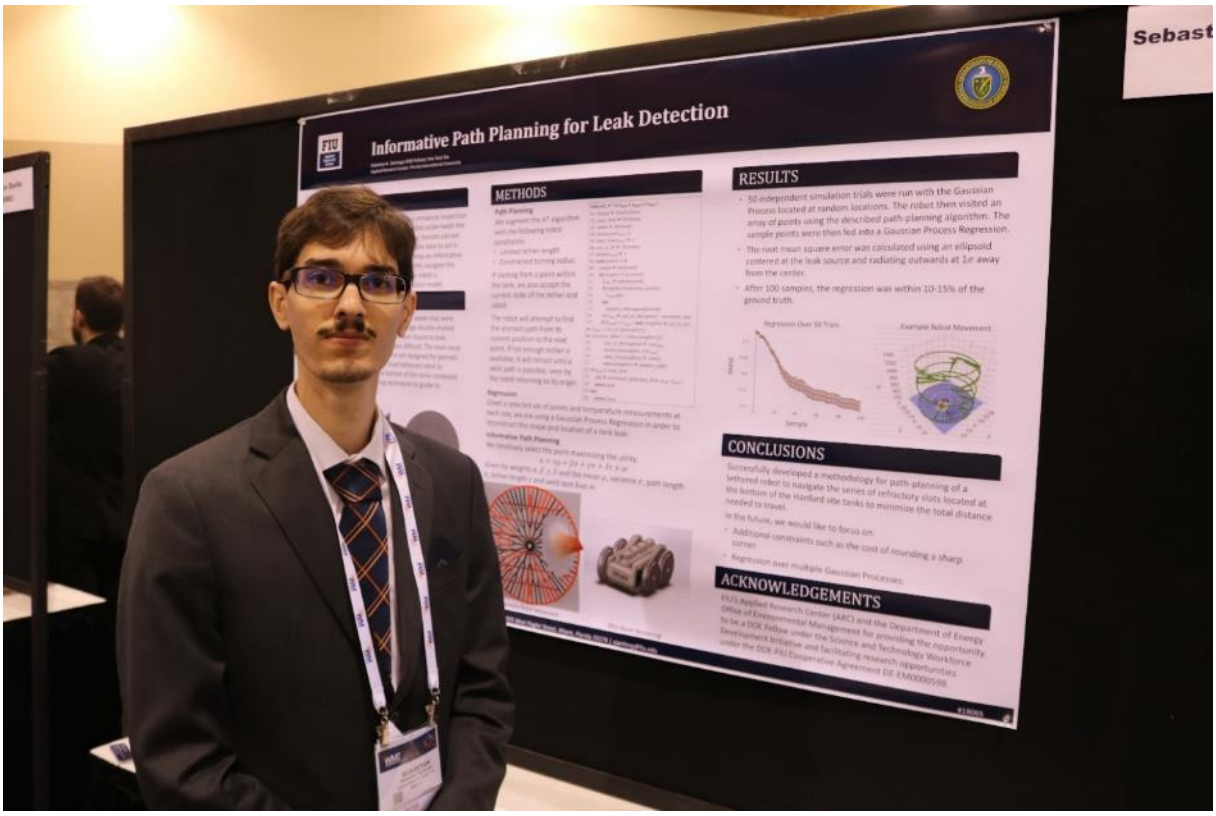


Figure 41. Sebastian Zanlongo - Informative Path Planning for Leak Detection.

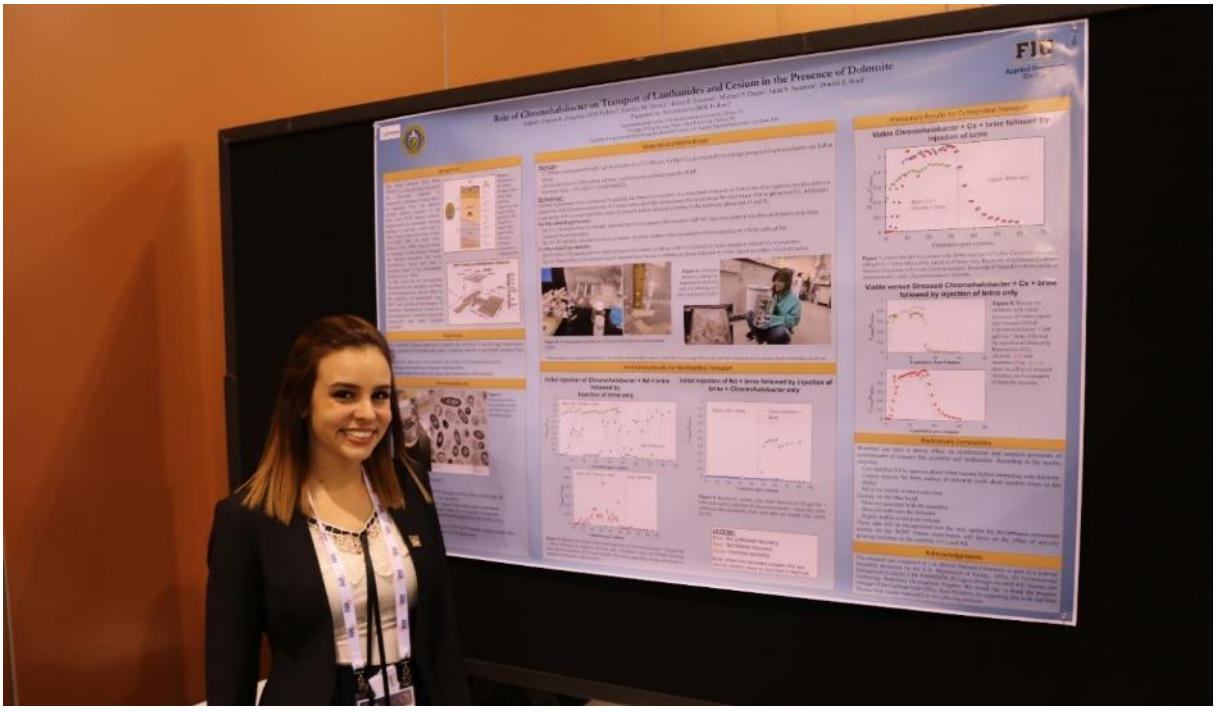


Figure 42. Silvia Garcia - Role of Chromohalobacter on the Potential Transport of Lanthanides and Cesium in a Dolomite Mineral System.

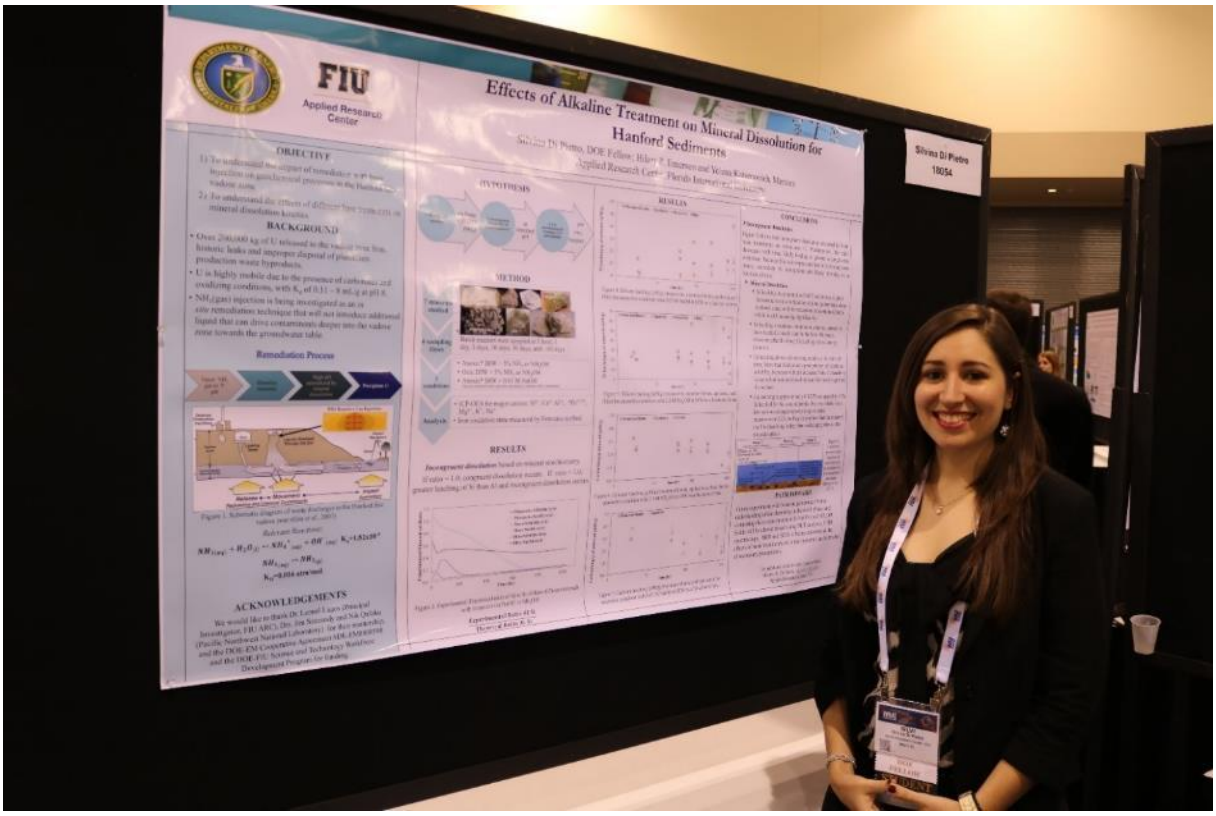


Figure 43. Silvina Di Pietro - Effects of Alkaline Treatment on Mineral Dissolution for Hanford Sediments.

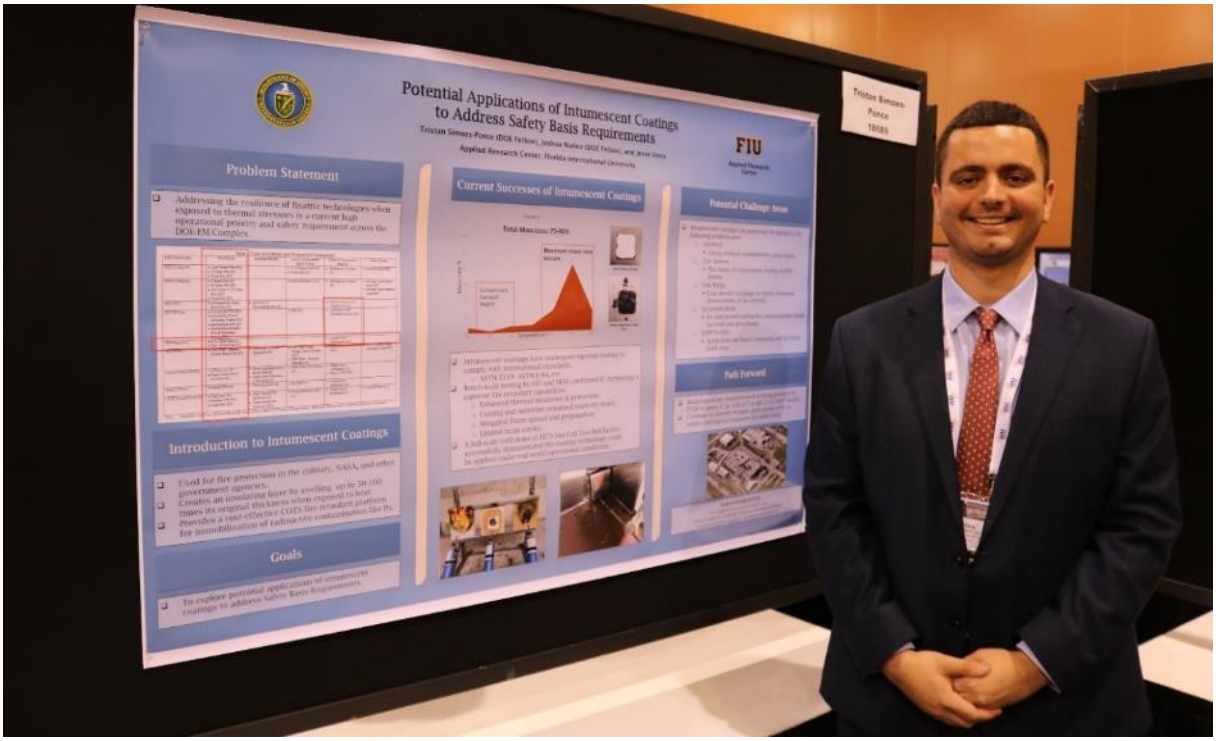


Figure 44. Tristan Simoes-Ponce - Potential Applications of Intumescent Coating Technologies to Address Safety Basis Requirements.

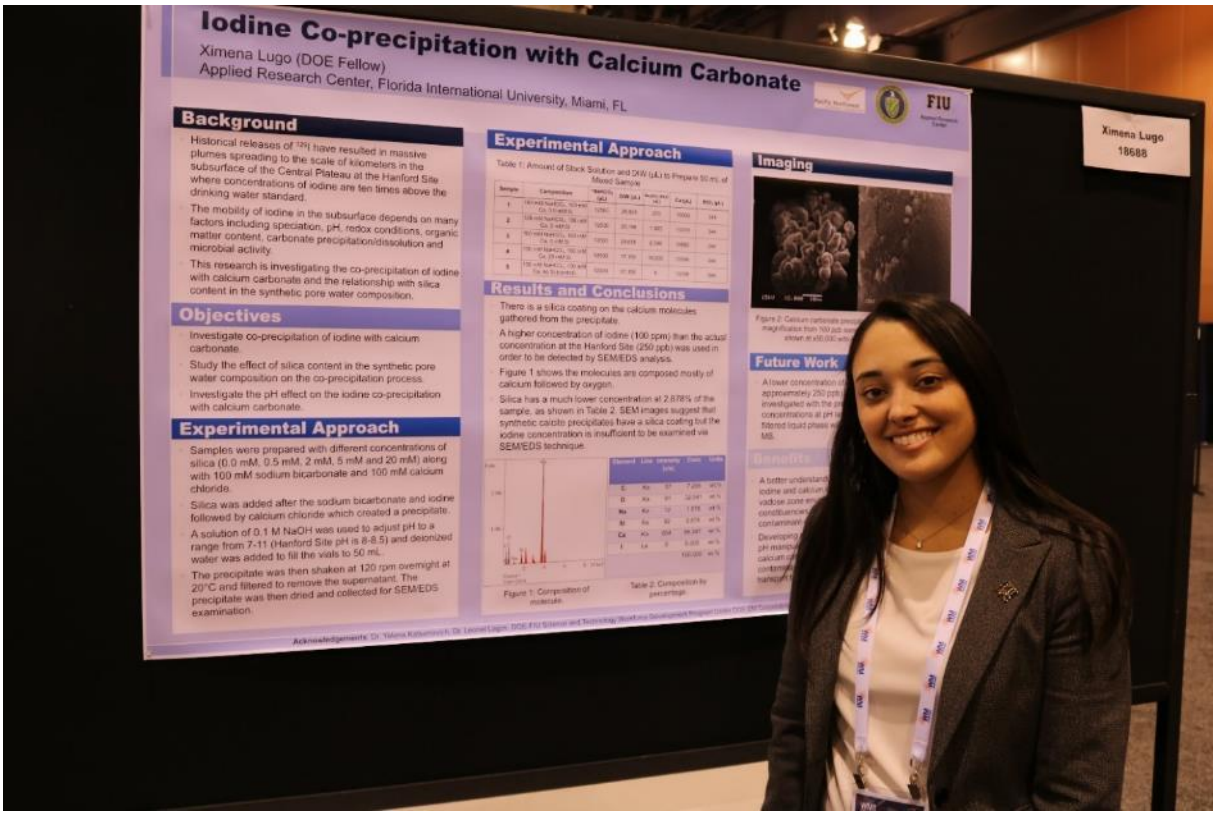


Figure 45. Ximena Lugo - Iodine Co-precipitation Process with Calcium Carbonate.

DOE Fellow Hansell Gonzalez won the best student poster award for his poster titled " Study of an Unrefined Humate solution as a possible Remediation Method for Groundwater Contamination" awarded during the WM2018 Conference Honors and Awards Luncheon on Tuesday, March 20, 2018.

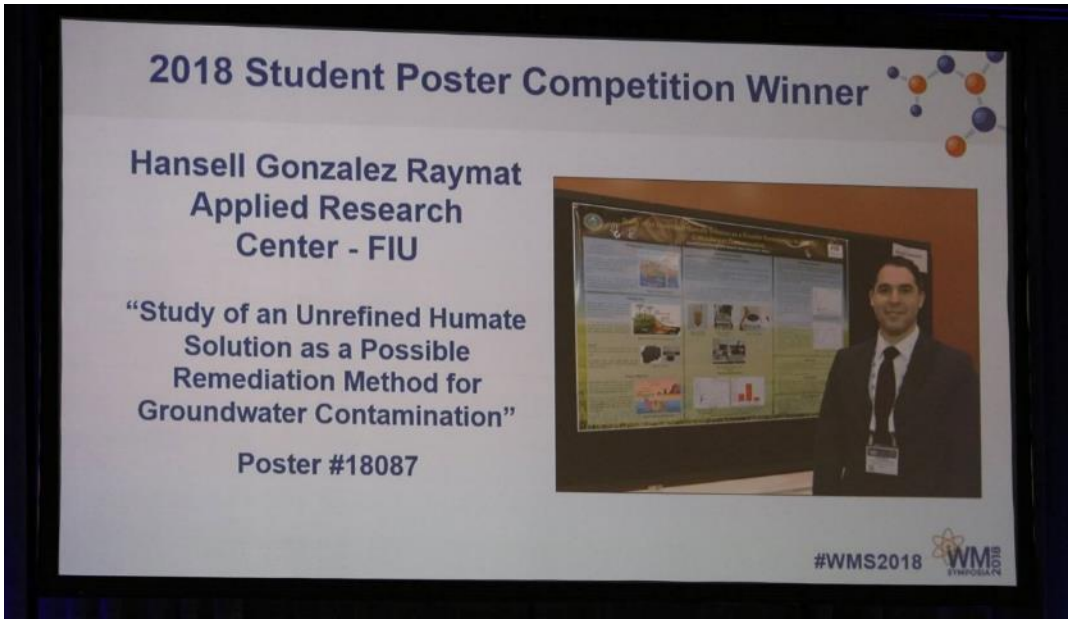


Figure 46. WM18 Student Poster Winner – Hansell Gonzalez Raymat.

A 2018 Roy G. Post Foundation Scholarship at the Undergraduate Student Level was awarded to DOE Fellow Christine Wipfli during the WM2018 Conference Honors and Awards Luncheon on Tuesday, March 20, 2018. Christine Wipfli also won WMS 2018 your professional award accepted by Dr. Leonel Lagos.

Figure 47. Roy G. Post Foundation Scholarship for undergraduate awarded to Christine Wipfli.

In addition, DOE Fellow Alejandro Garcia, gave a professional presentation on Thursday, March 22 titled "Evaluating the Effects of Microbes on Autunite Dissolution and the SIP Response in Hanford Sediment" and DOE Fellow Michael DiBono gave a professional presentation on Wednesday, March 21, titled "Engineering Scale Testing of Robotic Inspection Tools for Double Shell Tanks at Hanford."

Figure 48. Alejandro Garcia (left) and Michael DiBono (right) at professional oral presentations.

Session 63 on Tuesday, March 20, hosted a panel discussion on Graduating Scientists and Engineers: Wants and Needs. DOE Fellow Ripley Raubenolt participated in the panel discussion. This panel focused on new hires and graduating engineers having open lines of communication with employers. Considering the projected shortfalls in the workforce, effective communication of wants-and-needs of both the employer and employee must exist.

A 2018 Roy G. Post Foundation Scholarship at the Undergraduate Student Level was awarded to DOE Fellow Christine Wipfli during the WM2018 Conference Honors and Awards Luncheon on Tuesday, March 20, 2018.

The DOE Fellows joined staff from the Applied Research Center at Florida International University to host a booth in the exhibitor hall during the conference, interacting with conference attendees on how FIU-ARC provides support to the DOE EM in their mission of accelerated risk reduction and environmental legacy cleanup. DOE Fellows also participated as Student Assistants during the conference, assisting conference organizers and presenters during the technical sessions.

Figure 49. DOE Fellows at the FIU Booth in the WM18 Vendor Hall.

DOE Fellows also supported the FIU exhibition as part of the WM18 *Robotics Pavilion*, showcasing the conference theme, "Nuclear and Industrial Robotics, Remote Systems and Other Emerging Technologies." This event was highlighted in the EM Update Newsletter (Volume 10, Issue 12, March 28, 2018) and included three robots being developed at FIU:

1. The Mini Rover is a miniature robotic system designed for inspection of double-shell tank floors at the Hanford Site; it can be deployed to slots from the annulus and provides visual feedback as it maneuvers through bends to reach the central plenum. The system can house a variety of sensors, including those for temperature and radiation.
2. Activated by a smartphone, the Pipe Crawler can travel through the air supply line that leads to the central plenum of the tanks at Hanford. It provides information regarding the health of the tank floor around the tank's center. The crawler's movement mimics that of an inchworm and can navigate through several 90-degree elbows, reducers, and vertical runs. It also houses a camera for video feedback.
3. The Wall Crawler is a low-cost system with a camera capable of traversing both flat and curved surfaces for monitoring and inspection. It can navigate upside down or on vertical surfaces. This robot assists in the inspection of the SRNL H-Canyon tunnel.

Figure 50. Mr. Andrew Szilagyi (DOE EM 4.11) interacting with DOE Fellow at the FIU robotic display during WM18.

The DOE Fellows developed abstracts on their research at ARC and during summer internships to be presented during the student poster session at Waste Management 2019. A total of 16 student abstracts have been submitted to the conference. Two DOE Fellows also developed and submitted an abstract under professional tracks.

7.2 Other Conferences & Workshops

DOE Fellow Awmna Rana was competitively selected to participate and presented her research topic at the 2017 STEM Research and Career Symposium hosted by Emory University. Awmna, a chemistry and biology major, was provided a travel award and presented her experimental findings on the chemistry of the acidic plume located at SRS F/H Area at the Emory STEM Research and Career Symposium in Atlanta on October 1-3, 2017.

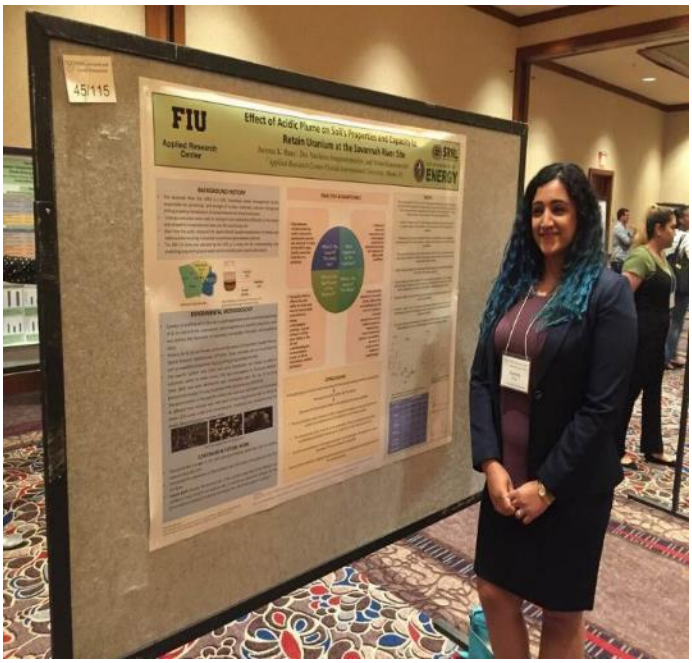


Figure 51. DOE Fellow Awmna Rana at the 2017 STEM Research and Career Symposium at Emory Univ.

DOE Fellows Ripley Raubenolt, Alexis Smoot, Anibal Morales and Frances Zengotita prepared and presented posters based on their research at the FIU McNair Scholars Research Conference on October 18-20, 2017. DOE Fellows Silvina Di Pietro and Sebastian Zanlongo also participated in the conference and judged research posters presented by undergraduate students. DOE Fellow Frances Zengotita won third place under life sciences track for her poster. Poster titles included:

- Frances Zengotita - Role of Chromohalobacter on the Potential Transport of Lanthanides and Cesium in a Dolomite Mineral System
- Ripley Raubenolt - Mercury Speciation Via Diffusive Gradients in Thin-Films (DGT) Technology
- Alexis Smoot - Study of Synergetic Interactions between Uranium, Humic Acid, Silica Colloids and SRS Sediments at Variable pH
- Anibal Morales - Microfabrication of Lab-on-a-Chip Devices for Polymerase Chain Reaction

Figure 52. DOE Fellows Anibal Morales and Alexis Smoot at the FIU McNair Conference.

Figure 53. DOE Fellows Frances Zengotita at the FIU McNair Conference.

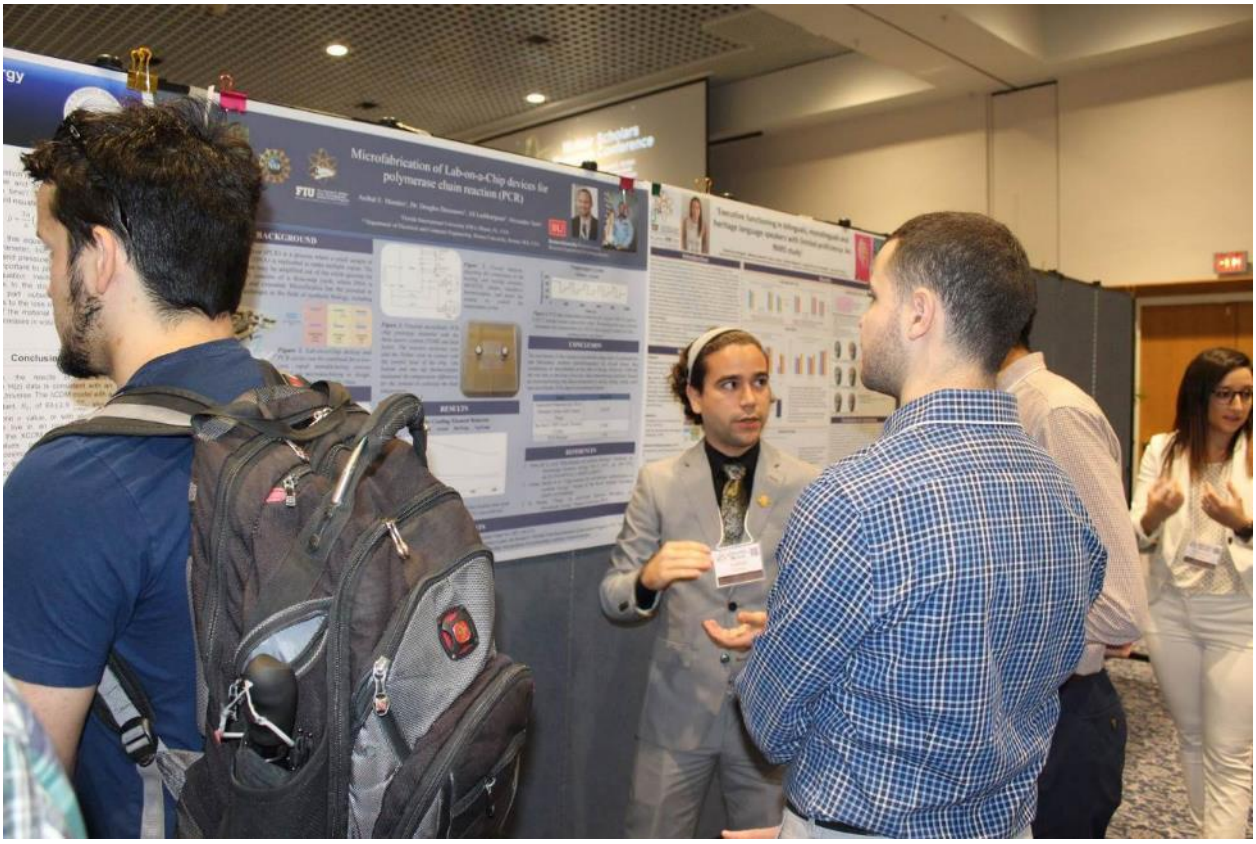


Figure 54. DOE Fellow Anibal Morales presenting his poster at the FIU McNair Conference.

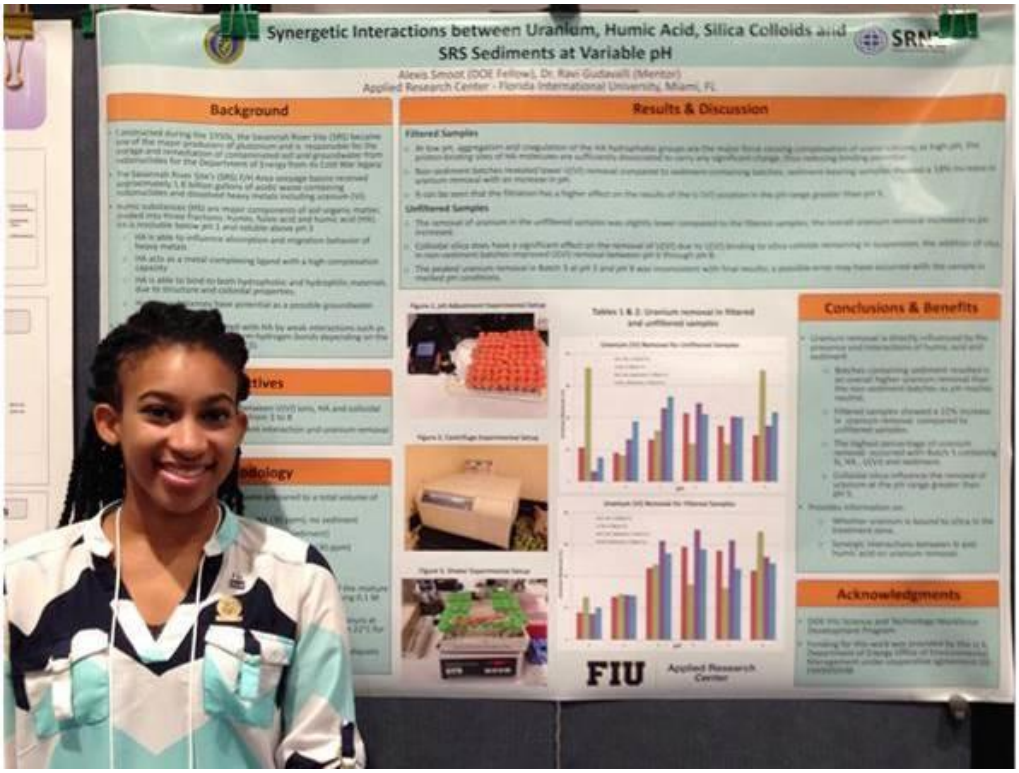


Figure 55. DOE Fellow Alexis Smoot presenting her poster at the FIU McNair Conference.

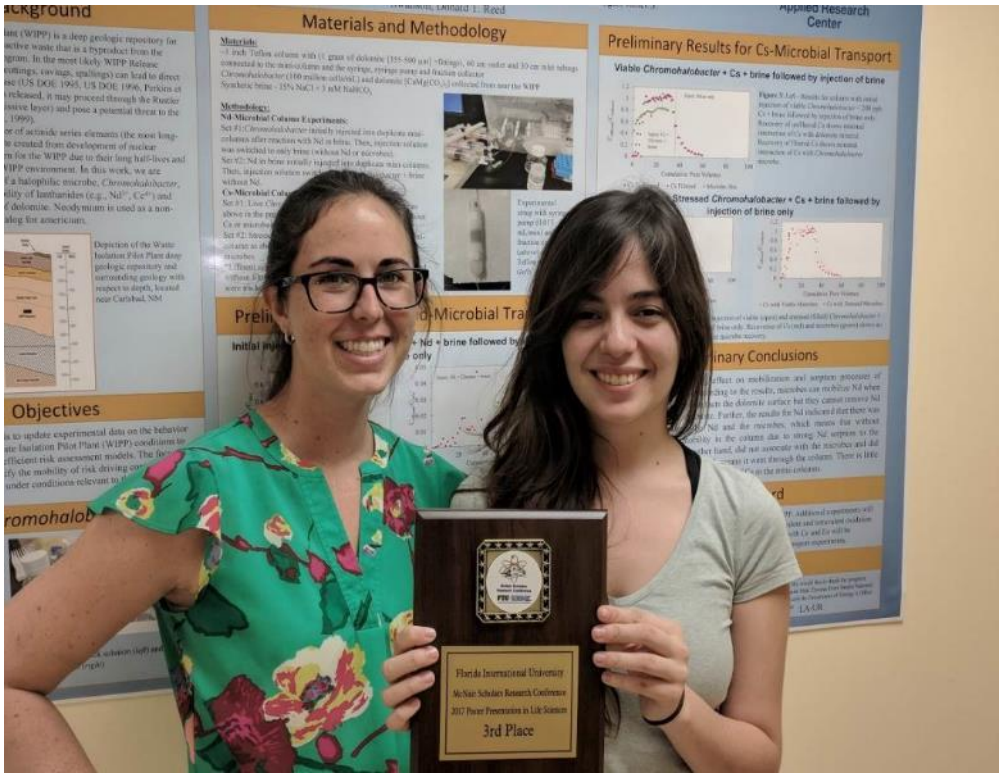


Figure 56. DOE Fellow Frances Zengotita (right) with FIU ARC Mentor Hillary Emerson and award for third place under life sciences track for her poster at the FIU McNair Conference.

DOE Fellow Alejandro Garcia participated in the American Geophysical Union (AGU) fall meeting held in New Orleans on December 11-15, 2017. Alejandro presented a poster based on his EM research titled, Spectral Induced Polarization of Biofilm Formation in Hanford Vadose Zone Sediment.

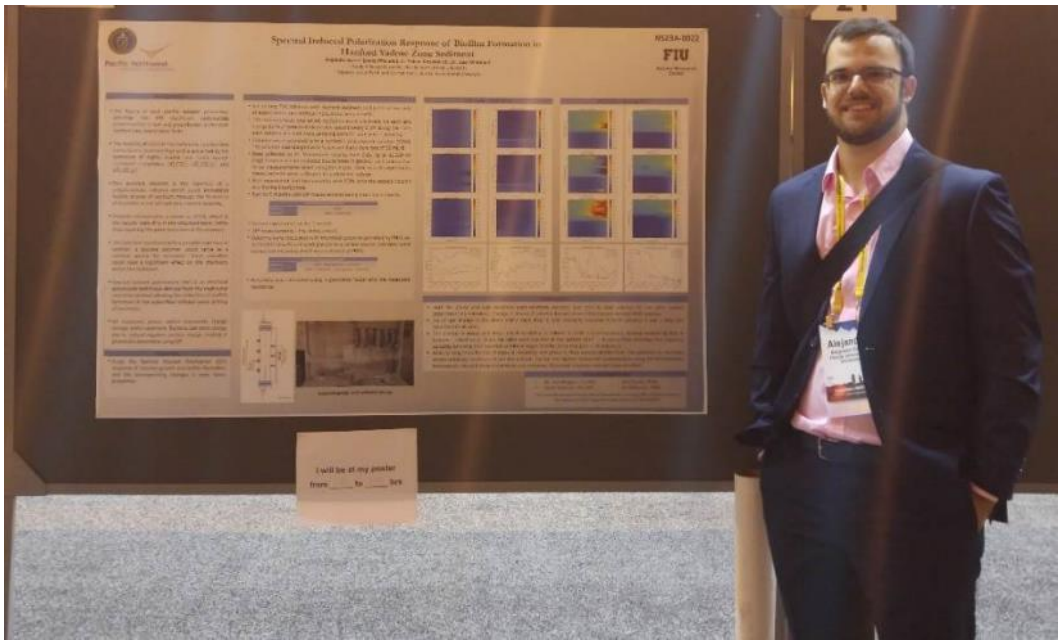


Figure 57. DOE Fellow Alejandro Garcia at AGU fall meeting.

In addition, seven (7) DOE Fellows participated in the Life Sciences South Florida 2018 Undergraduate Research Symposium on March 24, 2018.

- Ripley Raubenolt
- Katherine Delarosa
- Ximena Lugo
- Frances Zengotita
- Manuel Losada
- Tristan Simoes-Ponce
- Anibal Morales

Figure 58. DOE Fellows at the Life Sciences South Florida 2018 Undergraduate Research Symposium.

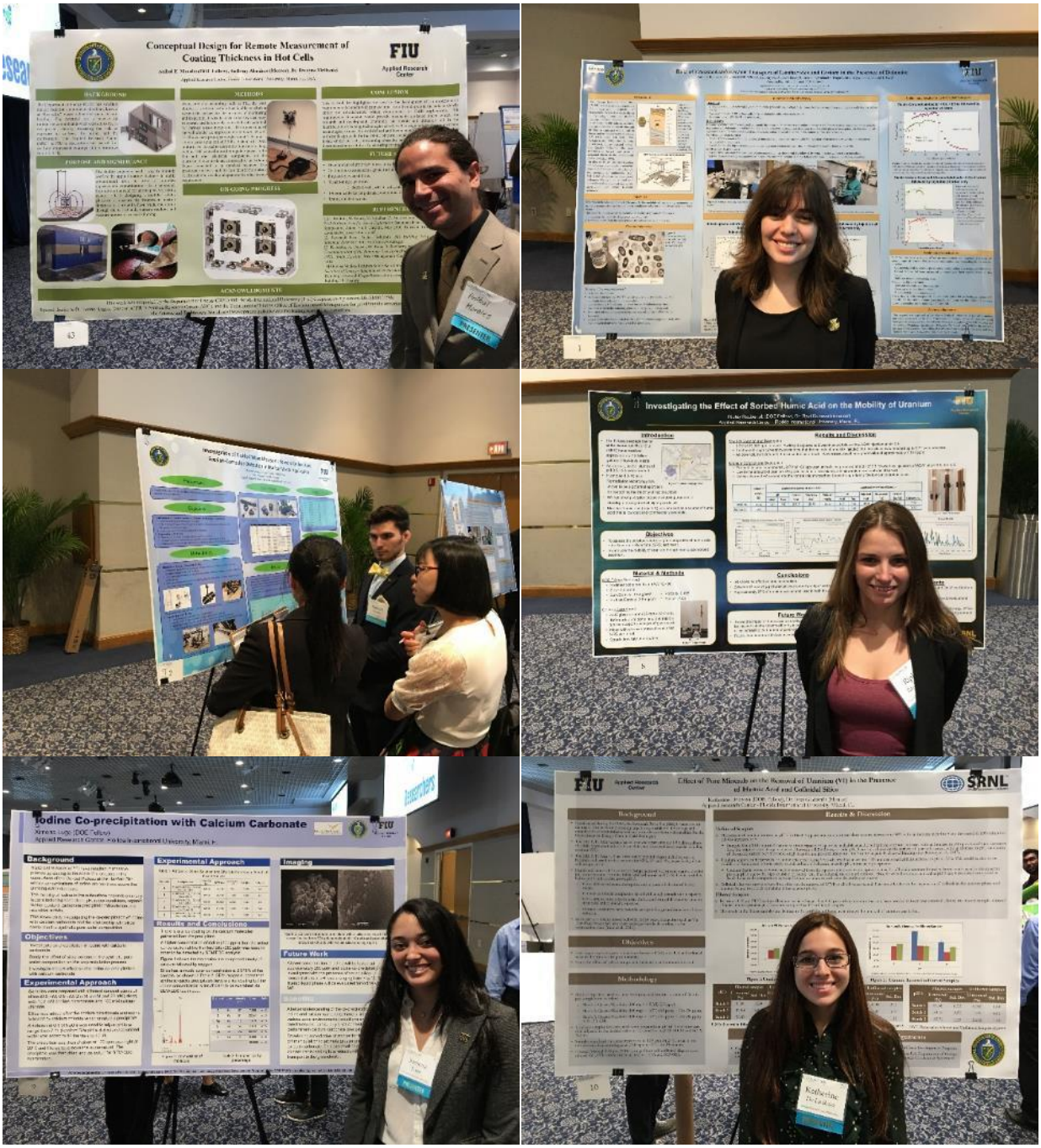


Figure 59. DOE Fellows presenting their research posters at the Life Sciences South Florida 2018 Undergraduate Research Symposium.

In addition, five (5) DOE Fellows and Dr. Ravi Gudavalli (Judge) participated in the 3rd Annual FIU Undergraduate Research Conference on March 27-28, 2018.

- Ripley Raubenolt
- Katherine Delarosa
- Ximena Lugo
- Frances Zengotita
- Manuel Losada

Figure 60. DOE Fellows with Dr. Ravi Gudavalli at the 3rd Annual FIU Undergraduate Research Conference.

DOE Fellows Silvina Di Pietro and Frances Zengotita attended the American Chemical Society National Meeting where they presented their research conducted at FIU. DOE Fellow Silvina Di Pietro presented her dissertation research quantifying the effects of injection of ammonia gas on the local mineralogy in the subsurface to support the Hanford Site's evaluation of the technology for immobilization of uranium that was previously releases to the vadose zone during the Manhattan Project. DOE Fellow Frances Zengotita presented the research she performed over two summers while interning at Los Alamos National Laboratory, investigating the potential for transport of radionuclides as bio-colloids in the Waste Isolation Pilot Plant (WIPP) environment.

Figure 61. DOE Fellows Frances Zengotita (eft) and Silvina Di Pietro (right) presenting at ACS.

8.0 DOE FELLOWS DIRECTLY SUPPORTING DOE EM PROJECTS

DOE Fellows provide direct support to DOE EM projects around the complex as part of the research efforts under the DOE-FIU Cooperative Agreement. Details of the applied research performed at ARC in support of DOE EM is reported in the FIU Performance Year 8 Year End Reports for Project 1, 2, and 3. The following DOE Fellows provided direct project support during FIU Performance Year 8.

Project 1: Max Edrei (graduate, M.S., mechanical engineering), Sebastian Zanlongo (graduate, Ph.D., computer science), Clarice Davila (undergraduate, mechanical engineering) Michael DiBono (undergraduate, mechanical engineering), Anibal Morales (undergraduate, electrical engineering), Joseph Coverston (graduate, M.S., mechanical engineering), Manuel Losada (undergraduate, electrical engineering), Jorge Montesino (undergraduate, civil engineering), and Christopher Excellent (undergraduate, mechanical engineering).

Project 2: Alejandro Garcia (graduate, M.S. geoscience), Alejandro Hernandez (undergraduate, chemistry), Hansell Gonzalez (graduate, Ph.D., chemistry), Silvina Di Pietro (graduate, Ph.D., chemistry), Alexis Smoot (undergraduate, environmental engineering), Awmna Kalsoom Rana (undergraduate, chemistry), Christine Wipfli (undergraduate, environmental engineering), Sarah Solomon (undergraduate, environmental engineering), Mohammed Albassam (graduate, M.S., water resources engineering), Frances Zengotita (undergraduate, chemistry and health), Juan Morales (graduate, M.S., public health), Ripley Raubenolt (undergraduate, environmental engineering), Ron Hariprashad (graduate, M.S., geosciences), Katherine Delarosa (undergraduate, environmental engineering), Silvia Garcia (undergraduate, biological sciences), Ximena Lugo (undergraduate, environmental engineering) and Alexis Vento (undergraduate, environmental engineering).

Project 3: Jesse Viera (undergraduate, mechanical engineering), Ryan Cruz (undergraduate, information technology), Alejandro Koszarycz (undergraduate, computer science), Tristan Ponce (graduate, mechanical engineering), Joshua Núñez (graduate, mechanical engineering), and Alex Rivero (undergraduate, computer science).

9.0 ADDITIONAL PROGRAM ACTIVITIES

9.1 Lecture Series

During the performance year, the DOE Fellows also participated in lecture series events. One lecture featured Mr. Saul Perez-Pijuan from IAEA on November 13, 2017. The title of Mr. Perez-Pijuan's presentation was "Overview of IAEA Technical Cooperation Program (TCP)."

Figure 62. Mr. Saul Perez-Pijuan (IAEA) with ARC staff (left) and DOE Fellows (right).

9.2 Other Activities

DOE Fellows had many opportunities throughout the year to share the research that they have performed in support of DOE-EM at ARC as well as during their summer. These presentations have been in the research areas of high level waste/waste processing, soil and groundwater modeling and remediation, deactivation and decommissioning, and technology development.

Six DOE Fellows participated and presented their research accomplishments during FIU's Research Review with DOE-HQ and the national labs on May 30, 2018, as a part of the event session on the workforce development project. Below is the list of presentations given by DOE Fellows:

- **Ron Hariprashad and Juan Morales** – Field Research to Support Contaminant Transport Modeling of Tims Branch Watershed - SRS
- **Silvina Di Pietro** – Uranium Fate and Mineral Transformations upon Remediation with Ammonia Gas
- **Michael DiBono** – Engineering Scale Testing of Robotic Inspection Tools for Double Shell Tanks at Hanford
- **Manuel Losada –** Thickness Measurement with Ultrasonic Transducers and Optimization of Mini Rover Electronics
- **Joshua Nunez –** Radiological Shielding Foams
- **Alejandro Koszarycz** – D&D KM-IT, Native Fixative App, and WIMS

Figure 63. DOE Fellows and ARC staff during FIU Research Review presentations.

During a visit to FIU by Mr. Christophe Xerri (Director of Nuclear Fuel Cycle & Waste Technology Division) on April 20, 2018, DOE Fellows Hansell Gonzalez and Michael DiBono presented their research accomplishments and DOE Fellow Christine Wipfli shared her experience from her 1 year internship at IAEA headquarters in Vienna, for a signing ceremony between FIU and the International Atomic Energy Agency (IAEA). During this visit, Mr. Xerri also had the opportunity to tour the ARC facilities and laboratories.

Figure 64. DOE Fellows during a visit to FIU from Mr. Christophe Xerri (Director of Nuclear Fuel Cycle & Waste Technology Division, IAEA).

The following DOE Fellows received recognitions and awards for their high levels of achievement.

- Two DOE Fellows won awards for innovative nuclear-technology-relevant research publications from the 2018 Innovations in Nuclear Technology R&D Awards, sponsored

by the U.S. DOE Office of Nuclear Technology. Silvina Di Pietro was awarded a prize in the Competition for Students at Universities with Less than $600 Million in 2016 R&D Expenditures. Her award-winning research paper, "Ammonia Gas Treatment for Uranium Immobilization at DOE Hanford Site," was presented at Waste Management Symposia in March 2017. Frances Zengotita was been awarded a prize in the Undergraduate Competition. Her award-winning research paper, "The Role of Chromohalobacter on Transport of Lanthanides and Cesium in the Dolomite Mineral System," was presented to Los Alamos National Laboratory in October 2017.

Figure 65. DOE Fellows Frances Zengotita (far left) and Silvina Di Pietro (far right) with Dr. Hilary Emerson and DOE EM MSIPP Intern Antony Arun Maria at the ACS Meeting.

- Silvina Di Pietro further received a travel grant sponsored by the Industrial and Engineering Chemistry Symposium to cover her registration for the American Chemical Society (ACS) National Meeting in August 2018 in Boston.
- Ripley Raubenolt received a cash prize at a conference for undergraduate research at FIU (CURFIU) for her participation and presentation of a poster based on DOE-EM research titled "Investigating the Effect of Sorbed Humic Acid on the Mobility of Uranium."
- Frances Zengotita has been selected to present a seminar as part of the inaugural Young Investigator's Series of the National Analytical Management Program (NAMP) Radiochemistry Webinar on May 17, 2018. The new series by young investigators will include webinars to showcase the work and research being completed by the future of the radiochemistry field at various universities on the topics of environmental chemistry, separation science, radioecology, and novel uranium nanostructures.

Several DOE Fellows graduated from FIU with their undergraduate or graduate degree during FIU Performance Year 8. Mr. Joshua Nunez and Mr. Triston Simoes-Ponce completed their B.S. degrees and are continuing their education by pursuing graduate degrees in mechanical engineering at FIU.

Graduates – December 2017

Claudia Cardona (Class of 2011) – Ph.D. CE
Max Edrei (Class of 2014) – M.S. ME
Alexis Smoot (Class of 2015) – B.S. EnvE
Jesse Viera (Class of 2014) – B.S. ME

Graduates – May 2018

Joshua Nunez (Class of 2017) – B.S. ME
Tristan Simoes-Ponce (Class of 2017) – B.S. ME
Christine Wipfli (Class of 2014) – B.S. EnvE

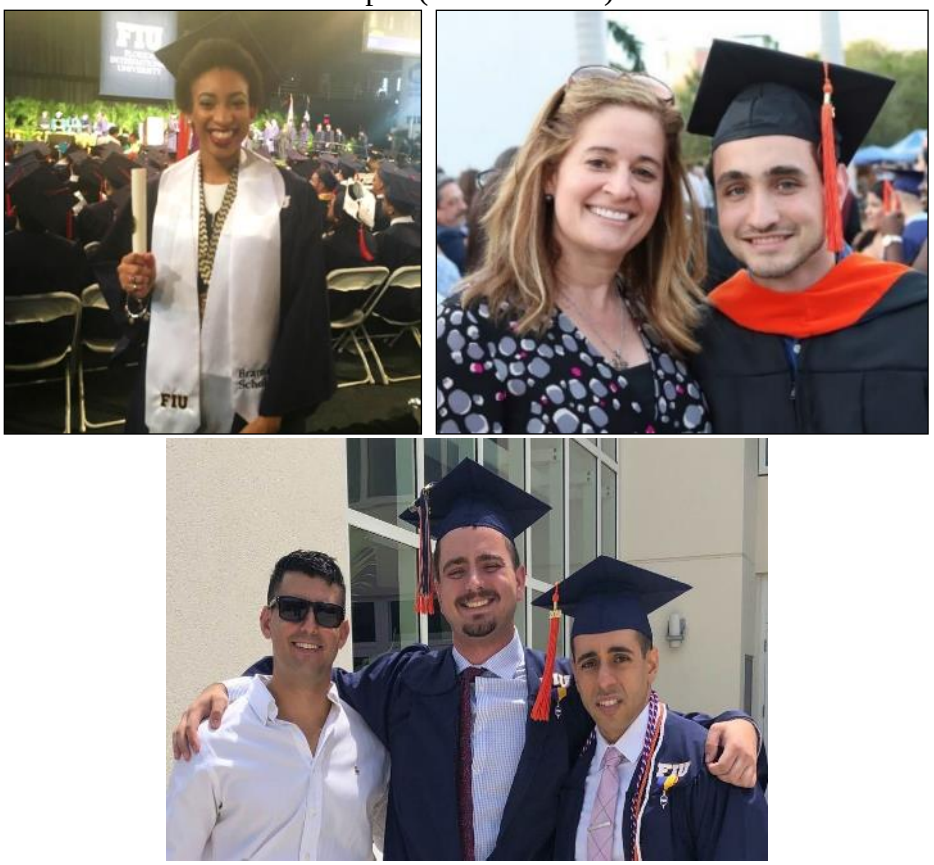


Figure 66. DOE Fellows at FIU's graduation ceremony in December 2017 (top) and May 2018 (bottom).

All Fellows also participated in a weekly meeting conducted by the program director. During each of these meetings, one DOE Fellow presents the work they performed during their summer internship and/or EM research work they are performing at ARC (Table 5).

Table 5. Research Presentation Schedule for DOE Fellow Meetings

DOE Fellow	Internship Location	Date
Michael Di Bono	University of Texas-Austin	9/29/17
Juan Morales and Mohammed Albassam	DOE-HQ	10/11/17
Ron Hariprashad	SRNL/SREL	10/25/17
Sebastian Zanlongo	Sandia National Lab	11/1/17
Christine Wipfli	DOE HQ	11/15/17
Sarah Solomon and Ripley Raubenolt	SRNL	2/22/18
Frances Zengotita	WIPP	2/27/18

CONCLUSIONS

This innovative workforce development program was officially established in March 2007. This project is successfully meeting its objectives by providing research training and mentoring for students from underrepresented groups on environmental problems at DOE sites in addition to providing several new formal recruitment and retention mechanisms for qualified students from underrepresented groups to pursue advanced studies, research training, and eventual career placement at DOE sites. Additional information about the entire program and the DOE Fellows can be found on the website http://fellows.fiu.edu/.

APPENDIX A

The DOE Fellows are finalizing their DOE Fellows Summer Internship Reports. The table below shows the DOE Fellows, internship location, summer mentors, and report titles. The following reports will be made available at the DOE Fellows website, http://fellows.fiu.edu.

DOE Fellow(s)	Location	Mentor(s)	Summer Intern Report Title
Juan Morales, Mohammed Albassam	DOE-HQ	Skip Chamberlain	Groundwater/Surface Water Interface and Radioactive Contaminant Ecological Risk Assessment at SRS F-Area
Christine Wipfli	DOE HQ	Robert Seifert	Supporting DOE EM 4.31, Office of Regulatory Compliance
Sebastian Zanlongo	Sandia National Lab	Kristopher Klingler Bill Prentice Jon Bradley	Anomaly Detection and Task Planning via Neural Networks and Hierarchical Task Networks
Andres Cremisini	Sandia National Lab	Kristopher Klingler Bill Prentice Jon Bradley	Coding a Weather Model
Sarah Solomon, Ripley Raubenolt	SRNL	Mike Paller Brian Looney	Mercury Speciation via Diffusive Gradients in Thin-Film Technology
Ron Hariprashad	SRNL/SREL	John Seaman Brian Looney	In-Situ Data Collection, Sampling, and Water Quality Monitoring in Tims Branch Watershed, Savannah River Site
Michael Di Bono	University of Texas-Austin	Mitch Pryor	Simulation of a Mobile Robotic Platform in Gazebo and RViz using ROS
Frances Zengotita	WIPP	Don Reed Tim Dittrich	The Role of Chromohalobacter on Transport of Lanthanides and Cesium in the Dolomite Mineral System

In addition, the following report is available at the DOE Research website for the Cooperative Agreement between the U.S. Department of Energy Office of Environmental Management and the Applied Research Center at Florida International University: http://doeresearch.fiu.edu

1. Florida International University, *Project Technical Plan*, Project 4: DOE-FIU Science & Technology Workforce Development Program, October 2016.

APPENDIX B

Major key accomplishments of this program to date include:

- Nine (9) DOE Fellows applied to the DOE EMPDC program in 2009 and 2010
- Six (6) DOE Fellows applied to DOE EM SCEP in spring 2011
- DOE Fellows, Edgard Espinosa, Charles Castello, and Lee Brady were selected by DOE EM as part of Student Career Experience Program (SCEP) and completed their SCEP assignments.
- DOE Fellow(Edgard Espinosa) was hired by DOE-EM and began working for Nuclear Materials Disposition under the direction of Mr. Gary Deleon
- DOE Fellow (Charles Castello) was hired by DOE's Oak Ridge National Laboratory under the Alvin M. Weinberg Fellowship program
- DOE Fellow (Lee Brady) was hired by DOE-EM and began work for D&D and Facility Engineering under the direction of Mr. Andrew Szilagyi
- DOE Fellow (Stephen Wood) joined Oak Ridge National Laboratory's Bredesen Center for Interdisciplinary Research and Graduate Education as an Energy Science & Engineering PhD Fellow
- DOE Fellow (Rosa Ramirez) was hired into the EM Professional Development Corps program
- Sixty-three (63) other DOE Fellows graduated FIU with bachelor's or master's degrees and obtained employment in private industry and government agencies, including:

- Florida Power & Light (6 Fellows)
- Beckman Coulter (3 Fellows)
- Boeing Company (3 Fellows)
- Nova Consulting Inc. (3 Fellows)
- HJ Foundation (1 Fellow), Lockheed (3 Fellows)
- General Electric (2 Fellows)
- Mount Sinai Medical Center (2 Fellows)
- CH2M Hill (1Fellow), StryKer (2 Fellows)
- Kimley-Horn and Associates, Inc. (2 Fellows)
- PriceSmart Inc. (1 Fellow)
- Bouygues Civil Works Florida (1 Fellow)
- Crane Aerospace and Electronics (1 Fellow)
- Motorola (1 Fellow)
- Kiewit Power (1 Fellow)
- CPH Inc. (1 Fellow)
- Texas Instruments (1 Fellow)
- ConocoPhillips (1 Fellow)
- MWH Global (1 Fellow)
- Johnson & Johnson (1 Fellow)
- TradeStation (1 Fellow)
- Raytheon (1 Fellow)
- Intel Corporation (1 Fellow)
- Cummins (1 Fellow)
- Regeneron Pharmaceutical (1 Fellow)
- Permasteelisa North America (1 Fellow)
- Goldman Sachs (1 Fellow)
- HaikuTech Europe B.V. (1 Fellow)
- Burns & McDonnell (1 Fellow)
- HDR (1 Fellow)
- Brown & Caldwell (1 Fellow)
- Creativity, Value, Logic (1 Fellow)
- King Engineering Associates, Inc (1 Fellow)
- Sikorsky Aircraft (1 Fellow)
- Caribe Utilities of Florida, Inc (1 Fellow)
- BRG Sports (1 Fellow)
- Magic Leap Inc. (1 Fellow)
- BND Engineers (1 Fellow)
- UTC Aerospace Systems (1 Fellow)
- FIU's Applied Research Center (1 Fellow)
- AECOM (1 Fellow)
- Velossa Tech (1 Fellow)
- John Hopkins - Applied Physics Laboratory (1 Fellow)

- DOE Fellows program has been featured in national and international newsletters
- Best Poster Awards at Waste Management Symposia
  - DOE Fellow (Leydi Velez) won Best Professional Poster at WM09
  - DOE Fellow (Denisse Aranda) won Best Student Poster at WM09
  - DOE Fellow (Denny Carvajal) won Best Student Poster at WM10
  - DOE Fellow (Stephen Wood) won Best Student Poster at WM11
  - DOE Fellow (Alexandra Fleitas) won Best Student Poster at WM14
  - DOE Fellow (Christine Wipfli) won Best Student Poster at WM15
- Completed 119 internships at DOE sites, DOE national labs, DOE-HQ, and DOE contractors since 2007
- 172 presentations (posters and papers) at Waste Management conferences (2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016) and other national and international conferences, including ICEM2013 in Brussels, Belgium
- DOE Fellows supported the Energy Facility Contractors Group (EFCOG) and contributed to the development of 13 Lessons Learned and Best Practices documents
- Development of DOE Fellows web site http://fellows.fiu.edu/ and Facebook page
- DOE Fellow Christine Wipfli completed a one year internship position with the International Atomic Energy Agency (IAEA), stationed at the agency headquarters in Vienna, Austria
- DOE Fellow Alejandro Fernandez obtained first place at the 2016 Life Sciences South Florida STEM Symposium, competing among 80 posters presented by STEM students representing state colleges and universities in the South Florida area
- The American Nuclear Society (ANS) approved the establishment of an ANS student section at Florida International University (FIU) with DOE Fellows being the key founding members of the chapter
- Two DOE Fellows received the Roy G. Post Foundation Scholarship at the Graduate Student Level awarded by Waste Management Symposium: Robert Lapierre (2014) and Silvina Di Pietro (2016).
- DOE Fellow Alejandro Hernandez received the Roy G. Post Foundation Scholarship at the Undergraduate Student Level awarded by Waste Management Symposium in 2017.

APPENDIX C

DOE Fellows in STEM Graduate Programs – Ph.D.

DOE Fellow	Discipline	Degree	Research Topic Based on DOE EM projects	Year of Graduation
Claudia Cardona	Environmental Engineering	Ph.D.	Remediation of the uranium-contaminated subsurface in the deep vadose zone via NH_3 gas injection	2017
Charles Castello	Electrical Engineering	Ph.D.	Soil/Groundwater - Sensor Development for Field Measurement of Mercury	2011
Silvina Di Pietro	Chemistry	Ph.D.	Ammonia Gas Treatment for Uranium Immobilization at DOE Hanford's Site	2019 (anticipated)
Alejandro Garcia		Ph.D.	*Note[1]*	
Orlando Gomez†	Physics	Ph.D.	*Note[1]*	
Hansell Gonzalez-Raymat	Chemistry	Ph.D.	Unrefined humic substances as a potential low-cost remediation method for groundwater contaminated with uranium in acidic conditions	2018
Alejandro Hernandez	Chemistry	Ph.D.		
Juan Morales	Public Health	Ph.D.	Accumulated Metalloestrogens Analysis for Health Risk Assessment and Watershed Toxicology Management in Tims Branch, SRS	2019 (anticipated)
Sebastian Zanlongo	Computer Science	Ph.D.	Multipurpose All-Terrain Robotic Platform for D&D	2018

[1]Note: student is pursuing graduate level degree at another academic institution/department.

DOE Fellows in STEM Graduate Programs – Masters

DOE Fellow	Discipline	Degree	Research Topic Based on DOE EM projects	Year of Graduation
Serkan Akar	Biomedical Engineering	Master	Design and Development of an Enzyme-Linked Biosensor for Detection and Quantification of Phosphate Species	2010
Mohammed Albassam	Water resource Engineering	Master	Effect of Frequent Atmospheric Events on Flow Characterization in Tims Branch and its Major Outfalls	2018
Yulyan Arias**	Environmental Engineering	Master	Non-thesis option	2012
Amaury Betancourt	Environmental Engineering	Master	Soil/Groundwater - Modeling of Mercury Contamination at ORNL	2011

DOE Fellow	Discipline	Degree	Research Topic Based on DOE EM projects	Year of Graduation
Lee Brady	Mechanical Engineering	Master	Non-thesis option	2012
Elsa Cabrejo	Environmental Engineering	Master	Soil/Groundwater - Modeling of Mercury Contamination at ORNL	2011
Duriem Calderin	Biomedical Engineering.	Master	Modeling of Loose Contamination Scenarios to Predict the Amount of Contamination Removed	2010
Denny Carvajal	Biomedical Engineering	Master	Soil/Groundwater – Bacteria Interaction due to Polyphosphate Injection at Hanford	2011
Dayron Chigin*	Electrical Engineering	Master	Non-Thesis Option	2015
Joseph Coverston	Mechanical Engineering	Master	Evaluation of Pipeline Flushing Requirements for HLW at Hanford and Savannah River	2019 (anticipated)
Ryan Cruz	Cyber Security	Master	Non-Thesis Option	2019 (anticipated)
Andrew De La Rosa*	Computer Science	Master	Non-Thesis Option	2015
Elicek Delgado-Cepero	Electrical Engineering	Master	Structural Health Monitoring Inside Concrete and Grout Using the Wireless Identification Sensing Platform	2013
Natalia Duque	Environmental Engineering	Master	Non-Thesis Option	2017
Maximiliamo Edrei	Mechanical Engineering	Master	Investigation of Mixing Times of Sparged Bingham plastic type fluids as applied to the Pulse Jet Mixing Process	2017
Edgard Espinosa	Mechanical Engineering	Master	Waste Processing - CFD Modeling of NuVison's Power Fluidic Technology/Process Remote Stack Characterization System	2011
Alejandro Garcia	GeoScience	Master	The influence of biofilm formation on the SIP response of Hanford vadose zone sediment	2018

DOE Fellow	Discipline	Degree	Research Topic Based on DOE EM projects	Year of Graduation
Janty Ghazi	Electrical Engineering	Master	Control, through Sensors and LabVIEW, of the Asynchronous Pulsing Unit	2013
Ron Hariprashad	GeoScience (Hydrogeology)	Master	Modeling of Surface Water Flow and Contaminant Transport in the Tims Branch Ecosystem	2019 (anticipated)
Heidi Henderson	Environmental Engineering	Master	Surface water and contaminant transport within the Oak Ridge National Laboratory	2013
Melina Idarraga	Environmental Engineering	Master	Dissolution rate of natural meta-autunite: effects of aqueous bicarbonate, pH and temperature	2011
Eric Inclan	Mechanical Engineering	Master	Mesh adaptation for use in Lattice Boltzmann code	2012
Kanchana Iyer	Biomedical Engineering	Master	Non-Thesis Option	2012
Robert Lapierre*	Chemistry	Master	Mineral characterization after uranium sequestration by pH manipulation using NH_3 gas	2017
Lilian Marrero	Environmental Engineering	Master	Soil/Groundwater - Modeling of Mercury Contamination at ORNL	2012
Jose Matos	Mechanical Engineering	Master	Development of improved Bodies for a Peristaltic Crawler for Radioactive Pipeline Unplugging	2013
Joel McGill*	Environmental Engineering	Master	Non-Thesis Option	2014
William Mendez	Engineering Mngmt.	Master	Development of Remote Stack Char. System	2011
Jaime Mudrich	Mechanical Engineering	Master	Development of a Coupling Model for Fluid-Structure Interaction using the Mesh-free Finite Element Method and the Lattice Boltzmann Method	2013
Merlin Ngachin	Environmental Sciences	Master	Waste Processing - Baltman-Lattice Method to Model HLW	2011
Joshua Nunez	Mechanical Engineering	Master	The applications of intumescent technologies in support of D&D activities across the DOE complex	2019 (anticipated)
Valentina Padilla	Environmental Engineering	Master	Non-Thesis Option	2014
Amy Pahmer	Engineering Management	Master	Non-Thesis Option	2010
Melissa Sanchez **	Environmental Engineering	Master	Non-thesis option	2012
Paola Sepulveda	Biomedical Engineering	Master	Investigating the Role of a Less Uranium Tolerant Strain, Isolated from the Hanford Site Soil, on Uranium Interaction in Polyphosphate Remediation Technology	2014

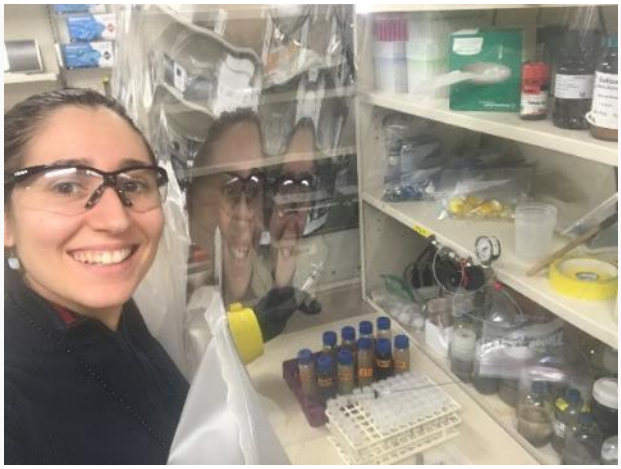
DOE Fellow	Discipline	Degree	Research Topic Based on DOE EM projects	Year of Graduation
Mariela Sliva	Engineering Management	Master	Non-Thesis Option	2013
Tristan Simoes-Ponce	Mechanical Engineering	Master	D&D Technology Demonstration & Development and Technical Support to SRS's 235-F Facility Decommissioning	2019 (anticipated)
Mario Vargas	Mechanical Engineering	Master	Kinematic Control of Remote Stack Characterization System	2012
Jose Vazquez	Environmental Engineering	Master	Effects of temperature and pH on volatilization of mercury after chemical reduction	2009
Leydi Velez	Industrial Engineering	Master	Decision Modeling Tools D&D Surveillance & Maintenance	2010
Revathy Venkataraman	Computer Science	Master	Performance Evaluation of Mobile Applications with KMIT Technology Web Services	2014
Stephen Wood	Mechanical Engineering	Master	Modeling of Pipeline Transients: Modified Method of Characteristics	2011

**This student left the DOE Fellows program before completion of their master's degree.*
***This student left the DOE Fellows program but completed their master's degree at FIU.*
† This student left the DOE Fellows program before completion of their doctoral degree.

APPENDIX D

Internship Highlights from the DOE Fellows

DOE Fellow Spotlight – Summer Internship
Silvina Di Pietro



- **Where did you intern?**
  Pacific Northwest National Laboratory in Richland, WA
- **How did you get your internship?**
  Thanks to the DOE Fellows Program from the Applied Research Center at the FIU Engineering Campus
- **What did you do there? What projects did you work on?**
  I worked on my mentor's project doing batch experiments with contaminated Hanford Site soils trying to reduce iodine. My experiments focused on two main processes: 1) understanding the influence of dithionite concentration (used as the reductant), and 2) understanding the rate of iron-oxide dissolution by dithionite solution. Because the soil sediments contain iron-oxides, we wanted to investigate how the reductant solution dissolved the iron-oxides.
- **What was the coolest thing about your internship or that happened during your internship?**
  Being able to visit the B-Reactor, the first large-scale plutonium nuclear reactor ever built. It was amazing to be standing in front of the marvelous engineering created in only 11 months during 1943.
- **What advice do you have for those beginning the internship process?**
  To be cognizant of everything that goes on around the lab or office you are working in, from the administrative aspects to the benefits to the actual day-to-day work. The main focus is to see if that internship experience matches your ideal future job.
- **What did you like most about your experience?**
  Interacting with the professionals in my field.
- **What did you learn about yourself?**
  That I am capable of working alongside experienced scientists to tackle, discuss and learn about the challenging environmental contamination problem at the Hanford Site.
- **How did the position increase your professional confidence?**
  As previously mentioned, working along with geochemists increased my professional knowledge on the research I am doing. Their invaluable input, suggestions on how to improve my experiments, teaching and collaboration allowed for my professional growth. This, in turn, allowed me to grow as a scientist because I emulate their thinking.

DOE Fellow Spotlight – Summer Internship
Tristan Simoes-Ponce

- **Where did you intern?**
  I interned at Savannah River National Laboratory which is located in Aiken, South Carolina.
- **How did you get your internship?**
  I got my internship thru the DOE Fellows Program at the Applied Research Center at FIU.
- **What did you do there? What projects did you work on?**
  I did mechanical testing on the polyurethane foams that SRNL is interested in deploying in radioactive environments such as a hot cell. I did dynamic mechanical analysis (DMA), tensile testing, differential scanning calorimetry (DSC), and thermogravimetric analysis (TGA) testing and analysis.
- **What was the coolest thing about your internship or that happened during your internship?**
  The coolest thing was working at a national lab and being exposed to work being performed by Ph.D.'s and seasoned professionals.
- **What advice do you have for those beginning the internship process?**
  To always ask for work and be as helpful as possible and to go the extra mile.
- **What did you like most about your experience?**
  The coworkers and mentors I was assigned to were really helpful and nice to me.
- **What did you learn about yourself?**
  I learned that I am independent since I had to reach out to a variety of people and conducted most of the research and lab work by myself.
- **How did the position increase your professional confidence?**
  I feel like I have a better understanding of how to operate in a professional workplace environment and what is expected from me.

DOE Fellow Spotlight – Summer Internship
Ximena Lugo

- **Where did you intern? Where did you intern?**
  I interned at Department of Energy Headquarters in Washington D.C.
- **How did you get your internship?**
  I got my internship through my fellowship at the Applied Research Center.
- **What did you do there? What projects did you work on?**
  I got to shadow Robert Seifert, the Director of Regulatory Compliance, and attend meetings with him to gain exposure to the various intergovernmental programs such as EPA, NEPA, and NRC. I worked on many tasks including reviewing annual summary reports, completing checklists for reports, and summarizing workshops for management.
- **What was the coolest thing about your internship or that happened during your internship?**
  The coolest thing was being able to travel to Savannah River Site and touring all the buildings and departments firsthand that I had been learning about over the summer. The exposure we got to the technology that DOE-EM utilizes was really interesting.
- **What advice do you have for those beginning the internship process?**
  I would advise interns to get to understand the careers of other employees, not just their internship mentor, so that they can experience all of the possible meetings, programs, and expand their network beyond just what they're assigned to for the summer.
- **What did you like most about your experience?**
  I really enjoyed how friendly everyone was which allowed me to shadow various people and understand what it is they do for their career.
- **What did you learn about yourself?**
  Living on my own with a roommate taught me independence and what I value most in my everyday life, as well as what I seek in a career.
- **How did the position increase your professional confidence?**
  The position definitely increased my professional confidence and I feel I better understanding what to expect when I start my career.

DOE Fellow Spotlight – Summer Internship
Manuel Losada

- **Where did you intern?**
  I interned at Savannah River National Laboratory in Aiken, South Carolina
- **How did you get your internship?**
  I got my internship by applying to the MSIPP program, for minority engineers seeking internships in national laboratories.
- **What did you do there? What projects did you work on?**
  I was a research and development engineer, working on the inspection of the H-Canyon Exhaust tunnel. Specifically, I worked on the integration of the inertial measurement unit into a sensor suite so that the robot's position could be tracked while it is inside the tunnel.
- **What was the coolest thing about your internship or that happened during your internship?**
  The coolest thing was getting to work with Chris and Connor, graduate students from the University of Texas, who taught me a tremendous amount. Also, traveling to Savannah, Georgia, with fellow interns Sebastian, Tristen, and Ryan was very rewarding.
- **What advice do you have for those beginning the internship process?**
  My advice for those starting the internship process is to make sure you will be going out there to continue the work you are currently doing.
- **What did you like most about your experience?**
  I loved the fact that I was doing very technical work and was trusted and given really good challenges related to robotics, which is my passion.
- **What did you learn about yourself?**
  I learned that I am pretty good at learning things on the fly.
- **How did the position increase your professional confidence?**
  This position increased my professional confidence tremendously because I had to learn something completely new, programming in using the ROS framework, and picking up a new scripting language (python).

DOE Fellow Spotlight – Summer Internship
Silvia Garcia

- **Where did you intern?**
  DOE EM Headquarters in Washington D.C. and Germantown, Maryland.

- **How did you get your internship?**
  Through my fellowship with FIU ARC due to their cooperative agreement.

- **What did you do there? What projects did you work on?**
  I participated in technical meetings to learn more about DOE and its processes. My three projects for the summer included: 1) The ATLAS project which includes an online interface to view environmental releases of contaminants at DOE sites. We made recommendations for important parameters (like contaminant concentrations and plume attenuation rates) to be shown through both the public and internal interfaces. 2) The Interstate Technology Regulatory Council (ITRC) project, a multi-agency project working to share environmental remediation technologies. We updated online document accessibility and navigation tools. 3) Added a recent case study on the Hanford Site's remediation project "300 Area Uranium Stabilization through Polyphosphate Injection" to the ITRC website.

- **What was the coolest thing about your internship or that happened during your internship?**
  Experiencing it all with my coworkers. The people at DOE EM were so kind and appreciative to have us participating. They really impacted us more than they know and always encouraged our input when it came to real issues.

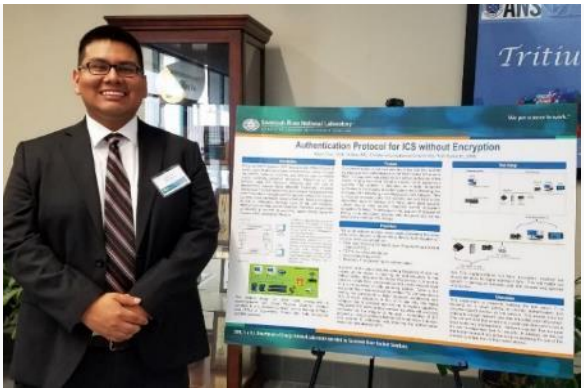
- **What advice do you have for those beginning the internship process?**
  To really come with an open mind and let your mentor know you are willing to learn about anything and everything. Your mentors will have a lot of experiences and connections, so don't be shy when it comes to asking them how they did it or for an introduction to someone.

- **What did you like most about your experience?**
  I loved being able to experience the various jobs at DOE EM and talking to everyone about the route that led them to DOE EM. In addition, I was able to make connections with other cooperative departments such as: EPA, NRC, and the Navy.

- **What did you learn about yourself?**
  I learned that I have a passion for technical jobs because I enjoy being more hands-on with my projects. I got to see myself in a different setting and I realized I'm more social and organized than I thought.

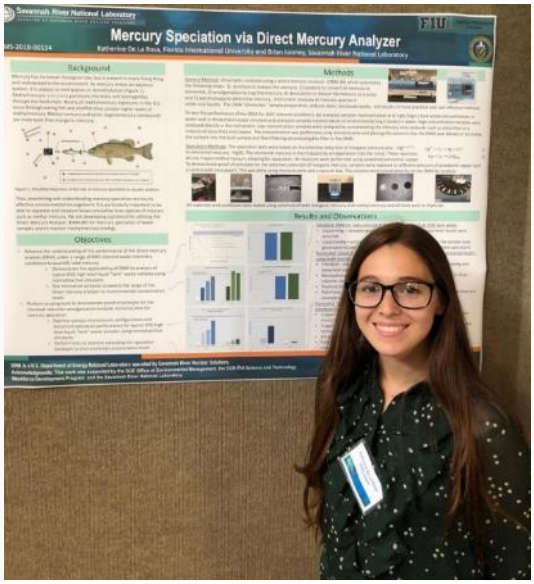
- **How did the position increase your professional confidence?**
  This position showed me how to interact with people in government and industry and the unspoken expectations of the professional workforce. I also have more confidence in myself and have a great frame of reference for my career as I begin searching for the next opportunity.

DOE Fellow Spotlight – Summer Internship
Ryan Cruz



- **Where did you intern?**
  Savannah River National Laboratory. Located in Aiken, South Carolina.
- **How did you get your internship?**
  I was awarded the internship by the DOE-FIU Science and Technology Workforce Development Program.
- **What did you do there? What projects did you work on?**
  I conducted research with the cyber security team at SRNL to identify authentication protocols for industrial control systems that use a digital signature rather than encryption.
- **What was the coolest thing about your internship or that happened during your internship?**
  I worked with a variety of hardware equipment that are essential for constructing a network such as the raspberry pi, a device necessary for the authentication. I was able to setup proxy servers as part of the network architecture. I got a chance to learn about the python language and enhance my programming skills.
- **What advice do you have for those beginning the internship process?**
  During the application process, keep communication constant by asking questions you may have to the person in charge of recruitment. Research the company/organization before the interview to demonstrate that you are interested in their work. Build relationships with your academic advisor and professors, as they are sources of letters of recommendation if you demonstrate excellence in your coursework, respect to others, and being responsible.
- **What did you like most about your experience?**
  Learning about industrial control systems from my summer mentor, Mr. Robert Barnett, who guided me on the authentication protocol procedures and setting up the architectural design for the network. I also liked having the opportunity to network with professionals as well as working alongside other interns.
- **What did you learn about yourself?**
  I learned that I can overcome any challenging obstacles by keeping an optimistic mindset and having the support from those that are always on my side. If I can make the right decisions and apply the knowledge I've gained over a certain period of time to the next level, I can succeed in any academic or career path I desire. Working at a Department of Energy site made me realize that I want to work for the government someday. I am an individual who is eager to take on the difficult tasks and would like to defend the nation from cyber-attacks in the near future.
- **How did the position increase your professional confidence?**
  I've gained insight on what the professional workforce looks like. Attending meetings, taking notes, being up-to-date with assignments, public speaking, and presenting research are just some of the routines I witnessed and accomplished on a daily basis. My confidence increased significantly when I realized that I didn't necessarily have to be a complete expert right away in the field I was assigned to work on. Prior to this internship, I only had basic knowledge about industrial control systems. I am appreciative of my summer mentor who taught me that, regardless of the level of expertise an individual may have, you always learn something new every day while working at R&D Engineering due to the many discoveries being made and methods that are constantly changing.

DOE Fellow Spotlight – Summer Internship
Katherine De La Rosa



- **Where did you intern?**
  Savannah River National Laboratory.

- **How did you get your internship?**
  Through the DOE-FIU Science & Technology Workforce Development Program at the FIU Applied Research Center.

- **What did you do there? What projects did you work on?**
  I worked on a project that investigated mercury speciation via direct mercury analyzer.

- **What was the coolest thing about your internship or that happened during your internship?**
  The work itself was cool, but the coolest thing about the internship was being able to travel to the neighboring states on my free time.

- **What advice do you have for those beginning the internship process?**
  Study the research documentation beforehand so when you get there it's a smoother transition to begin work and you can also enjoy time spent traveling and relaxing when you're there.

- **What did you like most about your experience?**
  I liked the independence. Having my own place, even sharing a place, and just getting my work done.

- **What did you learn about yourself?**
  I learned that I flourish when I'm on my own. I learned that I can survive life while being independent. And that I'm also pretty good at balancing my schedule.

- **How did the position increase your professional confidence?**
  I am definitely not nervous to tackle any new projects or tasks that are going to come my way in the future. I know I can accomplish anything now without being nervous.

DOE Fellow Spotlight – Summer Internship
Joshua Núñez

- **Where did you intern?**

  DOE Headquarters in Washington, DC

- **How did you get your internship?**
  Through the DOE Fellows program at FIU ARC

- **What did you do there? What projects did you work on?**
  I assisted in the organization of weekly staff meetings, contributed to the reorganization of the DOE HQ website, and contributed to the work of the DOE EM Office of Technology Development. One of my projects included a study and subsequent paper on how robots influence the civilian workforce.

- **What was the coolest thing about your internship or that happened during your internship?**
  Travelling to different nuclear facilities.

- **What advice do you have for those beginning the internship process?**
  Get to know the people you're working with in order to network and establish connections with your leadership

- **What did you like most about your experience?**
  The people I worked with

- **What did you learn about yourself?**
  That I would like to work for the federal government

- **How did the position increase your professional confidence?**
  It allowed me to see how professionals in the private and government sectors operate and communicate, therefore allowing me to become more comfortable around them.

DOE Fellow Spotlight – Summer Internship
Clarice Davila

- **Where did you intern?**
  I interned at Washington River Protection Solutions in Richland, Washington.

- **What did you do there? What projects did you work on?**
  I assisted with the organization and study of incoming data from several sensors being utilized to gather level measurements of waste within 149 single shelled tanks and within 33 miscellaneous tanks.

- **What was the coolest thing about your internship or that happened during your internship?**
  For me it was the ethic of the teamwork that I encountered at the WRPS Tank and Pipeline Integrity Department. Everyone kept each other well informed and consistently encouraged me to ask questions, whether for my task or regarding other tasks that members were working on. This helped me to understand the overall work effort as well as my specific tasks, assuring that I could carry out my tasks well. This also allowed me to interact with a variety of people, each full of knowledge that they were willing to share and even take the time to discuss, enhancing my learning experience.

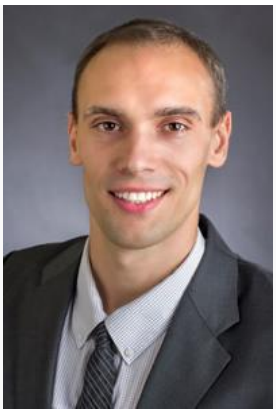
- **What advice do you have for those beginning the internship process?**
  Assure that your resume really shows what you're capable of; even if you're still in the process of gaining more skills, you can emphasize that you're a good observer and fast learner. Also important is to research wherever it is you plan to intern so that you're more prepared for your internship assignment. If you're about to start an internship, keep a digital journal using Google docs or even the memo feature on your cellphone, and write what you've done each day to keep track of what you've learned and what you've gotten to experience. This record doesn't have to be pretty, it just has to include information that is clear enough to keep track of your progress and refer to later when writing reports.

- **What did you like most about your experience?**
  What I liked most about my experience was how people were more than willing to explain to me anything I didn't understand because, although I'm a fast learner, I may struggle to keep up with fast flowing information and it takes time for everything to sink in effectively. Once I understand something though, it stays with me. The fact that everyone's cubicles were relatively close together made it easier to communicate with each other, both to socialize a bit as a break from focusing so much as well as to discuss topics regarding tasks needing to be completed.

- **What did you learn about yourself?**
  I learned that I can overachieve when I carry out a challenging task. When I was learning to use software known as OSIsoft Visualizing PI System Data, I was informed that it would be difficult to understand and could delay me from completing my assigned tasks. However, I quickly learned how to utilize it and accomplished more than I was initially asked to do.

- **How did the position increase your professional confidence?**
  In learning the ins and outs of this complex software package, I developed more efficient methods to complete the given tasks, which was noticed by the Tank and Pipeline Integrity Department. They appreciated how I took their time and effort into consideration for accessing the displays I would create to provide whatever data they needed.

DOE Fellow Spotlight – Summer Internship
Alejandro Koszarycz



- **Where did you intern?**
  I interned in Germantown, MD which is about 35 minutes from DOE Headquarters in Washington, DC.
- **What did you do there? What projects did you work on?**
  I was tasked with 2 main projects which I worked on intensively during my 10 week internship, including the remediation of the Lawrence Livermore National Laboratory (LLNL) 280 building and the Web Refresh Project. The LLNL 280 building project had started just prior to my arrival so I was able to see the progression of how these projects scale. Besides those 2 projects, I was able to attend many weekly/monthly meetings for all of the current nuclear reactor projects that are being funded.
- **What was the coolest thing about your internship or that happened during your internship?**
  The two coolest things that I personally got to experience during my internship was a site visit to SRNL and talking in depth with my mentor which allowed me to gain many personal and professional insights. While visiting SRNL, I got to see a decommissioned nuclear facility that was completely entombed with concrete, which was projected to maintain the facility's condition for over 1000 years. After seeing all of the effort and money involved with decommissioning of nuclear sites, I felt that this was a practical solution that could be used more often as allowed by site specific circumstances.
- **What advice do you have for those beginning the internship process?**
  Ask questions and meet everyone that they can. Some of the best contacts I met while at Germantown were people that I met by knocking on their doors; one of the main projects that I was able to work on was identified by knocking on a door and offering my services to help. I learned a lot during this project, and otherwise would have missed this opportunity if I didn't go around asking questions and meeting people.
- **What did you like most about your experience?**
  What I liked most about the entire experience was being able to see the infrastructure and how tasks were delegated for such large tasks. I took many notes on the structure and the layers of communication with the projects involved. Many meetings were held to go over the scope of complicated tasks and status the progress being made. I also really enjoyed the work environment at Germantown; everyone was friendly and hospitable. Everyone made an effort to take the time to interact with the interns and make us feel at home.
- **What did you learn about yourself?**
  What I learned about myself during the internship was to focus on my passions and to have that lead me in the future. Most of the people working at Germantown have been there for over 30 years, so it gave me added perspective to make sure that I am doing something that I love because I may be fortunate enough to continue along that path for the next 30 years.
- **How did the position increase your professional confidence?**
  While I had a certain level of professional confidence going into the internship, this position allowed me to see the inner workings of the department and see where I would like to fit in a professional setting. It gave me clarity in the direction that I see myself going forward.