



# The DOE-FIU Science & Technology Workforce Development Initiative

An Innovative Program Developed for  
the U.S. Department of Energy's Office of  
Environmental Management

Presented by: Leonel E. Lagos, PhD, PMP®  
Program Director



01/22/09

# Evolution of FIU



- *~38,000 students*
- *Among the nation's 25 largest universities*
- *Multi-campus university on 579 acres*
- *124,000 + alumni*

# FIU's Minority Student Enrollment – 2006-2007

- Hispanics: 55% of BS enrollment, about eight times (8x) the national average of 7%
- Hispanics: 34% of MS enrollment, about six times (6x) the national average of 6%
- Hispanics: 15% of PhD enrollment, over seven times (7x) the national average of 2%
- Women: 28% of MS enrollment and 29% of PhD enrollment, compared to a 22% national average for both degree levels

# FIU's Applied Research Center

- The Center was established in 1995 by DOE Office of Science and Technology and Florida International University
- The Center has successfully completed over 200 projects for 14 DOE sites over 13 years.
- Currently ARC supports DOE-EM in the following main areas:
  - Soil/Groundwater (ORNL – mercury, Richland – uranium)
  - Waste Processing & Disposal (Hanford and SRS)
  - Decontamination & Decommissioning (D&D) - (ONRL, SRS, DOE-HQ)
  - Workforce Development (DOE Fellows Program)

# Current work for DOE-EM

- Waste Processing (EM – 21):
  - Testing and Evaluation of pipe unplugging technologies
  - Development of a Solid/Liquid Interface Monitor for underground HLW tanks
- Soil & Groundwater Research (EM-22):
  - Assist U.S. DOE-ORO in developing solutions to Hg contamination in soil, sediment and water
  - Modeling of Mercury Distribution in Soil and Groundwater in Support of the Oak Ridge Mercury Remediation Strategies
  - Quantitative Evaluation of Mercury Sources for Improved Analysis of TMDL Requirements
  - Effect of pH and Temperature on Carbonate Promoted Dissolution of Meta-autunite
  - Sorption Potential of Polyphosphates in Hanford Soil
- D&D (EM-23 & EM60):
  - Technology Demonstration & Evaluation in Support of EM-23's D&D Tool Box Program
  - Development of a Web Based Knowledge Management Information Tool
  - Waste Information & Forecasting Management Tool

# D&D Background

- “Innovative” Technology Evaluation & Verification Testing for D&D Lifecycle
- D&D Information repository – Knowledge Management & Information Tools
- Alternative Methods for Equipment & Facility D&D
- Size Reduction Technologies/Cutting tools (thermal, and mechanical tools), & Re-Engineering
- Technology Development and Deployment



# DOE-FIU Science & Technology Workforce Development Initiative



November 2008: Assistant Secretary for Environmental Management – Mr. Jim Rispoli

# Program's Vision & Mission

## Vision:

- Build upon FIU's long research relationship with the US Department of Energy (DOE) to create a “pipeline” of minority, STEM engineers and scientists.

## Mission:

- **Stimulate** greater numbers of minority students entering graduate level programs at FIU (Masters & PhDs) - STEM
- **Provide** top quality minority students with a unique opportunity for hands-on research and a career with DOE
- **Enhance** quality of student, faculty & staff by building R&D collaborations with scientists at DOE National Labs

# Program's Components

- Paid 10 week summer internships at DOE National Laboratories & Field Sites working under the supervision of DOE scientists (mentors)
- Paid 20 hours/week Student Research Assistantship at ARC during school year
- Research experience with ARC scientists and/or faculty at FIU during school year: one-on-one mentoring working on DOE related applied research
- Tuition waiver for graduate studies (Masters, PhDs)
- 2 to 4 years Developmental Training Program (depends on Master or PhD track)
- Monthly Technical Seminars
- Participation on conferences/workshops

# Academic Disciplines Sought

- Environmental Engineering
- Mechanical Engineering
- Electrical/ Computer Engineering
- Biomedical Engineering
- Industrial Engineering
- Civil/Structural Engineering
- Construction Engineering
- Environmental Sciences
- Physics/Chemistry/Math Majors

# Eligibility Requirements

- United States Citizens/ Permanent Resident Aliens
- Minimum 3.0 Grade Point Average
- Three letters of recommendation from faculty members
- Fill out Program's Application ([www.arc.fiu.edu/intern](http://www.arc.fiu.edu/intern))
- Open to Bachelor (Juniors and Seniors) and upper level students (Graduate students)
- Underrepresented minority students

# Recruiting Efforts



- Information booths are placed at FIU's College of Engineering lobby area and PR material (program's flyer and applications) are distributed to interested students (Fall 07, Spring 08, Fall 08)
- Participated in FIU's Technical Career Fair (2007)
- In all, over **710 interested STEM FIU students** signed up at the booths and requested additional information regarding this program
- All enlisted students were contacted and provided with an Application Package

# Recruiting Efforts

- **Fall 2007:** 300 students were enlisted, 41 application packages were received, 40 interviews were conducted, 20 DOE Fellows were selected (12 fully funded, 8 volunteers)
- **Spring 2008:** 200 students were enlisted, 23 applications packages were received, 15 interviews were conducted, 5 DOE Fellows were selected
- **Fall 2008:** 210 students were enlisted, 26 applications packages were received, 15 interviews were conducted, 8 students were selected

# Selection Process

## DOE Fellows Selection Committee:

- Dr. Norman Munroe (FIU-MME & ARC Technical Director)
  - Dr. Berrin Tansel (FIU-Civil/Env. Engineering Dept)
  - Dr. Chuck Nalezny (DOE-EM HQ)
  - Dr. David Roelant (DOE-FIU Coop Agreement PI)
  - Dr. Leonel E. Lagos (DOE Fellows Program Director)
- 
- Application Packages are reviewed by Selection Committee
  - Pre-selected students are called back for one-on-one interviews
  - After interviews, students are selected based on recommendation from Selection Committee
  - Students are officially hired by FIU
  - Students are inducted as DOE Fellows in a special ceremony conducted during Fall Semester (November timeframe)
  - Students are partnered with ARC scientists and/or FIU faculty engaged in DOE-EM applied research

# DOE Fellows Induction Ceremony



2007 Induction Ceremony – 20  
DOE Fellows Inducted



2008 Induction Ceremony -13  
DOE Fellows Inducted



# Environmental Remediation Efforts Around the DOE Complex



# High Level Waste at DOE Sites



# Decontamination & Decommissioning of radiological contaminated facilities



# Internships – Oak Ridge National Laboratory



**Summer 2007**



**Summer 2008**



**Fall 2008**

**8 DOE Fellows** have participated in internships ORNL under the HERE and SULI programs

## DOE Fellow - Amy Pahmer (Fall 2008)

DOE Site/Nat. Lab: Oak Ridge National Laboratory, Nuclear Science & Technology Division  
Title of Research: Coal-Bed Methane (CBM) Produced Water Treatment  
Mentors: Dr. Costas Tsouris and Dr. Joanna McFarlane

### Research Assignment:

Amy participated in the Ozonation and post-treatment analysis of produced water as one of the three alternatives proposed to help in the treatment of Coal-Bed Methane (CBM) produced water.

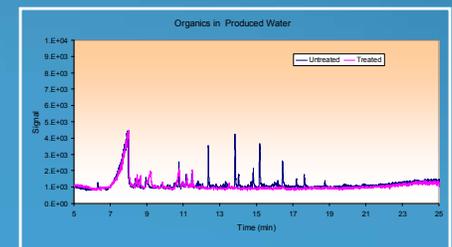
She also collaborated in the study of the kinetic of biodiesel production, and assisted with the commissioning of an Atomic Force Microscope.

Post-treatment lab analysis included:

- Organics Measurements
- Chloride ion analysis
- Carbonate/Bicarbonate measurements

### Accomplishments:

- Technical Internship Report
- Poster presentation at ORNL
- Student Poster Presentation at WM 09 conference



# DOE Fellow – Leydi Velez (Summer 2008)

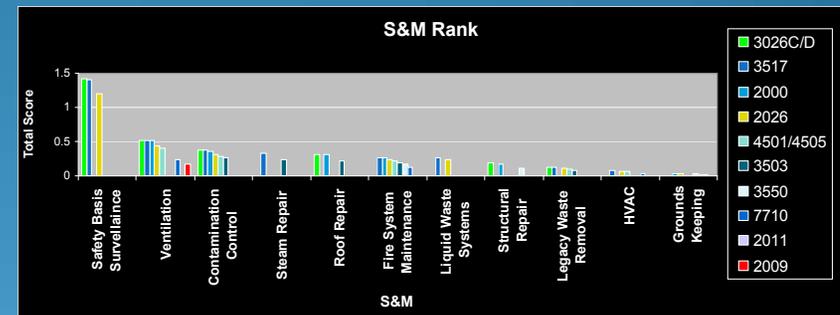
DOE Site/Nat. Lab: Oak Ridge National Laboratory, Nuclear Operations Directorate

Title of Research: *Decision Support Tool for Prioritization of Surveillance and Maintenance Funds across all Excess Facilities*

Mentors: Thomas B. Conley

## Research Assignment:

Leydi participated in the development of a decision support tool that would aid the U.S. Department of Energy (DOE) Environmental Management (EM) federal project directors and their contractors in prioritizing S&M investment across a site's excess facilities. Ms. Velez performed research on decision support methods and implemented the Analytical Hierarchy Process (AHP) in the development of this tool. With the help of her mentor and several subject matter experts at ORNL Ms. Velez tested the tool with 10 facilities from ORNL and prioritized them based on a set of defined risk criteria and S&M actions required by each one.



## Accomplishments:

- Technical Internship Report
- Poster presentation at ORNL
- Poster Presentation at WM 09 conference
- Continued working with ONRL after internship



# DOE Fellow – Jose Vasquez (Summer 2008)

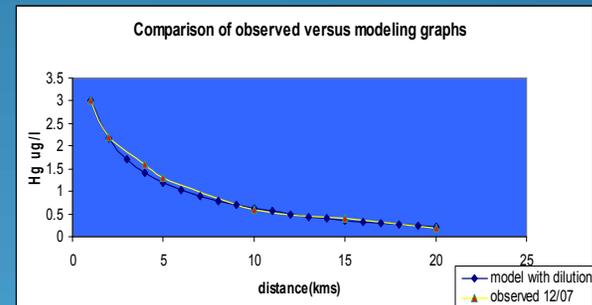
DOE Site: Oak Ridge National Laboratory, Environmental Sciences Division  
Title of Research: Chemical reduction and volatilization to remove mercury from East Fork Poplar Creek  
Mentor: Mr. George Southworth

## Research Assignment:

Jose participated in a 10 week internship collaborating in the project of removing mercury from EFPC in the Y-12 plant. He participated in the collection and lab analysis of samples from the creek and modeling the rate of volatilization of mercury in the creek after adding Stannous Chloride and air stripping into the samples. He also researched for other possible chemical reductor and he did a preliminary design of an air stripping system. He is currently doing his master thesis in Environmental Engineering in a related topic.

## Accomplishments:

- Technical Internship Report
- Poster presentation at ORNL
- Student Poster Presentation at WM 09 conference
- Masters thesis work



# DOE Fellow – William Mendez (Summer 2008)

DOE Site/Nat. Lab: Oak Ridge National Laboratory, Nuclear Science & Technology Division

Title of Research: Characterization of Contaminated Stacks at Nuclear Facilities

Mentors: Mark Noakes, Robotics and Energetic Systems Group ORNL

## Research Assignment:

William participated in the creation of a conceptual design of a mechanism specialized in the characterization of nuclear stacks. This conceptual design only included the kinematical aspect of it. In addition, He followed an investigation during the fall of the same year that consisted on a major survey of the stacks located at all DOE site as well as the current technology available for the matter of characterization purposes.

## Accomplishments:

- Technical Internship Report
- Poster presentation at ORNL
- Poster Presentation at WM 09 conference
- Continued working with ONRL after internship



# DOE Fellow – Danny Brenner (Summer 2008)

DOE Site/Nat. Lab: Oak Ridge National Laboratory, Measurement Science & Sysys Eng. Div.

Title of Research: Modification and Instrumentation of a Siemens *In Vitro* X-ray CT Scanner for Bioenergy Sample Characterization

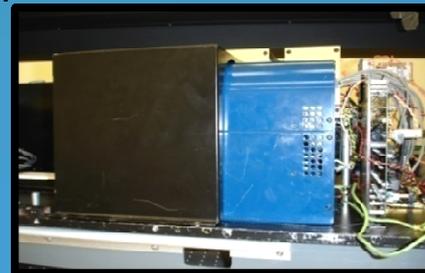
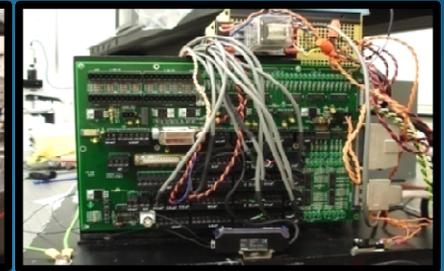
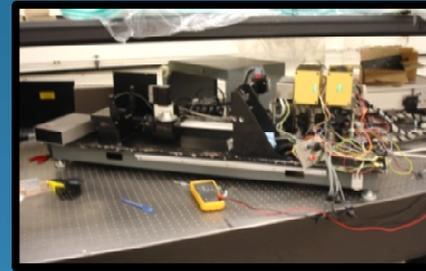
Mentors: Dr. Justin Baba

## Research Assignment:

Danny assisted in repair and troubleshooting of a micro Computed Axial Tomography CAT system. The unit was initially inoperable and finally reactivated. The work done consisted of installation of necessary system components, x-ray source and electronics. Wiring, circuit and interlock diagrams were also produced. The instrument has the capability to acquire images for volumetric microstructural characterization of herbaceous non-perennial plant matter. This information can be used to analyze the potential of different types of biomass feedstock for biofuels.

## Accomplishments:

- Technical Internship Report
- 2<sup>nd</sup> place DOE Fellows Poster Exhibition



# DOE Fellow – Henry Diaz (Summer 2008)

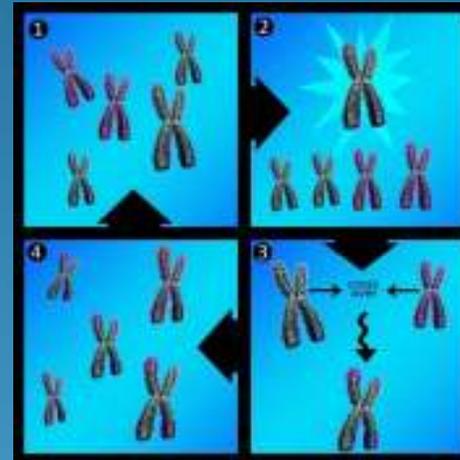
DOE Site/Nat. Lab: Oak Ridge National Laboratory,  
Computational Sciences and Engineering Division

Title of Research: Building and Employment of a GUI for a Stochastic Simulation and  
Optimization Tool Used to Study Cargo Inspection Protocols

Mentors: Dr. Glenn O. Allgood and Terri Rose

## Research Assignment:

Henry assisted in the research being conducted at ORNL for the Air Cargo Explosives Detection Pilot Program (ACEDP) created by the Department of Homeland Security. System was created to illustrate the economic and operational impacts on 100% screening of air cargo. Assisted in the analysis and optimization of a model simulating air cargo dynamics.



## Accomplishments:

- Technical Internship Report



# DOE Fellow – Giancarlo Pena (Summer 2007)

DOE Site/Nat. Lab: Oak Ridge National Laboratory, Nuclear Science & Technology Division  
Title of Research: Air Transport of Commercial Spent Nuclear Fuel (SNF) Assemblies  
Mentors: Dr. Jonathan Haire, Seokho Kim, Bryan Broadhead

## Research Assignment:

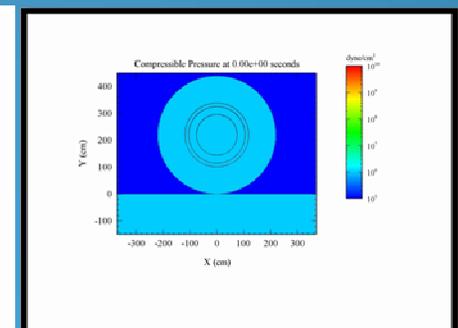
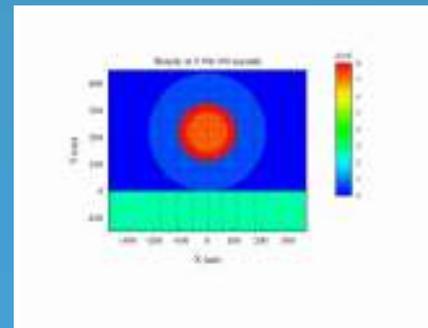
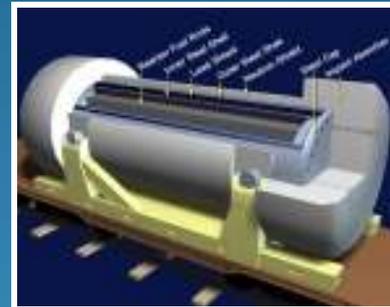
Giancarlo participated in the Development of a Spent Nuclear Fuel (SNF) Air Transport Cask. Shipment of spent fuel from reactors to permanent disposal site is an integral part of nuclear energy.

He was in charge of designing the canister and cask. Impact and shielding test were performed to make sure the transport cask was complying with the mandatory regulations.

The best aircraft was selected taking into consideration weight and payload capacity.

## Accomplishments:

- Technical Internship Report
- Poster presentation at ORNL
- Oral Presentation at WM 08 conference



# DOE Fellow – Ramón A. Colón (Summer 2007)

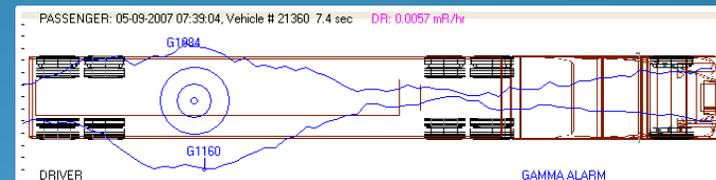
DOE Site/Nat. Lab: Oak Ridge National Laboratory, Comp. Sciences & Eng. Div.

Title of Research: Performance Analysis of the SensorNet's Southeastern Transportation Corridor Pilot Viewer Weigh Station

Mentors: Mr. David E. Hill

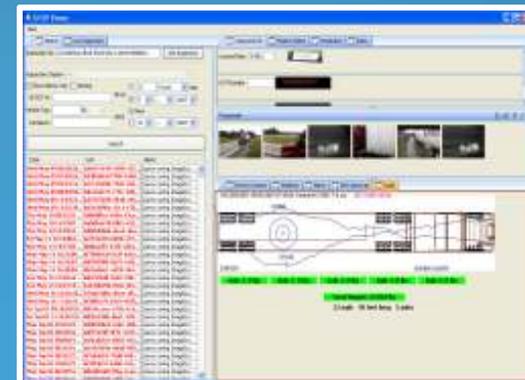
## Research Assignment:

Ramon analyzed the Southeastern Transportation Corridor Pilot (SETCP) viewer for inconsistencies. This system scan and identify the trucks driving through the weigh station without the aid of a trooper. Thanks to his work during the internship most inconsistencies were fixed and pattern of truck traffic were found.



## Accomplishments:

- Technical Internship Report
- Poster presentation at ORNL
- Oral Presentation at WM 08 conference



# Summer Internships – Idaho National Laboratory and DOE-HQ



Summer 2008



Summer 2008

## DOE Fellow – Denisse Aranda (Summer 2008)

DOE Site/Nat. Lab: Department of Energy Headquarters , Environmental Management

Title of Research: Internet Concept Development and Web Design for EM-20

Mentors: John DeGregory

### Research Assignment:

Denisse participated in the development of a webpage design for the DOE Office of Deactivation and Decommissioning/ Facility Management (EM-23). The Objective of this project was to engage the public through functional, user-friendly, and visually attractive WebPages. The revamping process used elements of WebDesign 101 such as:

- Design &Layout
- Personality & Functionality
- Reader Usability & Meeting expectations

### Accomplishments:

- Technical Internship Report
- 1<sup>st</sup> Place DOE Fellows Poster Exhibition
- Student Poster Presentation at WM 09 conference
- Continued working with DOE-HQ after internship



# DOE Fellow – Jose Rivera (Summer 2008)

DOE Site/Nat. Lab: Idaho National Lab (INL)

Title of Research: US DOE Pipeline Unplugging Requirements Development

Mentor: Mr. Rick Demmer

## Research Assignment:

Jose Rivera participated in the development of a criteria to reviewed the different unplugging technologies that are been tested for the DOE to treat the on-going problem of pipe plugging at High Level Waste tanks. With the assistance of mentor Rick Demmer and other professionals in the field the benefits and limitations of unplugging technologies like; NuVision and Aquimiser were evaluated.



Tank farm to process Spent Nuclear Waste at INL

## Accomplishments:

- Technical Internship Report
- Poster Presentation at WM 09 conference



# Summer Internships – Pacific Northwest National Laboratory



Summer 2007



Summer 2008

# DOE Fellow - Serkan Akar (Summer 2008)

DOE Site/Nat. Lab: Pacific Northwest National Laboratory

Title of Research: Automated Operation Control via Programmable Logic Controllers (PLC) for Pre-Engineering Platform (PEP) Prototype model of Waste Treatment Plant

Mentors: Dr. Gary Josephson and Sr. Eng. Joseph Tucker

## Research Assignment:

Serkan had an opportunity to participate in DOE Internship program during summer 2008 at Battelle, Richland, WA. The Scope of the experience was to develop an experimental lab based PLC control station and ensure the communication configurations as well as functions are same as the PEP model.

## Accomplishments:

- Technical Internship Report
- 3<sup>rd</sup> Place at DOE Fellows Poster Exhibition
- Student Poster Presentation at WM 09 conference



# DOE Fellow – Merlin Ngachin (Summer 2008)

DOE Site/Nat. Lab: Pacific Northwest National Laboratory, Energy & Environment Directorate  
Title of Research: External exposure of the U.S. population from terrestrial source of ionizing radiation  
Mentors: Dr. Daniel J. Strom

## Research Assignment:

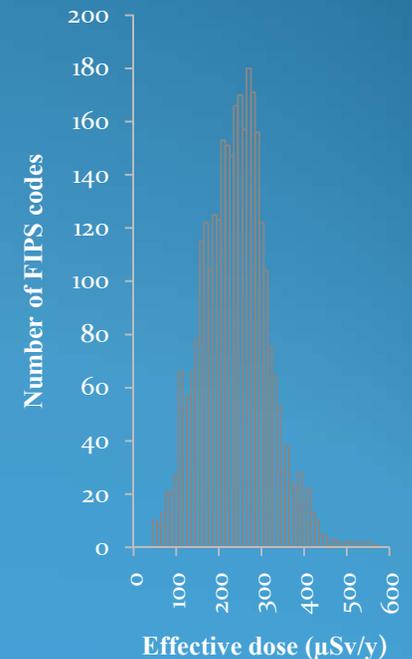
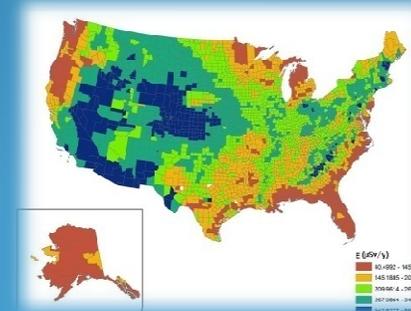
Merlin participated in a project to help determining the exposure of the United States population from terrestrial source of radiation.

He wrote and implemented Korn shell code and FORTRAN subroutines in order to determine radiation dose and distribution of primordial radionuclides such as Th-232 U-238 and K-40 in the soils of 3,102 counties, designated by their FIPS code.



## Accomplishments:

- Technical Internship Report
- 3<sup>rd</sup> Place at DOE Fellows Poster Exhibition
- Student Poster Presentation at WM 09 conference
- Paper presentation at the 54th Health Physics Society meeting



## DOE Fellow – Alex Henao (Summer 2008)

DOE Site/Nat. Lab: Pacific Northwest National Laboratory, Energy & Environment Directorate

Title of Research: Caustic Dissolution of Chromium in Underground Storage Tanks at Hanford

Mentors: Dr. Renee Russell

### Research Assignment:

Alexander participated on the dissolution of Chromium in underground storage tanks at the Hanford Site. Alex collected data and performed the experiment dealing with the concentration of Chromium in caustic solutions. He also created different solutions and mixtures need for the experiment. Finally he assisted on the calculations and modeling of the data obtained.



### Accomplishments:

- Technical Internship Report
- Student Poster Presentation at WM 09 conference

## DOE Fellow – Alex Henao (Summer 2007)

DOE Site/Nat. Lab: Pacific Northwest National Laboratory, Energy & Environment Directorate

Title of Research: Caustic Dissolution of Chromium in Underground Storage Tanks at Hanford

Mentors: Dr. Renee Russell

### Research Assignment:

Alexander participated in the development of a web-based system which will allow the D&D community to present problems related to their functional areas and receive solutions from subject matter specialist (SMS). All this work was done under the supervision of Larry Waggoner of the ALARA Center. The ALARA center presented the backbone of this project by supplying the data in their weekly reports. The ALARA biweekly reports gives an inside look at current activities and project dealing with D&D related issues.

### Accomplishments:

- Technical Internship Report
- Student Poster Presentation at WM 08 conference



# DOE Fellows Lecture Series – DOE-HQ's Yvette Collazo (Director, D&D & Facility Eng.)



# DOE Fellows Lecture Series – DOE-HQ's Diane Cochran (Deputy Assistant Secretary – Human Capital)



# DOE Fellows Poster Exhibition – Fall 08



# Participation at National Conferences



# Key Accomplishments

- Program established - March 2007
- A total of 710 students have been enlisted
- Received over **90 application** packages, **interviewed 70** potential candidates
- Selected **33 students** (20- Class of 2007 & 13 - Class of 2008)
- Conducted 1<sup>st</sup> Induction Ceremony (November 2007) - Ceremony attended by Mr. Mark Gilbertson (DAS EM20)
- Placed a total of 14 DOE Fellows as interns at DOE Nat. Lab & DOE sites:
  - Eight (8) DOE Fellows participated in summer and fall internships at ORNL under the Higher Education Research Experience (HERE)
  - Four (4) DOE Fellows were placed at Pacific Northwest National Laboratory (PNNL)
  - One (1) DOE Fellow was placed at Idaho National Laboratory (INL)
  - One (1) DOE Fellow worked at DOE-HQ during summer 2008

# Key Accomplishments

- Developed a dedicated program website [www.arc.fiu.edu/intern](http://www.arc.fiu.edu/intern)
- Integrated All 33 DOE Fellows into on going DOE applied research work at ARC:
  - 9 DOE Fellows working on D&D Technology Evaluations and Knowledge Management Tools (KM-IT and GET) supporting DOE-HQ and DOE sites across the Complex
  - 12 DOE Fellows working on Soil/groundwater related research, supporting Hanford and Oak Ridge
  - 12 DOE Fellows working on high level waste tank applied research, supporting Hanford and Savannah River sites

# Key Accomplishments

- Participated in Waste Management 2008 conference (Phoenix, Arizona), students had the opportunity to meet Mr. Jim Rispoli (Assistant Secretary – DOE-EM) and presented papers/posters
- Initiated the DOE Fellows Lecture Series on May 22, 2008. Ms. Yvette Collazo (Office of D&D & Facility Management EM23) was invited as guest speaker
- Completed 14 Summer Internship Technical Reports (Summer 08)
- Conducted the 2008 DOE Fellows Poster Exhibition/Competition (October 2008)
- Conducted the 2008 DOE Fellows Induction Ceremony (November 2008) – attended by Assistant Secretary for Environmental Management – Mr. Jim Rispoli
- Conducted 2<sup>nd</sup> DOE Fellows Lecture Series. Ms. Diane Cochran (DOE's Deputy Assistant Secretary for Human Capital) was invited as guest speaker (December 2008)

# Key Accomplishments

- 15 DOE Fellows will attend Waste Management Conference
- A total of 13 abstract/paper were submitted to Waste Management 2009
- A total of 13 posters will be presented by DOE Fellows at Waste Management 2009 in Phoenix AZ
- 15 DOE Fellows will participate in summer 2009 internship (ORNL, PNNL, Idaho National Lab, Savannah River National Lab, and DOE-HQ)
- A total of 10 DOE Fellows have started graduate school at FIU

# What's next

- **Four (2-4) DOE Fellows will start working with DOE contractor (Nuvision Engineering) – extending the pipeline**
- **Place DOE Fellows in DOE's Professional Development Corps**
- **Extend this program to other DOE offices**
  - **Office of Science**
  - **Office of Nuclear Energy**
- **Presentation to ORNL Global Nuclear Security Technology Energy Division & Nuclear Science & Technology Division – 01/22/09**
- **Meeting with ORISE at Oak Ridge for placement of summer 2009 interns and faculty research appointments**
- **Identify mentors at ORNL and other Nat. Lab and DOE sites**
- **Initiate monthly “brown bag lunch” tele-video conference with DOE-HQ**
- **17 DOE Fellows posters will be exhibit at DOE-HQ**

# Having Fun at Oak Ridge, Tennessee – Summer Interns



# Contact Information

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