STUDENT SUMMER INTERNSHIP TECHNICAL REPORT

Contributing to the DOE EM 4.1 and 4.12, Office of Groundwater and Subsurface Closure

DOE-FIU SCIENCE & TECHNOLOGY
WORKFORCE DEVELOPMENT PROGRAM

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Principal Investigators:

Alexis Suarez (DOE Fellow Student)
Florida International University

Grover Chamberlain, Mentor
DOE - EM, Germantown Office

Florida International University:

Ravi Gudavalli Ph.D. Program Manager
Leonel Lagos Ph.D., PMP® Program Director

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FIU | Applied Research Center
FLORIDA INTERNATIONAL UNIVERSITY

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1. INTRODUCTION

Under the supervision of Mr. Grover Chamberlain, over the summer of 2019 Ms. Alexis Suarez had the privilege to work on several different projects at DOE EM HQ. These projects featured a wide array of different topics and end goals. One of the first projects goal was to collect and organize data at the ORNL about the current groundwater monitoring approaches being used. Collection of information about cost, contaminants in different areas and the daily operations of the ORNL enabled Ms. Suarez to contribute to exit strategy (moving from active treatment to passive treatment of the groundwater) of the DOE.

Another project Ms. Suarez involved enabled her to gather data, compile information and to create a return on investment index that qualifies long term monitoring of groundwater. The goal of the return on investment will be to eliminate 80-90% of current monitoring wells and save millions of dollars over the long term. In addition to the return on investment, a survey was created for distribution to project managers at all of the DOE sites. This survey helped up to better understand the unique concerns of the sites when considering a change in paradigm having to do with groundwater and develop the index.

During a trip to the SRNL site in Aiken, South Carolina, Ms. Suarez had an opportunity understand the daily operations and potential impacts of a change in paradigm for groundwater practices. Dr. Brian Looney gave a tour of the various facilities at the site which helped solidify the concepts that Ms. Suarez had been researching about in the weeks before the trip.

For the last two weeks of my internship, MS. Suarez focused on the policy work that is done by DOE-EM.

2. EXECUTIVE SUMMARY

This research work was supported by the DOE-FIU Science & Technology Workforce Initiative, an innovative program developed by the US Department of Energy's Environmental Management (DOE-EM) and Florida International University's Applied Research Center (FIU-ARC). During the summer of 2019, a DOE Fellow intern Alexis Suarez spent 8 weeks participating in a summer internship at DOE - EM Germantown office under the supervision and guidance of Grover (Skip) Chamberlain. The intern's project was initiated on June 17, 2019, and continued through August 13, 2019.

3. RESEARCH DESCRIPTION

3.1 Long Term Monitoring Project

Long term groundwater monitoring or active treatment of contaminants is a process which involves drilling wells near to an area of contaminated groundwater based on regulatory guidelines, and using those wells as an entry point to take samples. The samples are taken manually and then delivered to the national lab where scientists can monitor the concentrations of contaminants as well as the general movement of the contaminated groundwater beneath the surface. Many of these wells exist, scattered all over the nuclear sites. The monitoring wells are very expensive to maintain; and in many cases, the areas which they have been deployed to monitor have been cleaned and have had extremely low levels of contamination for many years.

The goal of the projects that have been distributed to the interns this summer is to gain better understanding of exactly how many wells exist as each site and which of these wells are providing valuable information to the site treatment procedures vs the ones that no longer serve a purpose. Information recorded over 20 years was reviewed to gather information about ORNL. Information about the most recent site operations that had been taking place over the past 5-10 years was reviewed. A spread sheet was created which featured all relevant information gathered about ORNL. This document included building cleanup and demolition, installation of new monitoring wells (to better sample plumes which move through the ground over time), and the steps being taken at ORNL to remediate old pipelines, pull them out of the ground and safely dispose of the materials. In addition to the processes being taken at ORNL to remediate the site, the price for these practices was also tracked. All of this information compiled into a single document, helps ones to gain perspective about the achievements being made at ORNL to remediate the aftermath of the Cold War.

The second phase of the long term monitoring project was to gain knowledge and formulate a plan for future remediation efforts (relative to monitoring) at the sites. An important element to consider when thinking about future scope for any given site is the feasibility and possibility for implementation at each unique site. To help understand the perspectives of the project managers at the individual sites, a survey was created and distributed at the Legacy Management field mangers meeting. The idea was to become better acquainted with the practices and expectations of the individuals who monitor the sites. Past surveys distributed to stakeholders and managers were utilized to draft the survey which was reviewed by Grover Chamberlain, Carol Eddy Dilek and the professionals at the Savannah River Site or SRS, we were able to finalize a survey that we hope came shed some light on the future changes in more efficient long term monitoring that can are achievable at individual sites.

The third phase of the long term monitoring project was to create a return on investment index document which would serve as a general guideline for project managers and professionals at certain sites. The ROI was created so that a person at any given site can look into the controlling variables that are present at their site and access potential technologies that can be implemented to address that concern. Technologies/approaches provided to by Grover and Carol were utilized to find parameters and controlling variables that could be monitored by new systems. Using the general knowledge of the contamination concerns and monitoring limitations that exist at each site, approaches were selected that would generally best suited for the sites regulated by DOE. Based on this information, the information, cost, and parameters needed for the technologies that are relevant to most of the DOE sites were compiled. This ROI can now serve as a general

guideline to the project managers who are interested in migrating to new contamination monitoring approaches.

The future scope of the long term monitoring project is for stakeholders and site professionals to have access to the information they need to make good decisions. With the past information of the sites, the expectations and current practices at the sites, and the available technologies that can be implemented, we are hoping to set into motion a shift in paradigm. This new paradigm with close the chapter on out of date, expensive, ineffective approaches for long term monitoring and lead the way for smarter approaches for monitoring the movements of contamination plumes in ground water at sites across the country.

3.2 SRNL Site Visit

The overall plan for the SRS visit was to review the long term monitoring plan and progress of the F area, discuss the project to determine the return on investment of the DGT probes and ROI for new long term monitoring approaches, discuss the survey that is to be distributed to site mangers across the country and to tour the facility. Participated in presentations given by the DOE employees that were familiar with the site. Dr. Brian Looney led a tour which enabled interns to travel within the SRS site and observe the technologies in action. Among the technologies and programs/processes discussed for remediation, the one that stood out to me the most is the natural forest approach used to remediate Tritium on the site. By taking advantage of the local topography and groundwater movement in SRS, scientists were able to map where the Tritium contaminated water would flow. Knowing where the water would flow, dams were set in place to collect the contaminated water in lower elevations areas or small valleys. The contaminated water that has accumulated is then pumped to an area of mixed pine and hardwood forest and used to irrigate the vegetation. The Tritium water is then transferred to the atmosphere via evaporation and evapotranspiration through the natural process. The area being irrigated spans 60 acres and has accomplished about 70% reduction in the flux of Tritium in groundwater on the SRS. In addition to removing the Tritium from the ground water, this approach has reduced the population dose of Tritium for the site workers as well as surrounding communities to a minimal amount.

This approach particularly interesting and exciting because it showcases the advantages that are available to engineering and scientists when incorporating the natural systems and processes into our efforts, in this case specific to remediation efforts.

3.3 Managing Projects Training

The Tools for Managing Projects training class was a very insightful presentation put together by Skip Pettit. During this training class topics such as project management realities, skills and tool for effective managers, the six scope models, and causes of project failure. Project management realities involve looking at a project as a potential to build the future, considering the 4 different types of workers (High Task, High Relationship for example) as well as the strategic issues involved when developing a project and a task force to work on it. Some of the skills and tools reviewed which are essential for good project management are leadership, creativity, ability to identify team strengths and weaknesses, and communication. One of the six scope models is process flow. In this scope model the work flow for a specific step of a project is laid out in a diagram; along with the fundamental or high level processes, the more detailed entities of the project are also illustrated. This approach helps one to clearly see the interactions and dependencies of each step on one another. Some of the causes of failed projects can be

inaccurately defined scope of work for a project, failure to identify weaknesses or boundaries within the project, and misuse of strategy.

3.4 Policy

The general framework of the policy system utilized by DOE has to do with the requirements of the NEPA or National Environmental Policy Act. There are four different types of NEPA reviews which include the environmental impact statement (EIS), Categorical Exclusion (CX), Environmental Assessment (EA) and Supplement Analysis (SA). Depending on the specifications of the proposed action, the project leaders are responsible for providing in-depth details regarding the long term and short term effects on the environment, alternative opportunities for the project and resource commitments. In addition to learning the fundamentals about environmental policy, Ms. Suarez was able to read through the specific report requirements and format which the NEPA reviews must be written and read through sample reports to help the policy team to make observations about a NEPA review that was submitted.

4. CONCLUSION

This internship experience provided Ms. Suarez an opportunity to improve professional skills that will facilitate her succeeded after graduation. During this internship Alexis was able to collect and organize data about the current groundwater monitoring approaches being used at the ORNL which allowed her to provide input for moving from active treatment to passive treatment of the groundwater. During the visit to SRS, Ms. Suarez was able discuss the project to determine the return on investment of DGT probes and ROI for new long term approaches. Overall, the internship allowed Ms. Suarez to gain more comprehensive knowledge and hands-on experience of what DOE-HQ does on a day-to-day basis, and insight into the complexities and time required for each process.