

# YEAR-END TECHNICAL REPORT

September 29, 2019 to September 28, 2020

## DOE-FIU Science & Technology Workforce Development Initiative

<http://fellows.fiu.edu/>

**Date submitted:**

December 6, 2020

**Principal Investigator:**

Leonel E. Lagos, Ph.D., PMP®

**Florida International University Collaborators:**

Leonel E. Lagos, Ph.D., PMP® (Program Director)

Ravi Gudavalli, Ph.D. (Project Manager)

DOE Fellows

**Submitted to:**

U.S. Department of Energy

Office of Environmental Management

Under Cooperative Agreement No. DE-EM0000598



**Applied Research Center**

FLORIDA INTERNATIONAL UNIVERSITY

Addendum:

This document represents one (1) of four (5) reports that comprise the Year End Reports for the period of September 29, 2019 to September 28, 2020 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. Incremental funding under this cooperative agreement resulted in FIU having to execute FIU Year 9 carryover scope, which was completed in November 2019. The technical information for the carryover scope from FIU Performance Year 9 has therefore also been included in these reports.

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-2019-800006470-04b-270

Project 2: Environmental Remediation Science and Technology  
Document number: FIU-ARC-2019-800006471-04b-267

Project 3: Waste and D&D Engineering and Technology Development  
Document number: FIU-ARC-2019-800006472-04b-256

Project 4: DOE-FIU Science & Technology Workforce Development Initiative  
Document number: FIU-ARC-2019-800006473-04b-306

Project 5: DOE-FIU Science & Technology Workforce Development Initiative for Office of Legacy Management  
Document number: FIU-ARC-2019-800012253-04b-003

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: <https://doeresearch.fiu.edu>

### **DISCLAIMER**

This report was prepared as an account of work sponsored by an agency of the United States government. Neither the United States government nor any agency thereof, nor any of their employees, nor any of its contractors, subcontractors, nor their employees makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe upon privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States government or any other agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States government or any agency thereof.

## TABLE OF CONTENTS

---

|   |     |
|---|-----|
| TABLE OF CONTENTS.....  | i   |
| LIST OF FIGURES .....   | ii  |
| LIST OF TABLES .....  | iii |
| PROJECT 4 OVERVIEW .....  | 1   |
| MAJOR ACCOMPLISHMENTS.....  | 2   |
| PROJECT 4: DOE-FIU SCIENCE & TECHNOLOGY WORKFORCE DEVELOPMENT<br>INITIATIVE .....                                       | 7   |
| INTRODUCTION .....  | 7   |
| OBJECTIVES.....   | 7   |
| RESULTS AND DISCUSSION.....   | 7   |
| DOE Fellows Entering the Workforce.....   | 7   |
| Increasing the Retention of Minority Students in Science, Technology, Engineering, and Math<br>(STEM) Disciplines ..... | 8   |
| DOE Fellows Recruitment & Selection.....  | 9   |
| DOE Fellows Internships.....  | 11  |
| DOE Fellows Conference Participation.....   | 12  |
| DOE Fellows Directly Supporting DOE EM Projects.....  | 21  |
| Additional Program Activities .....   | 21  |
| CONCLUSIONS.....  | 31  |
| ACKNOWLEDGEMENTS.....   | 32  |
| APPENDIX.....   | 33  |
| APPENDIX A. Summer Internship Reports.....  | 36  |
| APPENDIX B. DOE Fellows Graduate Programs .....   | 37  |
| APPENDIX C. Summer 2020 Internship Highlights .....   | 41  |

## LIST OF FIGURES

---

Figure 1. DOE Fellows recruited during 2020: (Top: left to right) Ryan Ocampo, Joel Adams, Stevens Charles, (Middle: left to right) Mariah Doughman, Raymond Piloto, Sebastian Story, (Bottom: left to right) Phuong Pham, Adrian Munio, Alicia Maratos. .... 11

Figure 2. Florida International University’s DOE Fellows participating in summer internships across the DOE complex: (Top: left to right) Jeff Natividad, Aurelien Meray, Gisselle Gutierrez, (Middle: left to right) Juan Morales, Michael Thompson, Christopher Excellent, (Bottom: left to right) Roger Boza, Edward Nina. .... 12

Figure 3. DOE Fellows with Dr. Ike White, U.S. Department of Energy’s Senior Advisor for Environmental Management to the Under Secretary for Science. .... 13

Figure 4. WM2020 student poster session. .... 14

Figure 5. DOE Fellows presenting posters at the Waste Management Symposia 2020. .... 17

Figure 6. WM2020 Undergraduate Student Poster Winner – DOE Fellow Anilegna Nunez Abreu (center) receiving an award during the award luncheon. .... 18

Figure 7. DOE Fellows Amanda Yancoskie and Gisselle Gutierrez-Zuniga, awardees of the Roy G. Post foundation scholarship, standing in front of the winners’ banner at WM2020. Other former DOE Fellow scholarship winners from FIU included Anibal Morales and Frances Zengotita.. 18

Figure 8. DOE Fellows and ARC staff at WM2020. .... 19

Figure 9. DOE Fellows at panel, oral and poster sessions. .... 21

Figure 10. DOE Fellow Frances Zengotita (left) and DOE Fellows Alexis Vento, Ryan Cruz and Patrick Uriarte (right) during Fall 2019 commencement. .... 23

Figure 11. DOE Fellow Frances Zengotita during Fall 2019 commencement being recognized by FIU’s president Dr. Mark B. Rosenberg. .... 23

Figure 12. DOE Fellow graduates during the Spring 2020 virtual gradation ceremony. .... 25

Figure 13. DOE Fellow graduates during the Summer 2020 virtual graduation ceremony. .... 27

Figure 14. DOE Fellows presenting during the FIU Annual Research Review. .... 28

## **LIST OF TABLES**

---

|   |    |
|---|----|
| Table 1. DOE Fellows in STEM Graduate Programs During Performance Year 10 .....               | 8  |
| Table 2. DOE Fellows Class of 2020 Spring Recruits.....                                       | 10 |
| Table 3. DOE Fellows Class of 2020 Summer Recruits.....                                       | 10 |
| Table 4. DOE Fellows Summer Internships 2020 .....  | 12 |
| Table 5. Summer 2019 Internship Research Presentation Schedule for DOE Fellows Meetings ..... | 29 |
| Table 6. FIU Performance Year 10 Research Presentation Schedule for DOE Fellows Meetings .... | 29 |
| Table 7. Summer 2020 Internship Research Presentation Schedule for DOE Fellows Meetings ..... | 30 |

## PROJECT 4 OVERVIEW

---

Over the past decade, there has been a national need for more careers in science, technology, engineering and mathematics (STEM) workforce. This shortage is felt not only in the private industry sector but also across many federal agencies including the U.S. Department of Energy (DOE). Within DOE Environmental Management (EM), there is a critical shortage of entry-level STEM personnel. About 60% of the workforce is eligible to retire in 5 years, average work age is 55 years and only less than 4% of the workforce is less than 30 years of age. 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 internship programs, apply to DOE contractors, pursue post master's 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 164 minority FIU STEM students since program inception in 2007 up to the most recent induction ceremony held in November 2019. The DOE Fellows induction ceremonies have been attended by DOE EM officials each year, including EM-1s (Mr. Rispolli and Dr. Triay), other DOE-EM managers (from Mr. Mark Gilbertson in 2007 all the way to Mr. Kurt Gerdes in 2017 and 2018).

## MAJOR ACCOMPLISHMENTS

---

Major 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 the 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 through the Alvin M. Weinberg Fellowship program.
- DOE Fellow (Lee Brady) was hired by DOE-EM and began working for D&D and Facility Engineering under the direction of Mr. Andrew Szilagyi.
- DOE Fellow (Rosa Ramirez) was hired into the EM Professional Development Corps program.
- Twelve (12) DOE Fellows joined DOE EM, DOE National Labs and Contractors upon graduating from FIU with bachelors, master's or PhD degrees. Most recently this includes the hiring of Hansell Gonzalez and Tristan Ponce, hired by SRNL in 2018 and 2020 respectively.
- Ninety-three (93) other DOE Fellows graduated FIU with bachelors or master's degrees and obtained employment in private industry and government agencies.

| First Name | Last Name | Employer  |
|------------|-----------|---|
| Serkan     | Akar      | Department of Commerce  |
| Denisse    | Aranda    | NASA  |
| Danny      | Brenner   | General Electric  |
| Ramon      | Colon     | Bouygues Civil Works Florida                                  |
| Henry      | Diaz      | Lockheed  |
| Raul       | Dominguez | Kimley-Horn and Associates, Inc.                              |
| Edgard     | Espinosa  | DOE EM Office of Nuclear Materials Disposition                |
| Alex       | Henao     | Internal Revenue Services                                     |
| Erica      | McKinney  | Boeing Company  |
| William    | Mendez    | Boeing Company  |
| Merlin     | Ngachin   | Waste Control Specialists (Texas) and currently hired by SRNL |
| Amy        | Pahmer    | Mount Sinai Medical Center                                    |
| Giancarlos | Pena      | Caribe Utilities of Florida, Inc                              |
| Jose       | Rivera    | FIU's Applied Research Center                                 |



| <b>First Name</b> | <b>Last Name</b>  | <b>Employer</b>   |
|-------------------|-------------------|---|
| Rubymir           | Romero            | Bechtel Power   |
| Jose              | Vazquez           | Department of State   |
| Leydi             | Velez             | PriceSmart Inc  |
| Sandra            | Zapata            | Johnson & Johnson   |
| Amaury            | Betancourt        | Florida Department of Environmental Protection  |
| Lee               | Brady             | DOE EM office of Deactivation and Decommissioning   |
| Duriem            | Calderin          | Columbia-Energy Environmental Services (Richland, WA), AREVA NP (Richland, WA) and currently at Pacific Northwest National Lab (PNNL) |
| Charles           | Castello          | ORNL - Energy & Transportation Science Division   |
| Cindy             | Cerna             | Naval Sea Systems Command   |
| Melina            | Idarraga          | Nova Consulting Inc.  |
| Dasney            | Joseph            | General Electric  |
| Rosa              | Ramirez           | DOE EM International Programs   |
| Victor            | Uriarte           | Intel Corporation   |
| Stephen           | Wood              | ORNL  |
| Jennifer          | Borges            | Florida Department of Transportation  |
| Elsa              | Cabrejo           | Dade County Environmental Department (Miami, Fla)   |
| Denny             | Carvajal          | Mount Sinai Medical Center  |
| Rinaldo           | Gonzalez Galdamez | Crane Aerospace and Electronics   |
| Nadia             | Lima              | HJ Foundation   |
| Jose              | Matos             | Beckman Coulter   |
| Alessandra        | Monetti           | Department of Defense - Office of the Secretary of Defense, Army Corp of Engineering  |
| Mario             | Vargas            | Boeing Company  |
| Yulyan            | Arias             | CH2M Hill   |
| Maite             | Barroso           | Sikorsky Aircraft   |
| Givens            | Cherilus          | Florida Power & Light   |
| Elicek            | Delgado           | Motorola  |
| Janty             | Ghazi             | Kiewit Power  |
| Heidi             | Henderson         | CPH Inc.  |
| Kanchana          | Iyer              | Department of Health & Human Services   |
| Alexander         | Lopez             | Florida Department of Transportation  |
| Sheidyn           | NG                | Regeneron Pharmaceuticals   |
| Shina             | Rana              | Florida Power & Light   |
| Melissa           | Sanchez           | Florida Department of Environmental Protection  |
| Nel               | Ciurdar           | Burns & McDonnell   |
| Lilian            | Marrero           | MWH Global  |
| Joshua            | Midence           | Creativity, Value, Logic  |
| Carol             | Moreno-Pastor     | Cummins   |

| <b>First Name</b> | <b>Last Name</b> | <b>Employer</b>                                      |
|-------------------|------------------|--|
| Jaime             | Mudrich          | Beckman Coulter                                      |
| Ximena            | Prugue           | BRG Sports   |
| Paola             | Sepulveda        | Stryker  |
| Frank             | Silva            | Department of State                                  |
| Nicole            | Anderson         | National Energy Technology Laboratory (NETL)         |
| Jennifer          | Arniella         | Permasteelisa North America                          |
| Francisco         | Bolanos          | Beckman Coulter                                      |
| Dania             | Castillo         | HDR  |
| Dayron            | Chigin           | Florida Power & Light                                |
| Joel              | McGill           | BND Engineers  |
| Lucas             | Nascimento       | Raytheon   |
| Raul              | Ordonez          | Texas Instruments                                    |
| Valentina         | Padilla          | Brown & Caldwell                                     |
| Mariela           | Silva            | Conoco Phillips                                      |
| Gabriela          | Vazquez          | Florida Power & Light                                |
| Revathy           | Venkataraman     | TradeStation   |
| Michael           | Abbott           | Magic Leap Inc                                       |
| Michelle          | Embon            | Kimley-Horn and Associates, Inc.                     |
| Mariana           | Evora            | King Engineering Associates, Inc                     |
| Eduardo           | Garcia           | UTC Aerospace Systems                                |
| Hansell           | Gonzalez         | Savannah River Nuclear Solutions                     |
| Adamandios        | Manoussakis      | Sandia National Laboratory                           |
| Steve             | Noel             | Goldman Sachs  |
| Sasha             | Philius          | HaikuTech Europe B.V.                                |
| Brian             | Castillo         | Stryker  |
| John              | Conley           | Florida Power & Light                                |
| Andrew            | De La Rosa       | Lockheed   |
| Jorge             | Deshon           | Lockheed   |
| Maria             | Diaz             | Nova Consulting Inc.                                 |
| Maximiliano       | Edrei            | Huntington Ingalls Newport News Shipbuilding Company |
| Janesler          | Gonzalez         | Velossa Tech   |
| Kiara             | Pazan            | U.S. Corps of Engineers                              |
| Meilyn            | Planas           | Florida Power & Light                                |
| Ryan              | Sheffield        | Applied Physics Laboratory                           |
| Aref              | Shehadeh         | Nova Consulting Inc.                                 |
| Jesse             | Viera            | U.S. Marine Corps                                    |
| Christine         | Wipfli           | U.S. Dept of Defense                                 |
| Sarah             | Bird             | U.S. Dept of Defense                                 |
| Alexis            | Smooth           | Nexant   |
| Christopher       | Strand           | FAA  |

| First Name | Last Name    | Employer  |
|------------|--------------|---|
| Sebastian  | Zanlongo     | Johns Hopkins University, Applied Physics Laboratory      |
| Mohammed   | Albassam     | City of Coconut Creek                                     |
| Michael    | DiBono       | Microsoft   |
| Ron        | Hariprashad  | RS&H  |
| Ripley     | Raubenolt    | SCS Engineering   |
| Sarah      | Solomon      | County of Los Angeles Department of Public Works          |
| Joseph     | Coverston    | Pennsylvania State University Applied Research Laboratory |
| Ryan       | Cruz         | Lockheed  |
| Ximena     | Lugo         | Kimley-Horn and Associates, Inc.                          |
| Tristan    | Simoës-Ponce | Savannah River Nuclear Solutions                          |
| Alex       | Rivero       | General Electric  |
| Patrick    | Uriarte      | iRobot  |
| Michael    | Thompson     | Raytheon  |
| Rocio      | Trimino Gort | A&P Consulting Transportation Engineers, Corp.            |

- The 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
  - DOE Fellow (Hansell Gonzalez) won Best Student Poster at WM18
  - DOE Fellow (Michael DiBono) won Best Undergraduate Student Poster at WM19
  - DOE Fellow (Anilegna Nunez) won Best Undergraduate Student Poster at WM20
- Completed 159 internships at DOE sites, DOE national labs, DOE-HQ, and DOE contractors since 2007.
- Over 250 presentations (posters and papers) at Waste Management conferences (2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019 and 2020) 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.
- Developed DOE Fellows website <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 Hernandez 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.
- The following DOE Fellows received the Roy G. Post Foundation Scholarship at the Graduate Student Level awarded by the Waste Management Symposium: Robert Lapierre (2014) and Silvina Di Pietro (2016).
- The following DOE Fellows received the Roy G. Post Foundation Scholarship at the Undergraduate Student Level awarded by the Waste Management Symposium: Alejandro Hernandez (2017); Christine Wipfli (2018); Manuel Losada (2019); Anibal Morales, Frances Zengotita, Gisselle Gutierrez and Amanda Yancoskie (2020).

# **PROJECT 4: DOE-FIU SCIENCE & TECHNOLOGY WORKFORCE DEVELOPMENT INITIATIVE**

---

## **INTRODUCTION**

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, the U.S. Department of Energy 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 R&D. The center, now known as the Applied Research Center, has tackled and helped solve multiple problems at many DOE sites. The DOE-FIU Science and Technology Workforce Development Program is designed to build upon this relationship by creating 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.

## **OBJECTIVES**

The DOE-FIU Science and Technology Workforce Development Program has been designed to build upon the existing DOE/FIU relationship by creating a "pipeline" of minority engineers specifically trained and mentored to enter the Department of Energy workforce in technical areas of need. The main objective of the program is to provide interested students with a unique opportunity to integrate course work, DOE fieldwork, and research work at FIU into a well-structured academic program that leads to entry into DOE EM's Pathways Program. Students selected as DOE Fellows perform research at FIU and at DOE sites, national laboratories, and DOE contractors. Graduation and completion of this fellowship leads to employment opportunities with DOE EM, DOE contractors, DOE national laboratories, other federal agencies, and private industry as well as the pursuit of post-master or post-doctoral positions at DOE national labs.

## **RESULTS AND DISCUSSION**

### **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 10, 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.

- **Patrick Uriarte** (Class of 2018) graduated with a B.S. in Mechanical Engineering and accepted a position at iRobot as a Test Systems Engineer Intern.
- **Ryan Cruz** (Class of 2017) graduated with a M.S. in Information Technology and has accepted a position as an Information Assurance Engineer at Lockheed Martin.
- **Rocio Trimino Gort** (Class of 2019) graduated with a B.S. in Mechanical Engineering and joined A&P Consulting Transportation Engineers, Corp. as Junior Project Engineer.
- **Tristan Simoes-Ponce** (Class of 2017) accepted a job offer as a Mechanical Engineer in SRNL’s Mechanical Engineering Group.
- **Michael Thompson** (Class of 2019) accepted a position as a Systems Security Engineer II at Raytheon after completing his M.S. in Electrical Engineering.

### **Increasing the Retention of Minority Students in Science, Technology, Engineering, and Math (STEM) Disciplines**

A total of **Seventy-one (71) DOE Fellows** are currently pursuing 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. DOE Fellows Graduate Programs 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 10**

| <b>DOE Fellow</b> | <b>Discipline</b>         | <b>Degree</b> | <b>Research Topic Based on DOE EM projects</b>  | <b>Year of Graduation</b> |
|-------------------|---------------------------|---------------|---|---------------------------|
| Alexis Vento      | Environmental Engineering | Master        | Fate of Actinides in the Presence of Ligands in High Ionic Strength Systems           | 2021 (anticipated)        |
| Amanda Yankoskie* | Environmental Engineering | Master        | Non-Thesis Option   | 2020                      |
| Aurelien Meray    | Computer Science          | Master        | Analysis of Image Data using Machine Learning/Deep Learning and Big Data Technologies | 2022 (anticipated)        |
| Edward Nina*      | Mechanical Engineering    | Master        | Non-Thesis Option   | 2020                      |
| Gisselle Guterrez | Environmental Engineering | Master        | Digital Elevation Model and Hydrologic Network  | 2022 (anticipated)        |
| Jason Soto        | Mechanical Engineering    | Master        | Design of Robotic Inspection Platform for Structural Health Monitoring                | 2020                      |
| Jeff Natividad    | Mechanical Engineering    | Master        | Evaluation of Coatings for the H-Canyon Exhaust Tunnel                                | 2021 (anticipated)        |

| <b>DOE Fellow</b>    | <b>Discipline</b>         | <b>Degree</b> | <b>Research Topic Based on DOE EM projects</b>   | <b>Year of Graduation</b> |
|----------------------|---------------------------|---------------|--|---------------------------|
| Joel Adams           | Mechanical Engineering    | Ph.D.         | Long Term Surveillance of Nuclear Facilities and Repositories  | 2023 (anticipated)        |
| Joseph Coverston     | Mechanical Engineering    | Master        | Evaluation of Pipeline Flushing Requirements for HLW at Hanford and Savannah River                                       | 2019                      |
| Joshua Nunez         | Mechanical Engineering    | Master        | The applications of intumescent technologies in support of D&D activities across the DOE complex                         | 2019                      |
| Juan Morales         | Public Health             | Ph.D.         | Accumulated Metalloestrogens Analysis for Health Risk Assessment and Watershed Toxicology Management in Tims Branch, SRS | 2021 (anticipated)        |
| Lorryn Adnrade       | Environmental Engineering | Master        | Fate of Actinides in the Presence of Ligands in High Ionic Strength Systems  | 2022 (anticipated)        |
| Mariah Doughman      | Chemistry                 | Ph.D.         | Evaluation of Competing Attenuation Processes for Mobile Contaminants in Hanford Sediments                               | 2023 (anticipated)        |
| Michael Thompson     | Electrical Engineering    | Master        | Structural health monitoring of pipelines in radioactive environments through acoustic sensing and machine learning      | 2020                      |
| Phuong Pham          | Chemistry                 | Ph.D.         | Interaction of iodine species with Organo Clays and Granulated Activated Carbon  | 2022 (anticipated)        |
| Raymond Piloto       | Electrical Engineering    | Master        | Pipeline corrosion and erosion evaluation  | 2022 (anticipated)        |
| Roger Boza           | Computer Science          | Ph.D.         | Analysis of Image Data using Machine Learning/Deep Learning and Big Data Technologies                                    | 2023 (anticipated)        |
| Ron Hariprashad      | GeoScience (Hydrogeology) | Master        | Modeling of Surface Water Flow and Contaminant Transport in the Tims Branch Ecosystem                                    | 2020 (anticipated)        |
| Ryan Cruz            | Cyber Security            | Master        | Non-Thesis Option  | 2019                      |
| Ryan Ocampo          | Civil Engineering         | Master        | Evaluation of Coatings for the H-Canyon Exhaust Tunnel at the Savannah River   | 2022 (anticipated)        |
| Silvina Di Pietro    | Chemistry                 | Ph.D.         | Ammonia Gas Treatment for Uranium Immobilization at DOE Hanford's Site   | 2021 (anticipated)        |
| Tristan Simoes-Ponce | Mechanical Engineering    | Master        | D&D Technology Demonstration & Development and Technical Support to SRS's 235-F Facility Decommissioning                 | 2020                      |

## **DOE Fellows Recruitment & Selection**

The spring recruitment efforts for new DOE Fellows were initiated in January 2020 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. Applications were accepted from January 21 through February 21, 2020. The review committee reviewed applications and recommended 6 FIU students to be interviewed for the DOE Fellows program. The DOE Fellows selection committee selected the following 4 FIU students to join the DOE Fellows Class of 2020.

**Table 2. DOE Fellows Class of 2020 Spring Recruits**

| <b>DOE Fellow</b> | <b>Program</b>      | <b>Major</b>           | <b>Project Support</b>  |
|-------------------|---------------------|------------------------|---|
| Joel Adams        | Graduate, Ph.D.     | Mechanical Engineering | Project 1: Analysis of Image Data using Machine Learning/Deep Learning and Big Data Technologies      |
| Mariah Doughman   | Graduate, Ph.D.     | Chemistry              | Project 2: Evaluation of Competing Attenuation Processes for Mobile Contaminants in Hanford Sediments |
| Phuong Pham       | Graduate, Ph.D      | Chemistry              | Project 2: Humic Acid Batch Sorption Experiments with SRS Soil  |
| Sebastian Story   | Undergraduate, B.S. | Mechanical Engineering | Project 1: Development of Inspection Tools for Primary Tanks  |

The summer recruitment efforts for new DOE Fellows were conducted virtually in June 2020. A recruitment flyer was prepared and distributed via the DOE Fellows website, as well as via social media to attract FIU students. The DOE Fellows Program Director, Dr. Leonel Lagos, and Project Manager, Dr. Ravi Gudavalli, visited FIU Zoom classrooms to promote the DOE Fellows Program and to recruit new students. The applications were accepted from interested FIU students through June 12, 2020. A total of 20 applications were received. The DOE Fellows selection committee reviewed the applications and recommended 12 students for interviews which were conducted via Zoom between June 30 and July 2, 2020. Five (5) FIU students were selected as new DOE Fellows to join the DOE Fellows Class of 2020, alongside four (4) DOE Fellows hired during spring recruitment.

**Table 3. DOE Fellows Class of 2020 Summer Recruits**

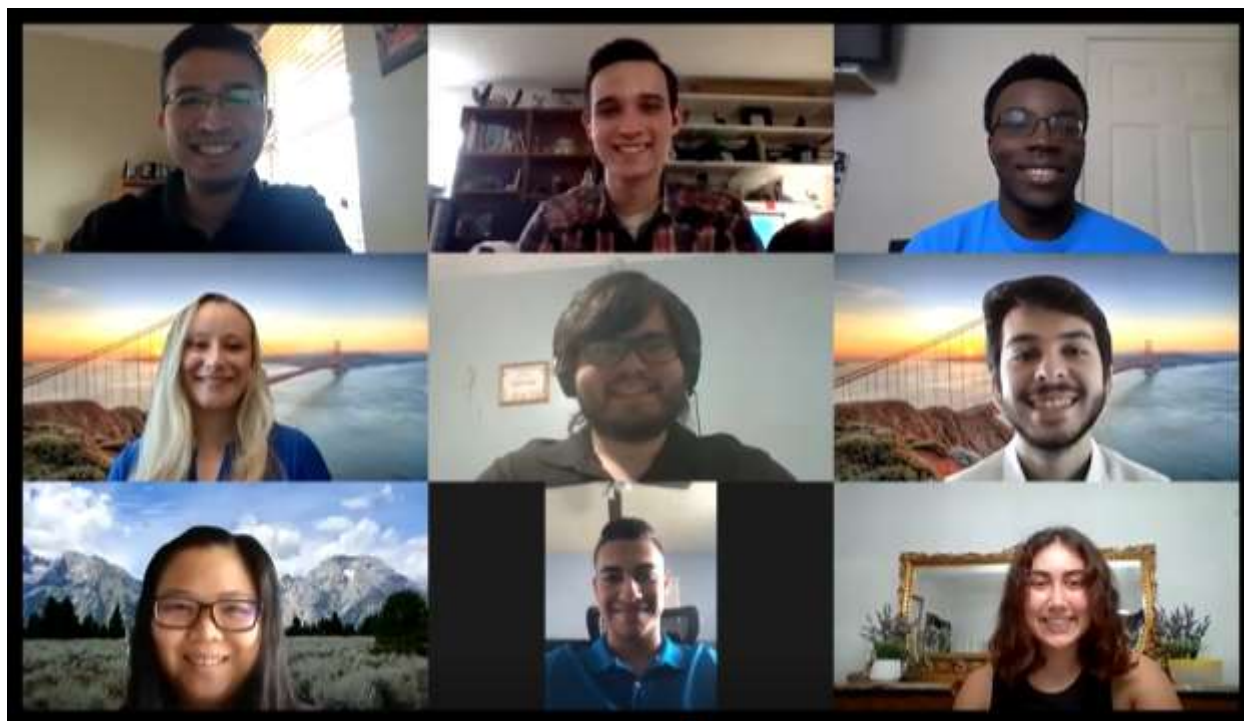
| <b>DOE Fellow</b> | <b>Program</b>     | <b>Major</b>              | <b>Project Support</b>   |
|-------------------|--------------------|---------------------------|--|
| Alicia Maratos    | Undergraduate B.S. | Environmental Engineering | Project 2: Subtask 1.4: Experimental Support of Lysimeter Testing  |
| Adrian Muino      | Undergraduate B.S. | Computer Engineering      | Project 3: Task 6: Analysis of Image Data using Machine Learning/Deep Learning and Big Data Technologies |
| Raymond Piloto    | Graduate M.S.      | Computer Engineering      | Project 1: Subtask 19.1: Pipeline corrosion and erosion evaluation                                       |
| Ryan Ocampo       | Graduate M.S.      | Civil Engineering         | Project 1: Subtask 18.3: Evaluation of coatings for the H-Canyon exhaust tunnel                          |
| Stevens Charles   | Undergraduate B.S. | Civil Engineering         | Project 2: Task 3: Contaminant Fate and Transport Modeling in the Tims Branch Watershed                  |

New DOE Fellows completed the required health and safety trainings listed below prior to engaging in the laboratory work.

- Laboratory Hazard Awareness
- HazCom: In Sync with GHS
- Fire Safety



- Environmental Awareness Part 1 & 2
- Small Spills and Leaks
- EPA Hazardous Waste Awareness & Handling
- Personal Protective Equipment: Laboratory
- Safe Use of Emergency Eyewash and Shower
- Safe Use of Fume Hood
- Compresses gas cylinder safety
- Safe Use of Biosafety Cabinets
- Radiation Safety - Pt. 1 Online
- Radiation Safety - Pt. 2 Hands-on



**Figure 1. DOE Fellows recruited during 2020: (Top: left to right) Ryan Ocampo, Joel Adams, Stevens Charles, (Middle: left to right) Mariah Doughman, Raymond Piloto, Sebastian Story, (Bottom: left to right) Phuong Pham, Adrian Munio, Alicia Maratos.**

## **DOE Fellows Internships**

The DOE Fellows Program Director coordinated with DOE-HQ, DOE sites, DOE national laboratories, and DOE contractors for summer 2020 internship assignments for the DOE Fellows. In spite of the challenges presented due to the COVID-19 pandemic, Florida International University's DOE Fellows successfully completed their summer 2020 internship programs at various national laboratories and Department of Energy (DOE) contractors across the country. A total of 8 DOE Fellows participated in remote and hybrid (remote and on-site) internships working with their mentors on topics related to robotics, environmental monitoring, high-level waste and machine learning/artificial intelligence across the DOE complex. For the DOE Fellows that participated in hybrid internships (i.e., remote and on site), arrangements were made for them to travel to their respective internship locations upon approval from the FIU Provost's Office.



**Figure 2. Florida International University’s DOE Fellows participating in summer internships across the DOE complex: (Top: left to right) Jeff Natividad, Aurelien Meray, Gisselle Gutierrez, (Middle: left to right) Juan Morales, Michael Thompson, Christopher Excellent, (Bottom: left to right) Roger Boza, Edward Nina.**

**Table 4. DOE Fellows Summer Internships 2020**

| <b>DOE Fellow</b>     | <b>Internship Location</b>             | <b>Mentor(s)</b>  |
|-----------------------|--|-------------------|
| Roger Boza            | INL (10 week remote)                   | Mike Griffel      |
| Michael Thompson      | INL (2 weeks remote + 8 weeks on site) | Ahmad Al Rashdan  |
| Christopher Excellent | INL (2 weeks remote + 8 weeks on site) | Steven Egan       |
| Aurelien Meray        | LBNL (10 week remote)                  | Haruko Wainwright |
| Juan Morales          | PNNL (10 week remote)                  | Katrina Waters    |
| Gisselle Gutierrez    | WIPP (10 week remote)                  | Anderson Ward     |
| Edward Nina           | WRPS (8 weeks on site)                 | Trent Fullmer     |
| Jeff Natividad        | WRPS (8 weeks on site)                 | Alexander Pappas  |

### **DOE Fellows Conference Participation**

DOE Fellows completed preparations and participated in the Waste Management 2020 Symposia (WM2020) in Phoenix, AZ, from March 8-12, 2020. 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 15 technical student posters (by 13 DOE Fellows and 2 non-Fellow students) were presented, as detailed below, during Session 32A

(Student Posters: The Next Generation - Industry Leaders of Tomorrow). 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.



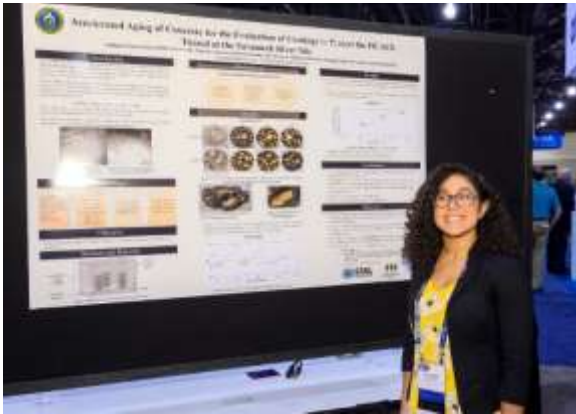
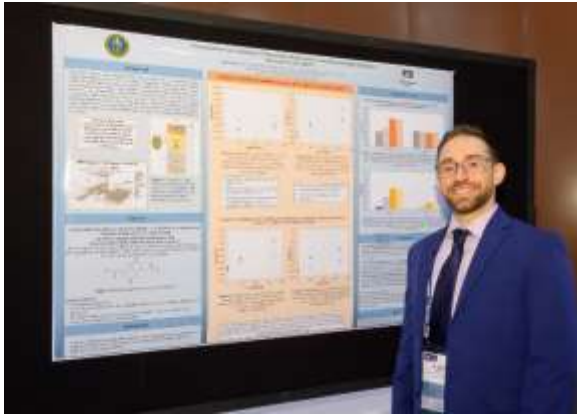
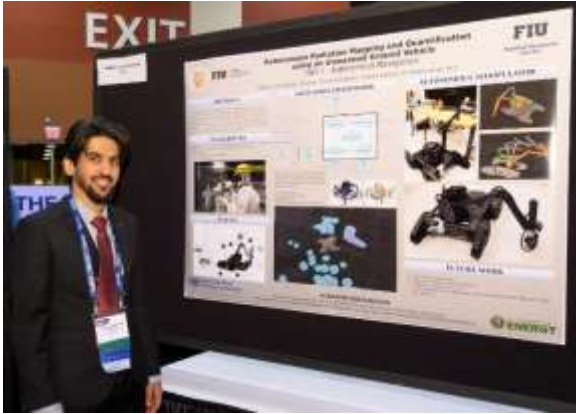
**Figure 3. DOE Fellows with Dr. Ike White, U.S. Department of Energy's Senior Advisor for Environmental Management to the Under Secretary for Science.**

- **Abdulmueen Alrashide:** Autonomous Radiation Mapping and Quantification using an Unmanned Ground Vehicle Part II - Autonomous Navigation (20571)
- **Alexis Vento:** Culebra Dolomite Dissolution of Relevance to the Waste Isolation Pilot Plant Near Carlsbad, NM (20550)
- **Anilegna Nunez Abreu:** Accelerated Aging of Concrete for the Evaluation of Coatings to Protect the HCAEX Tunnel at the Savannah River Site (20588)
- **Antony Maria:** Reductive Removal of Perchnetate and Chromate by Zero Valent Iron Under Variable Ionic Strength Conditions (20553)
- **Christopher Excellent:** Development of a Crawler for the Inspection of the Secondary Liners of The Double Shell Tanks at Hanford (20580)
- **Daniel Martin:** Deployment Updates for Miniature Inspection Tool for Double Shell Tanks at Hanford Site (20583)
- **Jason Soto:** Robotic Mapping and Monitoring of Nuclear Infrastructure (20581)
- **Jeff Natividad:** Robotic System for the Application of Coatings in the Savannah River Site H-Canyon Exhaust Tunnel (20579)
- **Juan Morales:** Amplicon Sequencing Assessment to Measure Microbial Community Response from Heavy Metal Contaminated Soils in Savannah River Site, Tims Branch Watershed (20578)

- **Katherine De La Rosa:** Mercury Speciation via Micro Column Extraction (20564)
- **Michael Thompson:** Ultrasonic and Fiber Optic Sensors for Pipeline Fault Detection in Hazardous Environments (20586)
- **Rocio Trimino Gort:** Iodine Co-precipitation with Calcium Carbonate in the presence of Silica Ions (20557)
- **Roger Boza Deep:** Learning Implementation for Structural Health Monitoring of Nuclear Facility (20584)
- **Silvina Di Pietro:** Uranium Partitioning Upon Ammonia Gas Treatment On Phyllosilicate Minerals (20554)
- **Tristan Simoes Ponce:** Mechanical Properties of Polyurethane Foams for D&D Activities (20551)



Figure 4. WM2020 student poster session.



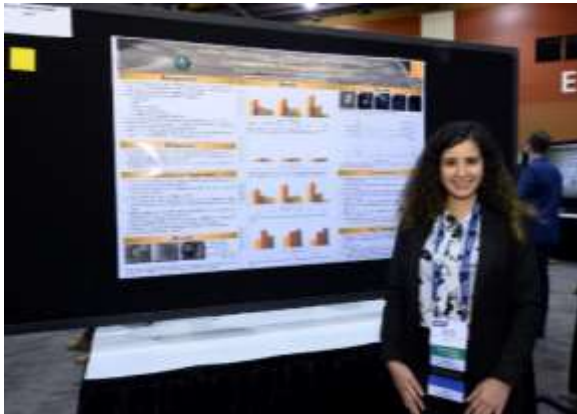
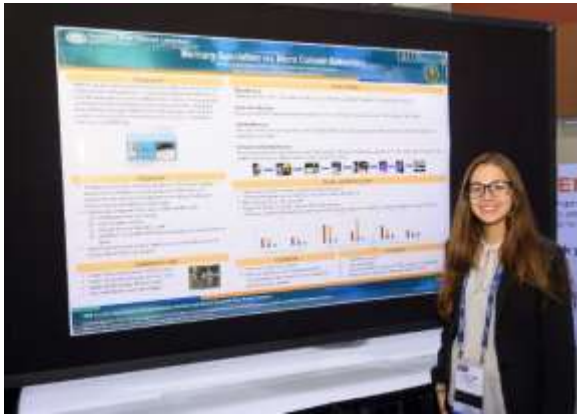
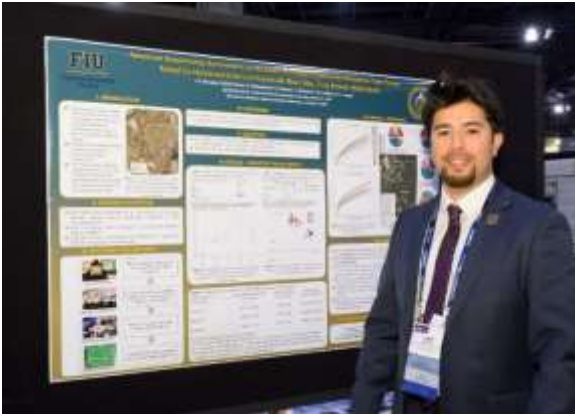
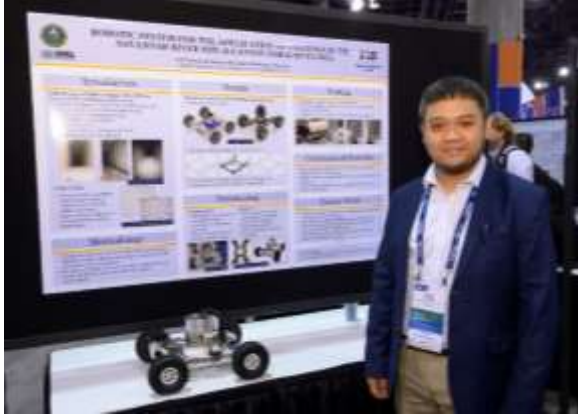




Figure 5. DOE Fellows presenting posters at the Waste Management Symposia 2020.

DOE Fellow Anilegna Nunez Abreu won the best undergraduate student poster award for her poster titled “Accelerated Aging of Concrete for the Evaluation of Coatings to Protect the HCAEX Tunnel at the Savannah River Site”. She was awarded with a cash prize during the WM2020 Conference Honors and Awards Luncheon.

Two DOE Fellows, Amanda Yancoskie and Gisselle Gutierrez-Zuniga, received Roy G. Post Foundation scholarships in the graduate and undergraduate categories respectively. They presented posters based on DOE-EM research during the Roy G. Post Student Scholarship Winners Poster Display. Two former DOE Fellows, Anibal Morales and Frances Zengotita, also received Roy G. Post Foundation scholarships at the undergraduate level.

- **Amanda Yancoskie:** 2D Dam-Break Analysis of L Lake and PAR Pond Dams Using HEC-RAS (20607)
- **Gisselle Gutierrez-Zuniga:** Evaluation of Techniques for Removing Vegetation from UAV-Based Photogrammetric Point Clouds (20587)



**Figure 6. WM2020 Undergraduate Student Poster Winner – DOE Fellow Anilegna Nunez Abreu (center) receiving an award during the award luncheon.**



**Figure 7. DOE Fellows Amanda Yancoskie and Gisselle Gutierrez-Zuniga, awardees of the Roy G. Post foundation scholarship, standing in front of the winners' banner at WM2020. Other former DOE Fellow scholarship winners from FIU included Anibal Morales and Frances Zengotita.**

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 and providing information 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 8. DOE Fellows and ARC staff at WM2020.**

Two DOE Fellows presented during professional sessions and one DOE Fellow participated in a panel session.

- Adhesion Capabilities of Permanent Foaming Fixatives for D&D Activities – 20308, Tristan Simoes-Ponce
- Inspection Tools for Hanford Tanks and Waste Transport Systems – 20444, Christopher Excellent
- Roger Boza participated as a panelist in the panel “The Wants and Needs of Graduating Students and New Engineers: Are Companies Even Listening?”



Figure 9. DOE Fellows at panel, oral and poster sessions.

## 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 10 Year End Reports for Projects 1, 2, and 3. The following DOE Fellows provided direct project support during FIU Performance Year 10.

**Project 1:** Anilegna Nunez Abreu (undergraduate, mechanical engineering), Christopher Excellent (undergraduate, mechanical engineering), Daniel Martin (undergraduate, electrical engineering), Edward Nina (graduate, M.S., mechanical engineering), Jeff Natividad (graduate, M.S., mechanical engineering), Joel Adams (graduate, Ph.D., Mechanical Engineering), Michael Thompson (graduate, M.S. electrical engineering), Patrick Uriarte (undergraduate, mechanical engineering), Raymond Piloto (graduate, M.S. electrical engineering), Ryan Ocampo (graduate M.S. Civil Engineering) and Sebastian Story (undergraduate, mechanical engineering).

**Project 2:** Alexis Vento (graduate, M.S., environmental engineering), Alicia Maratos (undergraduate, environmental engineering), Amanda Yancoskie (graduate, M.S., environmental engineering), Frances Zengotita (undergraduate, chemistry and health), Gisselle Gutierrez (graduate, M.S., environmental engineering), Heily Revoll (undergraduate, Civil Engineering), Juan Morales (graduate, Ph.D., Environmental Health Sciences), Katherine De La Rosa (undergraduate, environmental engineering), Mariah Doughman (graduate, Ph.D., chemistry), Nathalie Tuya (undergraduate, environmental engineering), Phuong Pham (graduate, Ph.D., chemistry), Rocio Trimino Gort (undergraduate, environmental engineering), Silvia Garcia (undergraduate, biological sciences), Silvina Di Pietro (graduate, Ph.D., chemistry) and Stevens Charles (undergraduate, civil engineering).

**Project 3:** Adrian Muino (undergraduate computer engineering), Alejandro Koszarycz (undergraduate, computer science), Aurelien Meray (graduate, M.S., computer science), David Mareno (undergraduate, computer engineering), Derek Gabaldon (undergraduate, mechanical engineering), Jason Soto (graduate, M.S., mechanical engineering), Joshua Núñez (graduate, mechanical engineering), Philip Moore (undergraduate, mechanical engineering), Roger Boza (graduate, Ph.D., computer science), Ryan Cruz (graduate, information technology) and Tristan Simoes-Ponce (graduate, mechanical engineering).

## Additional Program Activities

---

### DOE Fellows Graduations and Honors:

In December 2019, four DOE Fellows completed the Workforce Development Program and graduated from FIU, including Frances Zengotita, Joshua Núñez, Patrick Uriarte and Ryan Cruz.

- **Frances Zengotita** (Class of 2016) graduated with a B.S. in Chemistry and English from FIU's Department of Chemistry and Biochemistry.
- **Joshua Núñez** (Class of 2017) graduated with a M.S. in Mechanical Engineering after successfully completing his thesis titled "*The Applications of Intumescent Technologies in Support of D&D Activities Across the DOE Complex*".

- **Patrick Uriarte** (Class of 2018) graduated with a B.S. in Mechanical Engineering and accepted a position at iRobot as a Test Systems Engineer Intern.
- **Ryan Cruz** (Class of 2017) graduated with a M.S. in Information Technology and has accepted a position as an Information Assurance Engineer at Lockheed Martin.

At the commencement ceremony, Frances was honored by FIU's President, Dr. Mark Rosenberg, as a World's Ahead Graduate. Dr. Rosenberg also recognized the DOE-FIU Science and Technology Workforce Development Program and the DOE national labs. Since being admitted to the DOE Fellows Program in 2016, she was actively engaged in a project investigating the environmental chemistry of actinides and lanthanides under conditions relevant to the Waste Isolation Pilot Plant (WIPP) for disposal of transuranic waste near Carlsbad, NM. Frances completed two summer internships (2017, 2018) at Los Alamos National Laboratory investigating the effect of microbes on the mobility of radionuclides in the WIPP environment. In summer of 2019, Frances was selected to participate in research at the Glenn T. Seaborg Institute at Lawrence Livermore National Laboratory, working on batch desorption experiments to better understand the desorption behavior of plutonium migration from estuary sediments in Ravenglass, UK. She received positive feedback on her performance and attitude from her LLNL mentors.

Frances presented her research at the 2018 WM Symposia student poster competition, FIU's McNair Conference (receiving 3rd place for her poster), and the 2018 ACS conference in Boston. In 2018, Frances was awarded with the Innovations in Nuclear Technology R&D Award, sponsored by the U.S. Department of Energy, Office of Nuclear Technology R&D. 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. The results of her research "Potential for transport of Cesium as a biocolloid in high ionic strength systems" was published in collaboration with LANL researchers in the Chemosphere Journal. She also recently received the Waste Management Symposia's Roy G. Post Foundation scholarship to continue her graduate studies. In Fall of 2020 Frances plans to pursue her PhD.



**Figure 10. DOE Fellow Frances Zengotita (left) and DOE Fellows Alexis Vento, Ryan Cruz and Patrick Uriarte (right) during Fall 2019 commencement.**



**Figure 11. DOE Fellow Frances Zengotita during Fall 2019 commencement being recognized by FIU's president Dr. Mark B. Rosenberg.**

Three (3) DOE Fellows graduated from FIU in Spring 2020 and participated in a virtual graduation ceremony held on May 8, 2020. DOE Fellow Aurelien Meray graduated with a Bachelor's degree in computer science and will continue his education by pursuing a Master's degree in FIU's Computer Science Department. In addition, DOE Fellow Tristan Simoes-Ponce accepted a job offer from SRNL as a Mechanical Engineer in SRNL's Mechanical Engineering Group, where he is expected to lead the transition of the intumescent foam technology in support of real-world D&D activities.

- Aurelien Meray (Class of 2019) - B.S. Comp. Sci.
- Rocio Trimino Gort (Class of 2019) - B.S. Env. Eng.
- Tristan Simoes-Ponce (Class of 2017) - M.S. Mech. Eng.





Figure 12. DOE Fellow graduates during the Spring 2020 virtual graduation ceremony.

Three (3) DOE Fellows graduated from FIU in summer 2020 and participated in a virtual graduation ceremony held on August 2, 2020. Gisselle Gutierrez-Zuniga graduated with a Bachelor's degree in Environmental Engineering and will continue her education by pursuing a Master's degree in Environmental Engineering at FIU. Jason Soto graduated with a Master's in

Mechanical Engineering and Michael Thompson, upon completion of his summer 2020 internship, will join Raytheon as a Systems Security Engineer II after having graduated with a Master's in Electrical Engineering.

- Gisselle Gutierrez-Zuniga (Class of 2019): BS - Environmental Eng.
- Jason Soto (Class of 2018): MS - Mechanical Eng.
- Michael Thompson (Class of 2019): MS - Electrical Eng.

**Gisselle Gutierrez-Zuniga**  
Bachelor of Science in Environmental Engineering

*"Gracias mama por todo! Thank you to all my professors, friends, family, and boyfriend for being there through my stressful times and happy times!!"*



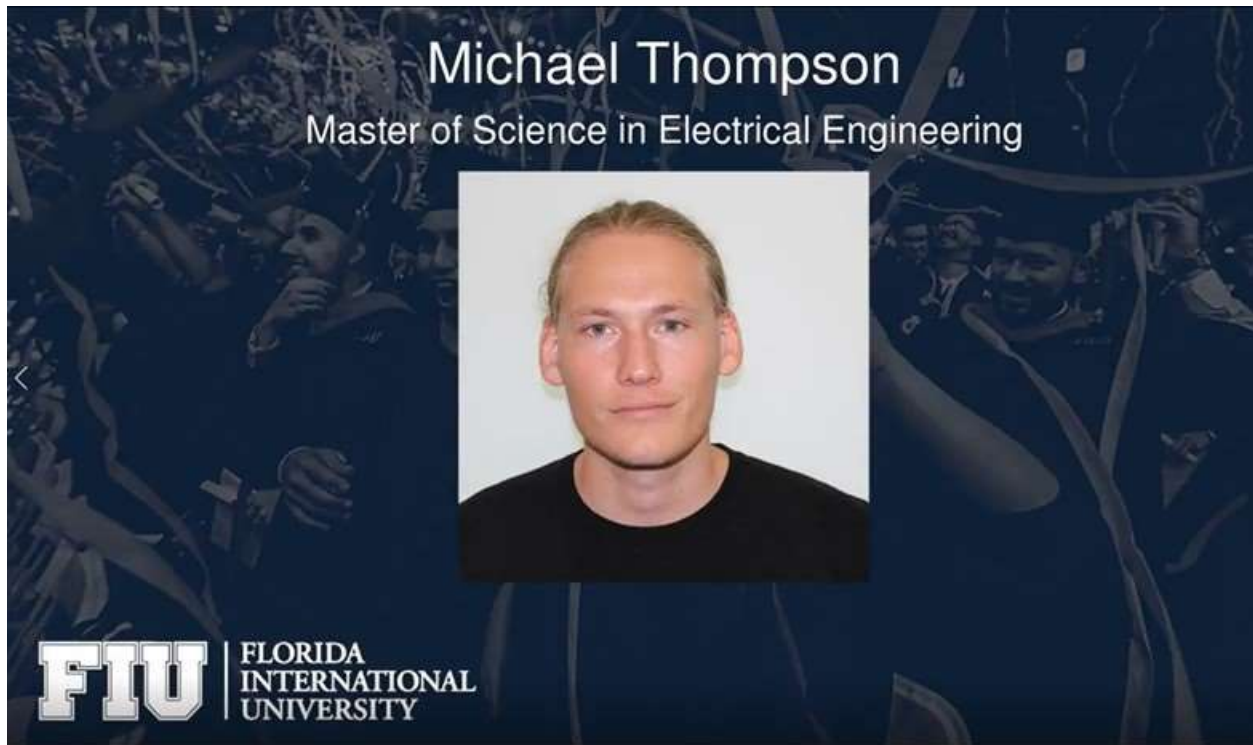
**FIU** | FLORIDA INTERNATIONAL UNIVERSITY

**Jason Soto**  
Master of Science in Mechanical Engineering



**FIU** | FLORIDA INTERNATIONAL UNIVERSITY



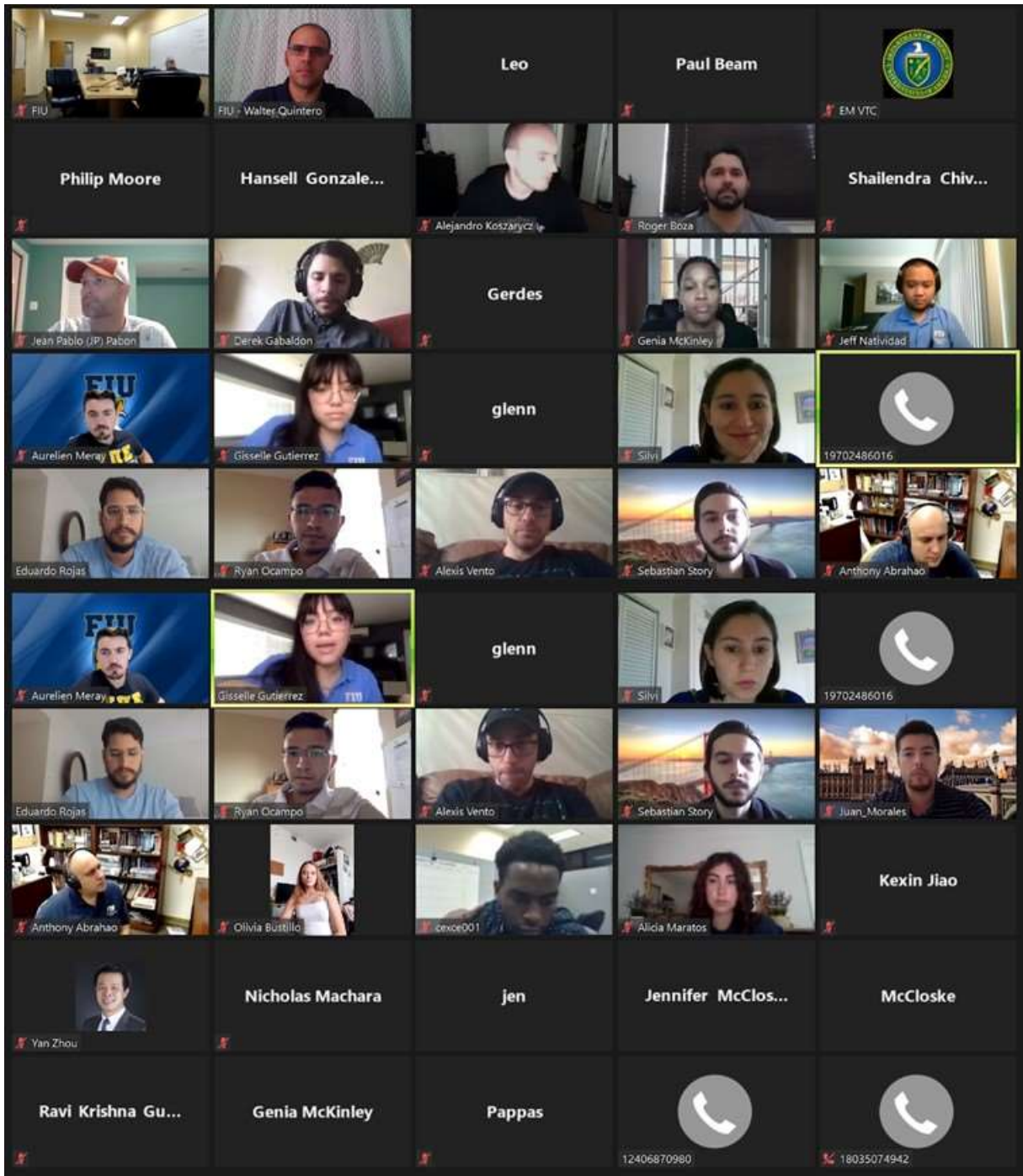


**Figure 13. DOE Fellow graduates during the Summer 2020 virtual graduation ceremony.**

### **Research Presentations**

The DOE Fellows also participated in the FIU Annual Research Review held on August 25, 2020 with DOE-HQ, the national laboratories and DOE sites. Five DOE Fellows presented research based on their summer internship activities and research performed at FIU-ARC. The titles of their presentations are listed below:

- Aurelien Meray - pyLEnM: A python package for Long-term Environmental Monitoring
- Derek Gabaldon - Deactivation & Decommissioning
- Gisselle Gutierrez-Zuniga - Hydrology Modeling for WIPP
- Jeff Navidad - WRPS Chief Technology Office Internship Recap
- Silvina Di Pietro - Uranium Fate and Mineral Transformations upon Remediation with Ammonia Gas



**Figure 14. DOE Fellows presenting during the FIU Annual Research Review.**

The DOE Fellows who participated in summer 2019 internships are preparing and presenting an oral presentation at the weekly DOE Fellows meetings. The tentative schedule for these presentations is provided below.

**Table 5. Summer 2019 Internship Research Presentation Schedule for DOE Fellows Meetings**

| <b>DOE Fellow</b>     | <b>Internship Location</b> | <b>Date</b> |
|-----------------------|----------------------------|-------------|
| Silvia Garcia         | SRNL                       | 10/9/2019   |
| Tristan Simoes-Ponce  | SRNL                       | 10/22/2019  |
| Ryan Cruz             | INL                        | 10/29/2019  |
| Frances Zengotita     | LLNL                       | 11/05/2019  |
| Alejandro Koszarycz   | SRNL                       | 11/12/2019  |
| Anilegna Nunez Abreau | DOE-HQ                     | 11/26/2019  |
| Patrick Uriarte       | WRPS                       | 12/05/2019  |
| Juan Morales          | ANL                        | 01/28/2020  |
| Jason Soto            | WRPS                       | 02/13/2020  |
| Silvina Di Pietro     | LLNL                       | 02/18/2020  |
| Alexis Vento          | SNL                        | 03/03/2020  |
| Roger Boza            | INL                        | 03/24/2020  |
| Amanda Yancoskie      | SRNL                       | 03/31/2020  |
| Katherine De La Rosa  | SRNL                       | 04/07/2020  |

After completion of the summer 2019 internship research presentations, DOE Fellows performing research at FIU have been preparing and presenting oral presentation at the weekly DOE Fellows meeting. The schedule of these presentations is provided below.

**Table 6. FIU Performance Year 10 Research Presentation Schedule for DOE Fellows Meetings**

| <b>DOE Fellow</b>     | <b>Date</b> | <b>Status</b>      |
|-----------------------|-------------|--------------------|
| Daniel Martin         | 04/14/2020  | Completed Via Zoom |
| Jeff Natividad        | 04/21/2020  | Completed Via Zoom |
| Rocio Trimino Gort    | 04/28/2020  | Completed via Zoom |
| Gisselle Gutierrez    | 05/05/2020  | Completed Via Zoom |
| Michael Thompson      | 05/12/2020  | Completed Via Zoom |
| Christopher Excellent | 05/26/2010  | Completed via Zoom |
| Daniel Martin         | 04/14/2020  | Completed Via Zoom |
| Jeff Natividad        | 04/21/2020  | Completed Via Zoom |
| Rocio Trimino Gort    | 04/28/2020  | Completed via Zoom |
| Gisselle Gutierrez    | 05/05/2020  | Completed via Zoom |
| Michael Thompson      | 05/12/2020  | Completed via Zoom |
| Christopher Excellent | 05/26/2010  | Completed via Zoom |
| Edward Nina           | 06/02/2020  | Completed Via Zoom |
| David Maren           | 06/10/2020  | Completed Via Zoom |

| <b>DOE Fellow</b>   | <b>Date</b> | <b>Status</b>      |
|---------------------|-------------|--------------------|
| Phuong Pham         | 06/16/2020  | Completed via Zoom |
| Derek Gabaldon      | 06/23/2020  | Completed via Zoom |
| Mariah Doughman     | 06/30/2020  | Completed via Zoom |
| Alexis Vento        | 7/21/2020   | Completed via Zoom |
| Philip More         | 7/28/2020   | Completed via Zoom |
| Nathalie Tuya       | 8/11/2020   | Completed via Zoom |
| Alejandro Koszarycz | 8/18/2020   | Completed via Zoom |

DOE Fellow Summer 2020 interns have been preparing and delivering oral presentations at the weekly DOE Fellows meeting. The schedule of these presentations is provided below.

**Table 7. Summer 2020 Internship Research Presentation Schedule for DOE Fellows Meetings**

| <b>DOE Fellow</b>     | <b>Date</b> | <b>Status</b>      |
|-----------------------|-------------|--------------------|
| Juan Morales          | 9/17/2020   | Completed via Zoom |
| Aurelien Meray        | 9/24/2020   | Completed via Zoom |
| Gisselle Gutierrez    | 10/02/2020  | Scheduled          |
| Christopher Excellent | 10/15/2020  | Scheduled          |
| Roger Boza            | 10/22/2020  | Scheduled          |

### **Thesis and Dissertation**

- DOE Fellow Joshua Núñez successfully defended his Master’s Thesis, titled “The Applications of Intumescent Technologies in Support of D&D Activities Across the DOE Complex” on November 14, 2019.
- DOE Fellow Tristan Simoes-Ponce successfully defended his Master’s Thesis, titled “Mechanical Properties of Permanent Foaming Fixatives for D&D Activities” on March 5, 2020.
- DOE Fellow Jason Soto successfully defended and passed his Master’s thesis defense titled “*Design of a Robotic Inspection Platform for Structural Health Monitoring*” on June 29, 2020 via a Zoom call. The objective of his thesis was to develop a robot capable of operating autonomously and manually for structural-health monitoring.
- DOE Fellow Michael Thompson successfully defended and passed his Master’s thesis defense titled “*Structural health monitoring of pipelines in radioactive environments through acoustic sensing and machine learning*” on July 8, 2020 via a Zoom call.

### **Other Activities**

DOE Fellows program director, Dr. Leonel Lagos, and program manager, Dr. Ravi Gudavalli, organized a Zoom call with the DOE Fellows participating in summer internships and DOE-HQ. Mr. Kurt Gerdes and Ms. Genia McKinley represented DOE-HQ. The Zoom call was held on August 11, 2020 during which the DOE Fellows shared their summer internship experience and described the research activities they performed as a part of the internship. Mr. Gerdes and Ms.

McKinley commended the DOE Fellows on their achievements and asked the Fellows to let them know if any assistance is needed from DOE-HQ.

## **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. One hundred and sixty-four (164) FIU STEM students have been inducted into the program and have completed 159 internships since 2007. Twelve (12) DOE Fellows were hired by DOE EM, DOE national labs and contractors. Ninety-three (93) DOE Fellows have been hired by private industry and government agencies. Additional information about the entire program and the DOE Fellows can be found on the website <http://fellows.fiu.edu/>.

## **ACKNOWLEDGEMENTS**

---

Funding for this research was provided by U.S. DOE Cooperative Agreement #DE-EM0000598. FIU's Applied Research Center would like to acknowledge the commitment of DOE-EM to this specific workforce development project and to all the research being conducted as part of the Cooperative Agreement. The partnership between DOE EM and FIU has resulted in the development and training of outstanding minority STEM students that will benefit this country as a whole.

## APPENDIX

---

The following 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: <https://doeresearch.fiu.edu>

FIU Year 10 Annual Research Review Presentations:

1. FIU Research Review - Project 1
2. FIU Research Review - Project 2
3. FIU Research Review - Project 3 - DnD
4. FIU Research Review - Project 3 - IT
5. FIU Research Review - Project 4 - 5
6. FIU Research Review - Project 4 - DOE Fellow Derek Gabaldon
7. FIU Research Review - Project 4 - DOE Fellow Gisselle Gutierrez-Zuniga
8. FIU Research Review - Project 4 - DOE Fellow Aurelien Meray
9. FIU Research Review - Project 4 - DOE Fellow Jeff Navidad
10. FIU Research Review - Project 4 - DOE Fellow Silvina De Pietro
11. FIU Research Review - Project 5 - DOE Fellow Olivia Bustillo
12. FIU Research Review - Project 5 - DOE Fellow Eduardo Rojas
13. FIU Research Review - Wrap Up - Project 1
14. FIU Research Review - Wrap Up - Project 2
15. FIU Research Review - Wrap Up - Project 3 - DnD
16. FIU Research Review - Wrap Up - Project 3 - IT
17. FIU Research Review - Wrap Up - Project 4 - 5

In addition, the following documents have been uploaded to OSTI.gov:

| Date Submitted to OSTI (mm/dd/yyyy) | OSTI ID | *STI PRODUCT TITLE:   | Publication/ Issue Date |
|-------------------------------------|---------|---|-------------------------|
| 09/09/2020                          | 1658912 | PROJECT TECHNICAL PLAN - Project 1: Chemical Process Alternatives for Radioactive Waste | 12/13/2019              |
| 09/09/2020                          | 1658920 | Literature Review of Adhesion Mechanisms For Mobile Platforms                           | 4/10/2020               |
| 09/15/2020                          | 1660375 | Summary of Testing for the Miniature Rover with Integrated UT Sensor                    | 7/24/2020               |
| 09/15/2020                          | 1660379 | Initial Testing for the H-Canyon Study  | 8/14/2020               |
| 09/15/2020                          | 1660434 | FIU PROJECT 1: Chemical Process Alternatives for Radioactive Waste                      | 8/25/2020               |
| 09/15/2020                          | 1660389 | PROJECT TECHNICAL PLAN - Project 2: Environmental Remediation Science & Technology      | 12/13/2019              |

|            |         |  |            |
|------------|---------|--|------------|
| 09/15/2020 | 1660396 | FIU PROJECT 2: Environmental Remediation Science & Technology  | 8/25/2020  |
| 09/16/2020 | 1660534 | PROJECT TECHNICAL PLAN - Project 3: Waste and D&D Engineering and Technology Development   | 12/13/2019 |
| 09/16/2020 | 1660535 | EXPERIMENTAL DESIGN: Quantifying / Certifying the Effects of Radiological Fixating Materials & Technologies ISO Source Term Calculations and Open Air Demolition | 1/31/2020  |
| 09/16/2020 | 1660536 | FIU PROJECT 3: Waste and D&D Engineering and Technology Development  | 8/25/2020  |
| 09/16/2020 | 1660539 | PROJECT TECHNICAL PLAN - Project 4: DOE-FIU Science and Technology Workforce Development Program   | 12/13/2019 |
| 09/16/2020 | 1660538 | Subtle Process Anomalies Detection using Machine Learning Methods  | 12/20/2019 |
| 09/16/2020 | 1660543 | Neptunium (IV) Diffusion through Bentonite Clay  | 12/20/2019 |
| 09/16/2020 | 1660544 | Amplicon Sequencing Assessment to Measure Microbial Community Response from Heavy Metal Contaminated Soils in Savannah River Site, Tims Branch Watershed         | 12/20/2019 |
| 09/16/2020 | 1660714 | An Assessment of Long-Term Monitoring Strategies and Developing Technologies   | 12/20/2019 |
| 09/16/2020 | 1660717 | Mechanical Properties Permanent Foaming Fixatives for D&D Activities   | 12/20/2019 |
| 09/16/2020 | 1660721 | Contributing to the DOE EM 4.1 and 4.12, Office of Groundwater and Subsurface Closure  | 12/20/2019 |
| 09/17/2020 | 1660918 | Double Shelled Tank Visual Inspections   | 12/20/2019 |
| 09/17/2020 | 1660919 | H-6bR Water density Stratification Investigation   | 12/20/2019 |
| 09/17/2020 | 1660921 | 2D Dam-Break Analysis of L Lake and PAR Pond Dams Using HEC-RAS  | 12/20/2019 |
| 09/17/2020 | 1660922 | Plutonium Migration from Estuary Sediments (Ravenglass, UK)  | 12/20/2019 |
| 09/17/2020 | 1660923 | FIU PROJECTS 4 & 5: DOE-FIU Science and Technology Workforce Development Program   | 8/25/2020  |
| 09/17/2020 | 1660925 | PROJECT TECHNICAL PLAN - Project 5: DOE-FIU Science and Technology Workforce Development Initiative for Office of Legacy Management (NEW)                        | 12/13/2019 |



|            |         |  |  |
|------------|---------|--|--|
| 09/17/2020 | 1660926 | DOE-FIU Science and Technology Workforce Development Initiative for Office of Legacy Management  | 4/30/2020  |
| 09/18/2020 | 1661159 | Biotic dissolution of autunite under anaerobic conditions: effect of bicarbonates and <i>Shewanella oneidensis</i> MR1 microbial activity. | Environmental Geochemistry and Health/12/19/2019.<br><a href="https://doi.org/10.1007/s10653-019-00480-7">https://doi.org/10.1007/s10653-019-00480-7</a> |

## APPENDIX A. SUMMER INTERNSHIP REPORTS

---

The DOE Fellows continued developing their technical reports based on their summer 2020 internships. A total of 8 DOE Fellows participated in summer internships as part of the DOE-FIU Cooperative Agreement. The summer 2020 internships and technical report titles are provided below.

**Table A- 1 Summer 2020 Internships**

| <b>DOE Fellow</b>     | <b>Internship Location</b> | <b>Internship Mentor(s)</b> | <b>Report Title</b>  |
|-----------------------|----------------------------|-----------------------------|--|
| Roger Boza            | INL                        | Mike Griffel                | Artificial Intelligence Implementation for Object Detection in Route Operable Unmanned Navigation of Drones (ROUNDS) |
| Michael Thompson      | INL                        | Ahmad Rashdan               | Flight control systems for autonomous indoor drones  |
| Christopher Excellent | INL                        | Steven Egan                 | Mobile Hot Cell for End-of-Life Source Management – Camera Control   |
| Aurelien Meray        | LBNL                       | Haruko Wainwright           | pyLEnM: A Python Package for Long-Term Soil and Groundwater Monitoring   |
| Juan Morales          | PNNL                       | Katrina Waters              | Investigation of Heavy Metal Biomarkers for the Assessment of Remediated Surface Waters                              |
| Gisselle Gutierrez    | WIPP                       | Anderson Ward               | Processing of Time Series Data in Support of Producing a Climatological Summary of WIPP                              |
| Edward Nina           | WRPS                       | Trent Fullmer               | Numerical Simulation for Radioactive Waste Transfer using COMSOL Multiphysics  |
| Jeff Natividad        | WRPS                       | Alexander Pappas            | Navigation and Positioning Tests for Vector Platform   |

## APPENDIX B. DOE FELLOWS GRADUATE PROGRAMS

### DOE Fellows in STEM Graduate Programs - Ph.D.

| DOE Fellow              | Discipline                | Degree | Research Topic Based on DOE EM projects  | Year of Graduation |
|-------------------------|---------------------------|--------|--|--------------------|
| Charles Castello        | Electrical Engineering    | Ph.D.  | Soil/Groundwater - Sensor Development for Field Measurement of Mercury   | 2011               |
| Claudia Cardona         | Environmental Engineering | Ph.D.  | Remediation of the uranium-contaminated subsurface in the deep vadose zone via NH <sub>3</sub> gas injection                         | 2017               |
| 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               |
| Sebastian Zanlongo      | Computer Science          | Ph.D.  | Multipurpose All-Terrain Robotic Platform for D&D  | 2018               |
| Roger Boza              | Computer Science          | Ph.D.  | Analysis of Image Data using Machine Learning/Deep Learning and Big Data Technologies  | 2023 (anticipated) |
| Silvina Di Pietro       | Chemistry                 | Ph.D.  | Ammonia Gas Treatment for Uranium Immobilization at DOE Hanford's Site   | 2021 (anticipated) |
| Juan Morales            | Public Health             | Ph.D.  | Accumulated Metalloestrogens Analysis for Health Risk Assessment and Watershed Toxicology Management in Tims Branch, SRS             | 2021 (anticipated) |
| Cristian Acevedo        | NA                        | Ph.D.  | <i>Note<sup>1</sup></i>  | NA                 |
| Emma Lopez              | NA                        | Ph.D.  | <i>Note<sup>1</sup></i>  | NA                 |
| Reiner Hernandez        | NA                        | Ph.D.  | <i>Note<sup>1</sup></i>  | NA                 |
| Eric Inclan             | NA                        | Ph.D.  | <i>Note<sup>1</sup></i>  | NA                 |
| Bryant Thompson         | NA                        | Ph.D.  | <i>Note<sup>1</sup></i>  | NA                 |
| Alejandro Garcia        | NA                        | Ph.D.  | <i>Note<sup>1</sup></i>  | NA                 |
| Orlando Gomez           | NA                        | Ph.D.  | <i>Note<sup>1</sup></i>  | NA                 |
| Alejandro Hernandez     | NA                        | Ph.D.  | <i>Note<sup>1</sup></i>  | NA                 |
| Joel Adams              | Mechanical Engineering    | Ph.D.  | Long Term Surveillance of Nuclear Facilities and Repositories  | 2023 (anticipated) |
| Mariah Doughman         | Chemistry                 | Ph.D.  | Evaluation of Competing Attenuation Processes for Mobile Contaminants in Hanford Sediments   | 2023 (anticipated) |
| Phuong Pham             | Chemistry                 | Ph.D.  | Interaction of iodine species with Organo Clays and Granulated Activated Carbon  | 2022 (anticipated) |

<sup>1</sup>Note: student is pursuing graduate level degree at another academic institution/department.

**DOE Fellows in STEM Graduate Programs - Masters**

| <b>DOE Fellow</b>  | <b>Discipline</b>         | <b>Degree</b> | <b>Research Topic Based on DOE EM projects</b>   | <b>Year of Graduation</b> |
|--------------------|---------------------------|---------------|--|---------------------------|
| Jose Vazquez       | Environmental Engineering | Masters       | Effects of temperature and pH on volatilization of mercury after chemical reduction                                | 2009                      |
| Amy Pahmer         | Engineering Management    | Masters       | Non-Thesis Option  | 2010                      |
| Duriem Calderin    | Biomedical Engineering.   | Masters       | Modeling of Loose Contamination Scenarios to Predict the Amount of Contamination Removed                           | 2010                      |
| Leydi Velez        | Industrial Engineering    | Masters       | Decision Modeling Tools D&D Surveillance & Maintenance   | 2010                      |
| Serkan Akar        | Biomedical Engineering    | Masters       | Design and Development of an Enzyme-Linked Biosensor for Detection and Quantification of Phosphate Species         | 2010                      |
| Amaury Betancourt  | Environmental Engineering | Masters       | Soil/Groundwater - Modeling of Mercury Contamination at ORNL   | 2011                      |
| Denny Carvajal     | Biomedical Engineering    | Masters       | Soil/Groundwater – Bacteria Interaction due to Polyphosphate Injection at Hanford                                  | 2011                      |
| Edgard Espinosa    | Mechanical Engineering    | Masters       | Waste Processing - CFD Modeling of NuVison's Power Fluidic Technology/Process Remote Stack Characterization System | 2011                      |
| Elsa Cabrejo       | Environmental Engineering | Masters       | Soil/Groundwater - Modeling of Mercury Contamination at ORNL   | 2011                      |
| Melina Idarraga    | Environmental Engineering | Masters       | Dissolution rate of natural meta-autunite: effects of aqueous bicarbonate, pH and temperature                      | 2011                      |
| Merlin Ngachin     | Environmental Sciences    | Masters       | Waste Processing - Baltman-Lattice Method to Model HLW   | 2011                      |
| Stephen Wood       | Mechanical Engineering    | Masters       | Modeling of Pipeline Transients: Modified Method of Characteristics  | 2011                      |
| William Mendez     | Engineering Mngmt.        | Masters       | Development of Remote Stack Char. System   | 2011                      |
| Eric Inclan        | Mechanical Engineering    | Masters       | Mesh adaptation for use in Lattice Boltzmann code  | 2012                      |
| Kanchana Iyer      | Biomedical Engineering    | Masters       | Non-Thesis Option  | 2012                      |
| Lee Brady          | Mechanical Engineering    | Masters       | Non-thesis option  | 2012                      |
| Lilian Marrero     | Environmental Engineering | Masters       | Soil/Groundwater - Modeling of Mercury Contamination at ORNL   | 2012                      |
| Mario Vargas       | Mechanical Engineering    | Masters       | Kinematic Control of Remote Stack Characterization System  | 2012                      |
| Melissa Sanchez ** | Environmental Engineering | Masters       | Non-thesis option  | 2012                      |
| Yulyan Arias**     | Environmental Engineering | Masters       | Non-thesis option  | 2012                      |

| <b>DOE Fellow</b>     | <b>Discipline</b>          | <b>Degree</b> | <b>Research Topic Based on DOE EM projects</b>  | <b>Year of Graduation</b> |
|-----------------------|----------------------------|---------------|---|---------------------------|
| Elicek Delgado-Cepero | Electrical Engineering     | Masters       | Structural Health Monitoring Inside Concrete and Grout Using the Wireless Identification Sensing Platform   | 2013                      |
| Heidi Henderson       | Environmental Engineering  | Masters       | Surface water and contaminant transport within the Oak Ridge National Laboratory  | 2013                      |
| Jaime Mudrich         | Mechanical Engineering     | Masters       | Development of a Coupling Model for Fluid-Structure Interaction using the Mesh-free Finite Element Method and the Lattice Boltzmann Method                    | 2013                      |
| Janty Ghazi           | Electrical Engineering     | Masters       | Control, through Sensors and LabVIEW, of the Asynchronous Pulsing Unit  | 2013                      |
| Jose Matos            | Mechanical Engineering     | Masters       | Development of improved Bodies for a Peristaltic Crawler for Radioactive Pipeline Unplugging  | 2013                      |
| Mariela Sliva         | Engineering Management     | Masters       | Non-Thesis Option   | 2013                      |
| Joel McGill*          | Environmental Engineering  | Masters       | Non-Thesis Option   | 2014                      |
| Paola Sepulveda       | Biomedical Engineering     | Masters       | Investigating the Role of a Less Uranium Tolerant Strain, Isolated from the Hanford Site Soil, on Uranium Interaction in Polyphosphate Remediation Technology | 2014                      |
| Revathy Venkataraman  | Computer Science           | Masters       | Performance Evaluation of Mobile Applications with KMIT Technology Web Services   | 2014                      |
| Valentina Padilla     | Environmental Engineering  | Masters       | Non-Thesis Option   | 2014                      |
| Andrew De La Rosa*    | Computer Science           | Masters       | Non-Thesis Option   | 2015                      |
| Dayron Chigin*        | Electrical Engineering     | Masters       | Non-Thesis Option   | 2015                      |
| Maximiliano Edrei     | Mechanical Engineering     | Masters       | Investigation of Mixing Times of Sparged Bingham plastic type fluids as applied to the Pulse Jet Mixing Process   | 2017                      |
| Natalia Duque         | Environmental Engineering  | Masters       | Non-Thesis Option   | 2017                      |
| Robert Lapierre*      | Chemistry                  | Masters       | Mineral characterization after uranium sequestration by pH manipulation using NH <sub>3</sub> gas   | 2017                      |
| Alejandro Garcia      | GeoScience                 | Masters       | The influence of biofilm formation on the SIP response of Hanford vadose zone sediment  | 2018                      |
| Mohammed Albassam     | Water resource Engineering | Masters       | Effect of Frequent Atmospheric Events on Flow Characterization in Tims Branch and its Major Outfalls  | 2018                      |
| Joseph Coverston      | Mechanical Engineering     | Masters       | Evaluation of Pipeline Flushing Requirements for HLW at Hanford and Savannah River  | 2019                      |
| Joshua Nunez          | Mechanical Engineering     | Masters       | The applications of intumescent technologies in support of D&D activities across the DOE complex  | 2019                      |

| <b>DOE Fellow</b>    | <b>Discipline</b>         | <b>Degree</b> | <b>Research Topic Based on DOE EM projects</b>  | <b>Year of Graduation</b> |
|----------------------|---------------------------|---------------|---|---------------------------|
| Ryan Cruz            | Cyber Security            | Masters       | Non-Thesis Option   | 2019                      |
| Amanda Yankoskie*    | Environmental Engineering | Masters       | Non-Thesis Option   | 2020                      |
| Jason Soto           | Mechanical Engineering    | Masters       | Design of Robotic Inspection Platform for Structural Health Monitoring  | 2020                      |
| Ron Hariprashad      | GeoScience (Hydrogeology) | Masters       | Modeling of Surface Water Flow and Contaminant Transport in the Tims Branch Ecosystem                               | 2020                      |
| Tristan Simoes-Ponce | Mechanical Engineering    | Masters       | D&D Technology Demonstration & Development and Technical Support to SRS's 235-F Facility Decommissioning            | 2020                      |
| Alexis Vento         | Environmental Engineering | Masters       | Fate of Actinides in the Presence of Ligands in High Ionic Strength Systems   | 2021                      |
| Jeff Natividad       | Mechanical Engineering    | Masters       | Evaluation of Coatings for the H-Canyon Exhaust Tunnel  | 2021                      |
| Edward Nina*         | Mechanical Engineering    | Masters       | Non-Thesis Option   | 2020                      |
| Michael Thompson     | Electrical Engineering    | Masters       | Structural health monitoring of pipelines in radioactive environments through acoustic sensing and machine learning | 2020                      |
| Aurelien Meray       | Computer Science          | Masters       | Analysis of Image Data using Machine Learning/Deep Learning and Big Data Technologies                               | 2022                      |
| Gisselle Guterrez    | Environmental Engineering | Masters       | Digital Elevation Model and Hydrologic Network  | 2022                      |
| Lorryn Adnrade       | Environmental Engineering | Masters       | Fate of Actinides in the Presence of Ligands in High Ionic Strength Systems   | 2022                      |
| Ryan Ocampo          | Civil Engineering         | Masters       | Evaluation of Coatings for the H-Canyon Exhaust Tunnel at the Savannah River  | 2022                      |
| Raymond Piloto       | Electrical Engineering    | Masters       | Pipeline corrosion and erosion evaluation   | 2022                      |

\*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 C. SUMMER 2020 INTERNSHIP HIGHLIGHTS

### Internship Highlights from the DOE Fellows

#### Summer Internship Highlights:

DOE Fellow Aurelien Meray (Class of 2019) participated in a remote internship with Lawrence Berkeley National Laboratory under the mentorship of Haruko Wainwright, working on developing a Python package for analyzing groundwater contamination data. The goal of this project is to build a package to help on-site leaders and scientists make decisions about DOE contaminated groundwater sites by quickly and easily visualizing the data.

#### Example functions that have been approved and completed:

- The function **plot\_MCL** plots the linear regression line of data given an analyte name and a well name. The plot includes the prediction where the line of best fit intersects with the Maximum Concentration Limit (MCL) which varies for each analyte.

```
plot_MCL(data, 'FSB110D', 'TRITIUM', year_interval=4)
```

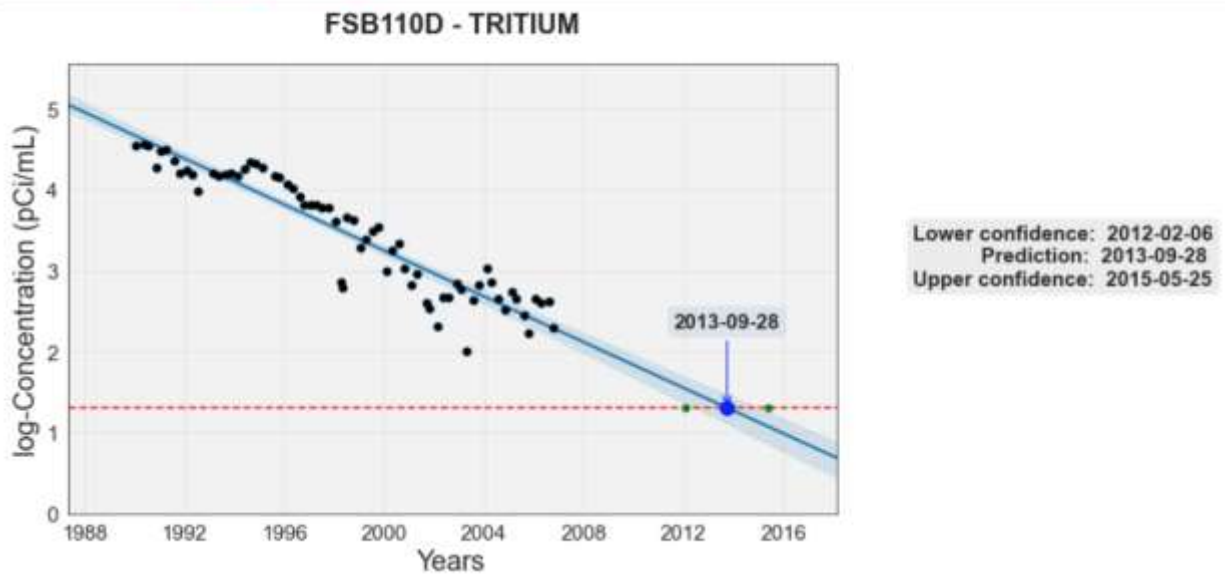


Figure C-1. Linear regression plot of tritium concentration.

- The function **plot\_correlation\_by\_date** plots the correlations with the physical plots as well as the correlation values of the important analytes for all the wells on a specified date.

```
plot_corr_by_date(data, '1993-02-21')
```

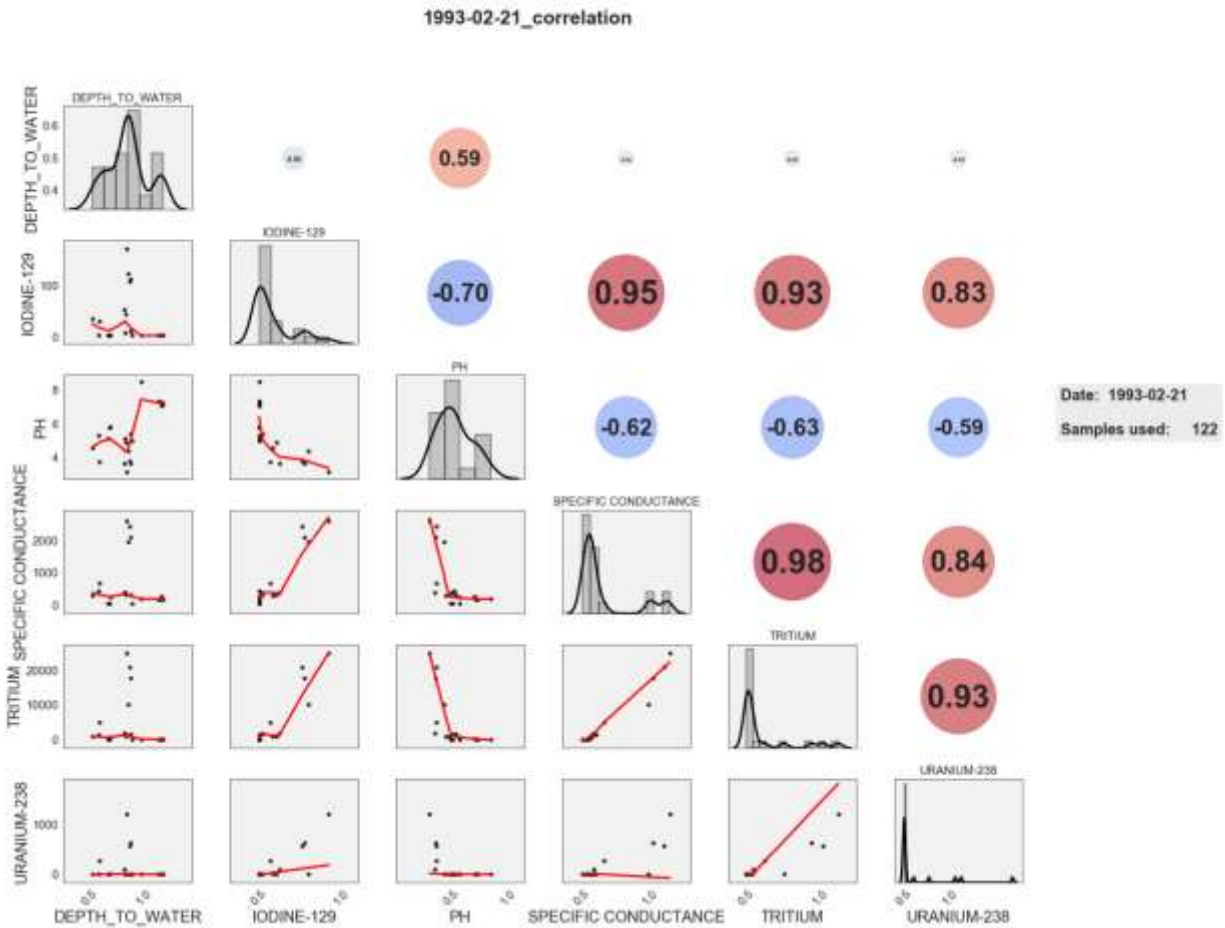


Figure C-2. Plotted correlational analysis results for a specified date.

This summer DOE Fellow Roger Boza participated in a remote internship at Idaho National Lab (INL). Under the mentorship of Ahmad Al Rashdan and Mike Griffel, Roger worked on a computer vision project focused on the implementation of Artificial Intelligence (AI) networks for image processing and object detection. The goal of the project is to get a quadcopter (drone) to navigate autonomously around a nuclear reactor facility. Since GPS navigation is not a viable solution, the drone relies on an AI network to detect quick response codes (QR codes) in its field of view for positional information and navigational decisions. The drone uses the QR codes to follow a flight path, like breadcrumbs, until it reaches its destination and reads information from sensors/gauges. This project will streamline the data collection procedure for sensors around the nuclear facility.

DOE Fellow, Gisselle Gutierrez-Zuniga, participated in a remote internship with the U.S. DOE Carlsbad Field Office under the mentorship of Dr. Anderson L. Ward, working on developing a web-accessible public database for meteorological data for the Waste Isolation Pilot Plant (WIPP) site. A major component is development of a Python program to automatically process archived data dating back to the 1970s, parse metadata, substitute NOAA data for missing data, and generate ASCII files of observations for storage. Gisselle will use this database to calculate statistics,



including normals and return intervals, which will be the basis of a Climatological Summary Report for WIPP, of which she will be a co-author.



**Figure C-3. Screenshot of the open-source program being used by DOE Fellow Gisselle Gutierrez for management, processing and visualization of data.**

DOE Fellow Jeff Natividad (Class of 2019) participated in a hybrid internship at Washington River Protection Solutions (WRPS) in Hanford, WA under the mentorship of Alexander Pappas. He worked on developing and validating semi-automated and automated robotic systems for use as part of a condition monitoring system. He also assisted the Chief Technology Office with daily activities involving maintenance, repair or modification of existing robotics equipment to suit the tasks given. Jeff developed experimental autonomous workflows and assisted in the development of automated instrumentation equipment. The process of maturing technologies, such as automated robotic routines, allows for the increase in safety and efficiency within the Hanford mission by reducing on-site exposure and allowing for the remote monitoring of key equipment and structures.

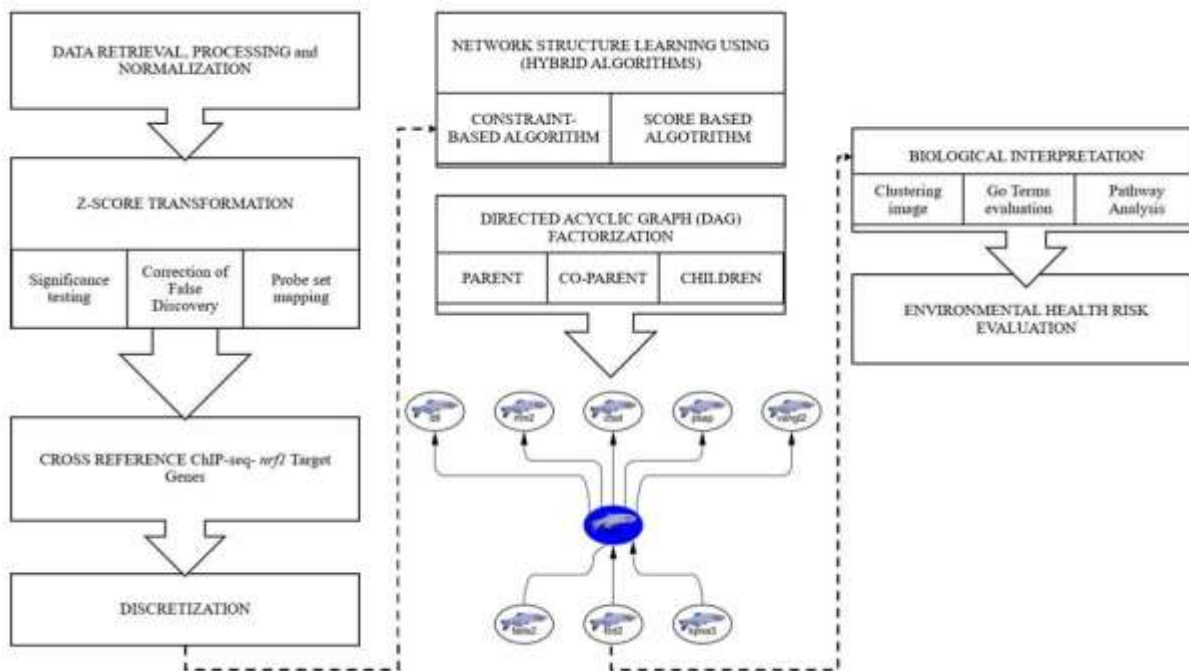


**Figure C-4. DOE Fellow Jeff Natividad working with robotic platforms at WRPS.**

DOE Fellow Michael Thompson (Class of 2019) participated in a hybrid internship at Idaho National Laboratory (INL) under the mentorship of Senior Research Scientist Ahmad Al Rashdan, working on flight control systems for autonomous indoor drones. The goal of the internship project was to automate routine security inspection and data collection from analog gauges to reduce the use of human labor for menial tasks, such as data logging. Michael worked on the control system implementation and drone autopilot code that will allow it to navigate indoors and in tight spaces by using image recognition of QR codes to determine its location instead of relying on GPS or other sensors. This will allow the technology to be easily implemented with commercially available drones without any special modifications as most already are equipped with cameras and have APIs for app development.

Juan Morales (DOE Fellow, Class of 2016) participated in a remote internship under the mentorship of Dr. Katrina Waters - Division Director for Biological Sciences at Pacific Northwest National Laboratory (PNNL). The objective of his research was to test a molecular framework measuring *nrf1* environmental stressor transcriptomic gene signatures in assessing the impact of heavy metals in surface waters. Notably, molecular indices to measure heavy metals in surface waters are currently unavailable. He was motivated to design a viable alternative to chemical testing using zebrafish transcriptomics for biomonitoring of aquatic environments. Juan learned

critical bioinformatic and machine learning skills to enable progress on his dissertation research. This included the ability to test his hypothesis and group a fate and transport model evaluating changes in hydrology, sediment transport and biological effects in the remediated surface waters of Tims Branch Watershed (TBW), Savannah River Site. This research has the potential to assist DOE-EM greatly and aid Environmental Monitoring/Risk Assessment applications.



**Figure C-5. Assessment of remediation of heavy metals in water through measuring nrfl environmental stressor transcriptomic gene signatures.**

DOE Fellow Edward Nina (Class of 2019) participated in a hybrid internship at WRPS. Under the mentorship of Jeremy Belsher, Edward worked on computational fluid dynamic modeling of several different projects. The objective of the project was to improve efficiency of these existing models as well as create new models for new projects. The modeling of a supernatant with diluted water as an inlet was examined, which uses a kappa-epsilon method with an automatic meshing. Local refinement was done to make a finer mesh around the walls and the turbulent region, while a more coarse mesh will be used for the bulk of the system. Other turbulent models such as kappa-epsilon and algebraic  $y^+$  were also examined in order to trade off computational efficiency with accuracy. These enhancements will improve both computational cost and time. In another project, Edward has been simulating the flushing procedure of internal pipe flow. The same methodology was used for this project, but the kappa-omega model was used due to the no-slip wall conditions.

DOE Fellow Christopher Excellent (Class of 2017) participated in a hybrid internship at INL. Under the mentorship of Steven E. Egan, Christopher worked on the Mobile Hot Cell (MHC) project that is being designed to support end of life radioactive sources by making the process faster and more efficient. The current processes that are in place to remove such sources are typically costly and time consuming. This project will utilize robotics and sensors, as opposed to the traditional manipulators used in mobile hot cells, to create a system that can be deployed rapidly, perform accurately, and complete tasks in minimal time through robotic automation. INL's

MHC project will also utilize cameras to remove the need for windows and all the requirements and procedures that come along with them, therefore adding to the efficiency of the MHC. Christopher contributed to this project by applying his robotics/mechatronics skills on various parts of the MHC project.