

# DOE-FIU SCIENCE & TECHNOLOGY WORKFORCE DEVELOPMENT PROGRAM

## STUDENT SUMMER INTERNSHIP TECHNICAL REPORT

June 4, 2011 to August 12, 2011

### **U.S. Department of Energy Headquarters Environmental Management (EM-20) Office of Safety and Security Program**

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## **ABSTRACT**

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During the summer of 2011, DOE Fellow Sheidyn Ng was a part of an internship at the U.S. Department of Energy Headquarters in Washington, DC. This internship took place during a 10-week period from June 6 to August 12. She worked under the mentorship of Mr. Kenneth Pica, Office of Safety and Security Program. Sheidyn's role was to support the work of the Office of Environmental Management (EM) by aiding the safety and security programs through Integrated Safety Management. Sheidyn assisted in evaluating DOE contractors, attended the Nuclear Safety Workshop, and represented EM-20's mission at an EM-1 briefing meeting. These tasks included knowledge of standards assurance, operational safety, and quality assurance programs. In this report, an overview of Sheidyn's tasks throughout the internship will be given.

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# 1. INTRODUCTION

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The Environmental Management (EM) program was established in 1989 to address the nation's Cold War environmental legacy resulting from five decades of nuclear weapons production and government-sponsored nuclear energy research. While pursuing this mission, EM is committed to sound safety principles and will continue to maintain and demand the highest safety performance to protect workers and communities where EM cleanup activities occur. The Office of Environmental Management (EM) has an overall straightforward goal. This goal is to complete its cleanup mission in a safe, secure, and compliant manner and to do so within prescribed costs and schedules.

The Office of Safety and Security Program (EM-20) mission is to manage DOE EM-wide Integrated Safety Management implementation oversight activities. Other aspects of EM-20's objectives include keeping in touch with the Defense Nuclear Facilities Safety Board (DNFSB) recommendations and specific issues as well as overseeing safety and security programs while upholding standards assurance for major project planning and execution. In order for everyday work to be safe for the workers in the field, different approaches are taken. These include operational safety and awareness programs for the personnel on site. Throughout all operations, DOE EM-20 maintains their set "Safety Strategy" as listed below:

- Safety excellence and breakthrough
- Continuous improvement
- Management commitment and worker participation
- Increased safety oversight of new contractors

Therefore, even when striving for innovation and productivity, EM's highest priority is safety. This has been proven through an excellent DOE EM safety record. Analyzing data from the DOE Total Recordable Case (TRC) and Days Away, Restricted or on Job Transfer (DART) case rates are significantly better than Department of Labor reported performance for the comparable industry (construction and waste disposal), despite the hazardous nature of EM program work. The EM complex has received over a hundred state, regional, or national level safety awards or recognitions for sustained safety performance, excellence in safety program implementation, and employee involvement in safety program activity since 2004.

EM's approach to safety is not limited to achieving good safety statistics. A completely integrated approach to safety is wanted for the Department. A key factor in achieving an improved safety performance is to identify the opportunities and take actions to continuously improve workplace safety. These opportunities can include the day to day workforce and the EM Headquarters management of the sites through rules and regulations. For that matter, there are challenges that arise with optimizing safety, which include the following:

- Integrated work planning and control

- Timely feedback and effective lessons learned
- Sustaining safety culture through multiple contract transitions

EM will overcome these challenges by improving human performance, implementing effective work planning and control, and providing constructive feedback.

## **2. EXECUTIVE SUMMARY**

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This research work has been 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 2011, a DOE Fellow intern (Sheidyn Ng) spent 10 weeks doing a summer internship at U.S Department of Energy Headquarters under the supervision and guidance of Kenneth Picha. The intern's project was initiated in June 4, 2011, and continued through August 12, 2011, with the objective of assisting the Office of Safety and Security Program.



### 3. RESEARCH DESCRIPTIONS

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Because of the sensitivity of the work being done at the DOE sites around the United States, safety management is of vital importance to the department. For that matter, the functions and outputs of EM-20 must be able to meet the needs of the workers. The mission of the Office of Safety and Security Program (EM-20) includes managing the safeguards and security and emergency management activities for EM. The mission also includes serving as the senior executive official and focal point for providing day-to-day safety operational oversight, feedback, interface and direction to the EM field/operations offices. The DAS represents EM in frequent interfaces with the Defense Nuclear Facilities Safety Board and its senior staff of the Chief of Nuclear Safety for the Under Secretary. The DAS oversees startup/restart of nuclear facilities and Operational Readiness Reviews.

Sheidyn was able to work, under the supervision of Mr. Kenneth Picha, towards improving the understanding of how DOE contractors assessed safety in three sites around the nation. Also, she was able to attend a Nuclear Safety Workshop in order to further understand the preliminary lessons learned from the Fukushima Daiichi. Finally, she was able to participate in the completion of tasks, which included analyzing travel assignments and DOE contractor data.

## 4. RESULTS AND ANALYSIS

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### 4.1 Nuclear Safety Workshop

On June 6<sup>th</sup> and 7<sup>th</sup>, Sheidyn attended the Nuclear Safety Workshop in Crystal City in Washington, D.C. This workshop was targeted to discuss the preliminary lessons learned from Fukushima Daiichi. On March 11, 2011, the Fukushima Daiichi in Japan suffered substantial damage from a major earthquake and subsequent tsunami. Subsequent nuclear events included a series of equipment failures, nuclear meltdowns, and releases of radioactive materials. These events adversely affected the surrounding area and residents. As a result, the Nuclear Safety Workshop was dedicated to discussing the timeline of the Fukushima Daiichi disaster and the lessons learned from a safety and security perspective.

The following organizations collaborated in the two-day workshop:

- U.S. Department of Energy
- Nuclear Regulatory Commission
- Environmental Protection Agency
- Defense Nuclear Facilities Safety Board
- National Nuclear Security Administration
- Department of Homeland Security
- Institute of Nuclear Power Operations

The workshop was divided into three different topics:

- DOE Evaluation of/Design for Beyond Design Basis Events (BDBEs)
- Natural Phenomena Hazards
- Emergency Management

One of the sessions included smaller groups of professionals discussing a common understanding of the variations of BDBEs and how they are defined, evaluated, used, and controlled. Sheidyn participated in this breakout session. Specific questions that arose during this session included:

- What outcome or measure of effectiveness is expected of controls established to address Design Basis Events?
- What outcome or measure of effectiveness should be expected of controls established to address Beyond Design Events (BDBEs)?
- What are the reasons for classifying some events as Beyond Design Basis Events instead of Design Basis Events?
- What are the reasons to dismiss (i.e. not analyze) a BDBE, and is there an upper limit, what is that basis?
- What are the reasons not to establish controls for BDBEs that have been analyzed and, if unmitigated, could result in significant consequences?
- Assuming you create a list of BDBEs to be analyzed, to what extent should they be analyzed and how should the rigor of analysis be graded?

These questions were addressed for the safety and security of each of the participating agencies. These questions were used as leverage and the Fukushima Daiichii event was also analyzed. The topics covered in the workshop were discussed in order to gain insight from the best field experts to mitigate the repercussions from any type of natural disaster that may happen in the U.S.

#### **4.2 Leading Indicators of Safety Performance in Sites**

Sheidyn assisted in the analysis of DOE contractors' safety and security programs data. DOE contractors use a large number of different metrics to track and trend the performance of a site in the various focus areas. These indicators can be categorized as either leading or lagging indicators. The leading indicators allow the management team to detect an adverse trend in the culture or behavior of the workforce that if left unchecked may lead to an adverse trend in safety, security, conduct, disciplined operations, overall equipment readiness, work execution, or overall project cost.

Over the years, the safety and conduct of operations of the nuclear facilities has continued to improve. This improving trend is a direct result of the management use of metrics that are ever changing and evolving to highlight areas that are in need of improvement. In order to continue this overall improving trend, we must continue to be critical of ourselves and work toward deploying tactics that will sustain our performance. We must also continuously look for new areas for improvement and always be willing to move our focus to the next troubled area.

For this specific task, Sheidyn provided input for the common leading indicators from three different DOE contractors:

- Savannah River Nuclear Solutions for Savannah River Site
- Savannah River Remediation for Savannah River Site
- CH2M HILL Plateau Remediation Company for the Hanford Site

Between the DOE contractors, there is a great amount of data supplied that each contractor gathers for their own analysis. Some of the different methods to measure safety and security programs include the following:

- Radiological Protection
- Occupational Illness & Injury
- Medical Surveillance
- Conduct of Operations
- Work Management
- Fire Protection
- Vehicle Safety
- Training by Personnel
- Number Spill/Leaks

Sheidyn created a table which included the different indicators and the three DOE contractors being analyzed, which is shown in Table 1.

**Table 1. Common Leading Indicators**

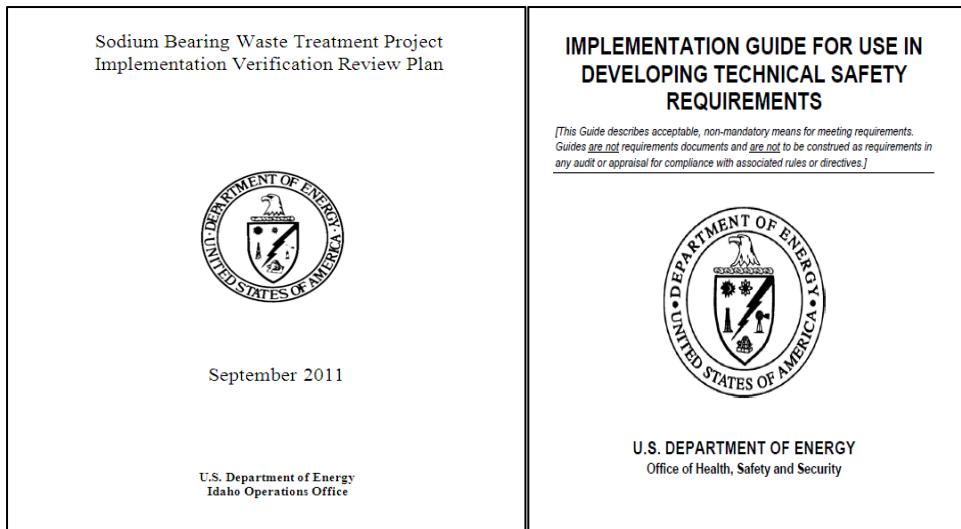
	Leading Indicators	CHPRC- Hanford	SRR- Savannah River Site	SRNS- Savannah River Site
Safety and Protection	Unplanned Radiation Dose/Uptakes	x		
	ECF near misses			x
	Radiological Survey Records	x		
	Medical Appointment Attendance	x		
	BBS Participation-"Just Culture"	x		x
Hazardous Material	Process Compliance	x		
	DART Rate	x		
	Hazard Contact	x		
	Below Threshold Events	x	x	
	TRC Rate	x		
	TSR Violations	x		x
Liquid Waste Operations	Number of Containments		x	
	Environmental Spills	x		
Conduct of Operations	Number of ORPS Events			x
	Number of Caution Tags Open		x	x
	MFO and Assessments		x	x
	Occurrence Reporting	x		
Disciplined Operations	TSR and PM Maintenance		x	x
	Nonconformance Reports (NCR's)		x	
	Backlog Maintenance			x
	Total Base Labor Hours		x	
Equipment Readiness/Emergency Preparedness	Number of Active Condition Tags		x	
	Temp Mods Open		x	
	Training Attendance/Hours/Grade Performance		x	x
	Leak Collection Devices		x	
	EP Drill Performance	x		x
	Drill Conduct	x		

The table illustrates the common leading indicators between the different DOE contractors. The importance of the common leading indicators is for DOE to be able to track the safety improvement progress of the contractors. They are also able to see how different sites are being analyzed and points in which they can improve on.

**4.3 Implementation Review Plan**

DOE invests a lot of resources into developing new technologies to solve the nation’s problems. DOE EM is interested in a wide range of critical activities including managing the design, construction, operation, and eventual disposition of mission critical projects/facilities. A key corporate function that all EM-headquarters (HQ) organizations have in common is the collective responsibility to ensure that the necessary quality requirements, expectations, and standards are properly identified and implemented in the HQ activities.

It is vital to maintain open communication between the field site and HQ personnel in order to efficiently work toward the same common goal. Sheidyn performed an important role in the Sodium Bearing Waste Treatment Project. Her role included analyzing the Implementation Verification Review Plan of the facility. While doing so, she cross-checked the review plan with DOE G 423.1-1A. The Implementation Verification Review Plan is made for the facility prior to opening and commencing work.



**Figure 1. Implementation Review Plan for Sodium Bearing Facility and DOE Guidance for Technical Requirements.**

Though DOE G 423.1-1A is not a requirement for facilities, it is seen as a guidance document for DOE sites to use. The analysis of these two documents was done in order for DOE to determine the following before the facility is opened:

- Technical Safety Requirements
- Conditions of Approval
- Operation Orders
- Operations & Maintenance Procedures
- Shift Orders
- Drawings and other Design Documents
- Surveillance Requirements Matrix
- Training Documents

## 5. CONCLUSION

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DOE Office of Environmental Management will always uphold safety as one of the priorities in the workforce. Sheidyn experienced the importance of the Office of Safety and Security Program during her Summer 2011 DOE HQ internship under the supervision of Mr. Kenneth Picha. She was able to take part in several tasks that included risk assessment and quality assurance of the safety and security of sites around the nation. Using her expertise in science and business, she was able to make a positive impact through her assignments in the department. This allowed EM-20 to execute their work smoothly, while providing Sheidyn with a great learning experience.

In her 10 weeks of internship, Sheidyn attended the Nuclear Safety Workshop, participated in analyzing DOE contractor's safety assessments, organized the upcoming travel assignments for the department, cross-checked an Implementation Review Plan for the Idaho Sodium Bearing Facility, and compiled a EM-1 Briefing Book for informational purposes. Through these tasks, the 2011 Summer DOE HQ internship was a success in both exposing the DOE Fellow to possible DOE opportunities and in allowing her to grow and learn through the work experience with such a prestigious department.

## 6. REFERENCES

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