UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 24, 2014

Dr. Pao-Chiang Yuan
Jackson State University
1400 Lynch Street
Jackson, Mississippi 39217

VIA Electronic Mail:
Pao-chiang.yuan@jsums.edu

SUBJCT: GRANT NO: NRC-HQ-84-14-G-0066

Dear Dr Yuan:

Pursuant to the authority contained in the Federal Grant and Cooperative Grantee Act of 1977 and the Atomic Energy Act of 1954, the Nuclear Regulatory Commission (NRC) hereby awards to Jackson State University (hereinafter referred to as the "Grantee" or "Recipient"), the sum of $199,726.00 to provide support for " JAM Curriculum Development Alliance".

This award is effective as of the date of this letter and shall apply to expenditures made by the Grantee furtherance of program objectives during the period beginning with the effective date of September 30, 2014 and ending September 29, 2016.

This award is made to the Recipient on condition that the funds will be administered in accordance with the terms and conditions as set forth in Attachment A (the Schedule); Attachment B (the Program Description); and Attachment C (the Standard Provisions); all of which have been agreed to by your organization.

Please ensure individuals selected as beneficiaries of support under this grant meet the legal requirements consistent with recent Supreme Court Decisions including *Fisher, Gratz, and Grutter.*

Please sign the enclosed grant to acknowledge your receipt of the award, and return as a pdf file to Mr. Daniel App by email at Daniel.App@nrc.gov.

Sincerely yours,

Sheila Bumpass

Sheila Bumpass
Grants Officer
Acquisition Management Division

Attachments:
Attachment A – Schedule
Attachment B – Program Description
Attachment C – Standard Terms and Conditions

Grant and Cooperative Agreement

CHOOSE ONE:
- ☐ COOPERATIVE AGREEMENT
- ☒ GRANT

CHOOSE ONE: ☒ EDUCATION ☐ FACILITIES ☐ RESEARCH ☐ SDCR ☐ TRAINING

1. GRANT/COOPERATIVE AGREEMENT NUMBER	2. SUPPLEMENT NUMBER	3. EFFECTIVE DATE	4. COMPLETION DATE
NRC-HQ-84-14-G-0066		09/30/2014	

5. ISSUED TO
NAME/ADDRESS OF RECIPIENT (No., Street, City/County, State, Zip)
JSU
1400 J R LYNCH ST STE 206
JACKSON MS 392170002

6. ISSUED BY U.S. NRC - HQ
Mailing Address: Acquisition Management Division
Mail Stop: 3WFN-05-C64MP
Washington DC 20555-0001

7. TAXPAYER IDENTIFICATION NO. (TIN)

8. COMMERCIAL & GOVERNMENT ENTITY (CAGE) NO.

9. PRINCIPAL INVESTIGATOR/ORGANIZATION'S PROJECT OR PROGRAM MGR. (*Name & Phone*)
Dr. Pao-Chiang Yuan
Email:Pao-Chiang.Yuan@jsums.edu Phone:601-979-2489

10. RESEARCH, PROJECT OR PROGRAM TITLE
JAM Curriculum Development Alliance

11. PURPOSE
See Schedule

12. PERIOD OF PERFORMANCE (*Approximately*)
09/30/2014 through 09/29/2016

13A.	AWARD HISTORY	13B.	FUNDING HISTORY
PREVIOUS	$0.00	PREVIOUS	$0.00
THIS ACTION	$199,726.00	THIS ACTION	$199,726.00
CASH SHARE	$0.00	**TOTAL**	$199,726.00
NON-CASH SHARE	$0.00		
RECIPIENT SHARE	$0.00		
TOTAL	$199,726.00		

14. ACCOUNTING AND APPROPRIATION DATA
2014-X0200-FEEBASED-84-84D002-51-K-134-T8453-4110

PURCHASE REQUEST NO.	JOB ORDER NO.	AMOUNT	STATUS
OCHCO-14-0294			

15. POINTS OF CONTACT

	NAME	MAIL STOP	TELEPHONE	E-MAIL ADDRESS
TECHNICAL OFFICER	TANYA L. PARWANI-JAIMES		301-287-0730	Tanya.Parwani-Jaimes@nrc.gov
NEGOTIATOR				
ADMINISTRATOR	DANIEL APP		301-287-0939	Daniel.App@nrc.gov
PAYMENTS				

16. THIS AWARD IS MADE UNDER THE AUTHORITY OF :
Pursuant to Section 31B and 141B of the Atomic Energy Act of 1954, as amended

17. APPLICABLE STATEMENT(S), IF CHECKED:
- ☐ NO CHANGE IS MADE TO EXISTING PROVISIONS
- ☐ FDP TERMS AND CONDITIONS AND THE AGENCY-SPECIFIC REQUIREMENTS APPLY TO THIS GRANT

18. APPLICABLE ENCLOSURE(S), IF CHECKED:
- ☐ PROVISIONS ☐ SPECIAL CONDITIONS
- ☐ REQUIRED PUBLICATIONS AND REPORTS

UNITED STATES OF AMERICA		COOPERATIVE AGREEMENT RECIPIENT	
CONTRACTING/GRANT OFFICER	DATE	AUTHORIZED REPRESENTATIVE	DATE
SHEILA H. BUMPASS Sheila Bumpass	09/24/2014		

Grant and Cooperative Agreement

ITEM NO. (A)	ITEM OR SERVICE (Include Specifications and Special Instructions) (B)	QUANTITY (C)	UNIT (D)	ESTIMATED COST	
				UNIT PRICE (E)	AMOUNT (F)
	CFDA Number: 77.006 Application for Payment (ASAP.gov) unless the receipient has failed to comply with the program objectives, award conditions, Federal reporting requirements or other conditions specified in 2 CFR 215 (OBM Circular A110). Delivery: 09/30/2016 Delivery Location Code: NRCHQ US NUCLEAR REGULATORY COMMISSION- MAIL PROCESSING CENTER 4930 BOILING BROOK PARKWAY ROCKVILLE MD 20852 USA Payment: ASAP GRANT FUNDS REIMBURSEMENT SYS US TREASURY Period of Performance: 09/30/2014 to 09/29/2016				

ATTACHMENT A - SCHEDULE

A.1 PURPOSE OF GRANT

The purpose of this Grant is to provide support to the "JAM Curriculum Development Alliance" as described in Attachment B entitled "Program Description."

A.2 PERIOD OF GRANT

1. The effective date of this Grant is September 30, 2014. The estimated completion date of this Grant is September 29, 2016.

2. Funds obligated hereunder are available for program expenditures for the estimated period: September 30, 2014 – September 29, 2016.

A. GENERAL

1. Total Estimated NRC Amount:	$199,726.00
2. Total Obligated Amount:	$199,726.00
3. Activity Title:	JAM Curriculum Development Alliance
4. NRC Project Officer:	Tanya Parwani - Jaimes
5. DUNS No.:	044507085

A.3 BUDGET

Revisions to the budget shall be made in accordance with Revision of Grant Budget in accordance with 2 CFR 215.25.

	Year 1	Year 2
Personnel	$ 15,800.00	$ 15,700.00
Fringe	$ 5,056.00	$ 5,024.00
Travel	$ 1,100.00	$ 3,600.00
Equipment	$ 42,790.00	$ 0.00
Supplies	$ 3,000.00	$ 2,500.00
Contractual	$ 20,689.00	$ 20,689.00
Other Direct Costs	$ 7,600.00	$ 6,600.00
Total Direct Cost	$ 96,035.00	$ 54,113.00
Indirect Cost	$ 24,574.00	$ 25,004.00
Total	$ 120,609.00	$ 79,717.00

All travel must be in accordance with Jackson State University Travel Regulations or the US Government Travel Policy absent Grantee's travel regulation.

A.4 AMOUNT OF AWARD AND PAYMENT PROCEDURES

1. The total estimated amount of this Award is $199,726.00 for the two year period.

2. NRC hereby obligates the amount of $199,726.00 for program expenditures during the period set forth above and in support of the Budget above. The Grantee will be given written notice by the Grants Officer when additional funds will be added. NRC is not obligated to reimburse the Grantee for the expenditure of amounts in excess of the total obligated amount.

3. Payment shall be made to the Grantee in accordance with procedures set forth in the Automated Standard Application For Payments (ASAP) Procedures set forth below.

Attachment B – Program Description

PROGRAM DESCRIPTION

Project Title: *JAM Curriculum Development Alliance*

1. MOTIVATION

The U.S. Nuclear Regulatory Commission (NRC) recently published a report entitled "Recommendations for Enhancing Reactor Safety in the 21st Century – The Near-Term Task Force Review of Insights from the Fukushima Daiichi Accident" [1]. The task force was established in response to Commission direction to conduct a systematic and methodical review of NRC processes and regulations. It is responsible for determining whether the agency should make additional improvements to its regulatory system and for making recommendations to the Commission for its policy direction, in light of the incident at the Fukushima Daiichi nuclear power plant in Japan.

The Task force makes the following overarching recommendations: a) Clarifying the Regulatory Framework, b) Ensuring Protection, c) Enhancing Mitigation, d) Strengthening Emergency Preparedness, and e) Improving the Efficiency of NRC programs. The report is geared towards policy makers and professionals in nuclear industry. The recommendation clearly states that it is necessary to clarify the regulation and strengthen the emergency preparedness areas which include decision making, radiation monitoring, and public education.

We feel that there is a need to educate more science and technology students on the basics of nuclear industry and facilities. Regarding nuclear safety, the focus should not only be on nuclear reactor design, operator training, and on-site emergency preparedness, but also on outside plant boundary.

2. PROJECT SUMMARY

This proposed project is a cooperative effort of Jackson State University (JSU), Alcorn State University (ASU), and Mississippi Valley State University (MVSU). JSU, ASU, and MVSU are ***predominantly minority***-serving ***institutions. These three universities comprise the Jackson State, Alcorn State and Mississippi Valley State Curriculum Development Alliance (JAM CDA).*** These efforts will promote and encourage undergraduate and graduate students to pursue careers in the nuclear field as well as ensure that they will have the set of skills needed in the future workplace. To effectively train students, the program is comprised of three inter-related components that foster academics and professionalism. The components are:

1. Nuclear related course development
2. New ***instructional strategies*** and student mentoring
3. Partnerships

The enhanced programs will meet the increased student and local communities' demands as well as accommodate more diverse participants. In doing so, it will:

1. Expand curriculum options for undergraduate and graduate students by introducing new courses focused on nuclear/radiological areas.
2. Increase the number of minority students pursuing a career in the nuclear or ***related industries***.
3. Establish partnerships with industry and government.
4. Provide the means for a wider audience participation via the on-line and hybrid modes of instruction delivery

The project team includes Drs. P.C. Yuan, HR Shih, and John Colonias from JSU, Dr. Voletta Williams (ASU), and Dr. Louis Hall (MVSU). The partnership among these three universities can improve nuclear related education in Mississippi.

3. EMERGENCY MANAGEMENT TECHNOLOGY PROGRAM AT JSU

As natural and man-made disasters pose greater risks to communities, the demand for skilled professionals who can manage and mitigate their effects continues to grow. During the Spring of 2010, JSU's Technology Department was selected to receive a grant from the US Department of Homeland Security (DHS) to establish an Emergency Management Technology (EMT) program and to provide a number of scholarships to outstanding undergraduate students. The EMT program offers students a combination of homeland security related science, technology, engineering and mathematics (HS-STEM) coursework, skill-development activities, experiential research opportunities, and efforts that connect students to internships and employment in homeland security and first responder disciplines. The EMT program strives to prepare the next generation of emergency management professionals with the knowledge and skills they need to improve outcomes in disasters of all types.

In September of 2011, the Department of Technology received additional funding from DHS under the HS-STEM Career Development Grant Program. That funding has allowed JSU to offer full-tuition scholarships to five academically talented students.

A bachelor degree with a concentration in Emergency Management Technology requires the successful completion of 124 credits of coursework. Students are required to complete the university's 43-hour Liberal Studies component. Other program requirements, outside the major department, supplement the major with additional math and science courses that will enhance the student's success in the major and in practice. Those requirements include Trigonometry, Calculus, Biology, Chemistry, and Physics.

Nuclear disaster in Japan led to serious concerns related to the contamination in public domain. Nuclear emergencies can arise due to factors beyond the control of the operating facilities. However, through certain pre-planned and established structural and non-structural measures, various stakeholders can still manage such emergencies to minimize risks to health, life, and the environment. The EMT program needs to train its students to not only be emergency management and preparedness professionals who protect the general public from any potential nuclear/***radiological*** incidents, but to also be radiation protection specialists who work at nuclear facilities.

4. HAZARDOUS MATERIALS MANAGEMENT PROGRAM AT JSU

The Master of Hazardous Materials Management (HMM) Degree Program under the Department of Technology was approved by the Mississippi Institute of Higher Learning in 1995. The program is mainly designed to teach students to deal with hazardous materials, hazardous waste, transportation of toxic/hazardous materials and wastes, occupational safety, and

environmental protection areas. The Hazardous Materials Management program integrates science and technology disciplines. This multidisciplinary program has attracted not only students across JSU campus and students from several colleges but also students from foreign countries. HMM program can provide students with a solid foundation in the principles, regulations, and technologies required to manage hazardous materials and hazardous waste. Its graduates have the skills and knowledge to coordinate and manage major hazardous material/waste projects and programs.

The Hazardous Materials Management program has very successful student placement records. Many of its graduates currently work at FEMA, Mississippi Emergency Management Agency (MEMA), Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), Department of Energy (DOE), private sector, etc.

The HMM program can not only be concentrated in the area of hazardous materials but can also be combined with the areas critical to the Nuclear Regulatory Commission. We will make additional changes to meet those needs and to well prepare our students to take a variety of nuclear technology related positions. The NRC grant can help us attain our goals and help students pursue professions pertaining to ***radioactive waste management***, nuclear safety, and associated environmental protection.

5. PROGRAMS COLLABORATION

Nuclear technology, emergency management, and hazardous materials management encompass a wide range of activities and are a ***multi-disciplinary*** endeavor. Faculty and programs collaboration is becoming increasingly necessary in the preparation of the future workforce. To further enhance programs, the Department of Technology at JSU made efforts to collaborate with other academic disciplines. The proposed project will be operated in cooperation with faculty from the Biological Sciences and Environmental Health Departments at Alcorn State University and Mississippi Valley State University, respectively.

Mississippi Valley State University has historically drawn the majority of its students from throughout the Mississippi Delta. MVSU offers concentrated study in the arts, business, education, humanities, public services, pre-professional health services, social sciences, sciences, social work, and technology. Master's level programs are offered in environmental health and Bioinformatics. MVSU also endeavors to provide additional programs that are vital and unique to the needs of the population it serves.

Mississippi has one nuclear power plant – Grand Gulf Nuclear Station (GGNS). Alcorn State University is located 12 miles south wind of the Grand Gulf Nuclear site. Alcorn is at a high risk for nuclear exposure in the event of a nuclear power plant incident. This proposed project can help Alcorn to lay the foundation for its own Emergency Management degree program. Alcorn has been a long-term collaborative partner of the Grand Gulf Nuclear Power Plant [2]. This project will help JSU and MVSU ***build*** a collaborative relationship with Grand Gulf Nuclear Power Plant. Dr. Voletta Williams, Associate Professor of Biology ***at Alcorn***, will serve as ***a liaison between*** GGNS and this proposed project.

6. CURRICULUM ENHANCEMENT

Every science, engineering, and technology department must adapt to changing societal needs so that their graduates will possess relevant skills and knowledge vital to potential employers. As radiation technology expands, the potential of a nuclear/radiological emergency is real. Universities in Mississippi need to train students to have the technical capability to respond to nuclear and radiological incidents. In recent years, nuclear energy production has been re-emerging as vital economic sector in need of workers. JSU, ASU, and MVSU need to produce graduates who have a familiarity with and have a clear understanding of nuclear technologies and who will seriously consider employment in nuclear or ***related industries*** upon graduation. To accomplish these, we propose to offer two new courses, revise four existing courses, and introduce a suite of nuclear related laboratory modules into the curricula.

6.1 Development of New Courses and Laboratory

The following two new courses will be developed: *Course 1:* Introduction to Nuclear Technology and *Course 2:* Nuclear Emergency Preparedness and Exercises. The first new course will replace an existing course (Introduction to Technology) in the undergraduate EMT curriculum at JSU. A learning lab environment is essential to draw the attention of students and to promote recruitment and retention. Adding a laboratory facility, along with new courses, is critical for the productivity and viability of the proposed new courses. The new lab will facilitate learning enhancement of the courseware with hands-on activities.

6.1.1 Course 1: Introduction to Nuclear Technology

This proposed new course will consist of introducing five new modules. These modules provide students with broad and in-depth knowledge in nuclear field. The course will open to all interested students in all STEM disciplines. The topics covered will facilitate the students to become self-sufficient in seeking higher education, research, or employment in nuclear industry and associated fields.

Nuclear Radiology

This module will focus on radioactivity, radioisotopes, nuclear radiation, interaction of radiation with matter, radiation dosimetry, safety levels of radiation, and radiation emergency management.

Nuclear Power Technology

This module presents an overview of the nuclear power technology including nuclear reactions, nuclear reactor principles, reactor components, types of nuclear reactors, nuclear power plant layout, and nuclear fuel cycle: enrichment, fabrication, reprocessing, waste production and disposal.

Nuclear Safety

This module will provide an introduction to nuclear safety, including the following topics: nuclear safety and security, safety assessment of nuclear facilities, quality assurance and accident analysis, radioactive materials transportation, in-plant accident and management, offsite protective actions, emergency planning, current and future nuclear policy, and safety regulations.

Nuclear Health

The topics will include radiation hazards, living organisms and radiation damage, radiation exposure and health impacts, food irradiation, radiation controlling methods, nuclear fall out, and health safety measures in nuclear industry,

Nuclear Waste Management

This module will introduce the basic concepts of nuclear waste management, with a focus on radiation sources, nuclear cycle, reactor dismantling, fuel storage, radiological hazards, disposal of radioactive wastes, and safety culture.

Besides combining five modules into a single course, these separate course modules can be inserted directly into existing courses. The course modules can also exist as separate short courses. The faculty team will teach the course modules and provide lectures and laboratory activities relating to their expertise.

Nuclear industry also requires many new professionals whose areas of expertise lie outside of the classical nuclear science/engineering disciplines. We need to reach out to students who will fill these roles. This proposed program is designed to appeal to a wide range of students who are interested in STEM. For instance, the Electronics and Computer Technology students can take the proposed new course. They can become the instrumentation and controls technicians/specialists at nuclear facilities. This program will provide students with the knowledge they will need when working in proximity to a nuclear reactor or in an environment where radiological hazards are present.

6.1.2 Course 2: Nuclear Emergency Preparedness and Exercises

The new course "Nuclear Emergency Preparedness and Exercises" will be a one-semester course. This new course will serve as an elective for the Hazardous Materials Management Program. The undergraduate Emergency Management Technology students at senior level can also take this course. This course will reinforce several important topics (such as nuclear radiation, health and safety in the nuclear industry) and also further discuss the nuclear emergency, major nuclear reactor disasters, 10 miles and 50 miles protection action areas, community reception centers, emergency preparedness equipment, and potassium iodine medicine distribution. This course will be a hybrid of lecture and laboratory exercises. This project will develop a virtual reality training program that will be used in this course. The development of this training program will be discussed in more details later in this proposal.

6.2 Laboratory Module

This project will also add a laboratory module on radiation instrumentation and measurements. Radiation detection and measurement is used to monitor normal operations, detect and analyze abnormal conditions, and ensure safe operation in nuclear facilities. This program will purchase new radiation detection equipment (such as contamination survey meter, exposure rate survey meter) for teaching laboratory. Several experimental sessions and an accompanying comprehensive laboratory manual will be developed and introduced into the curriculum. The laboratory activities will introduce students to various types of detectors used to measure radiations and the general properties of radiation detection systems. The hands-on equipment operation training will further enhance the student's educational experience. This laboratory module will be infused in new course (Introduction to Nuclear Technology) and other existing courses.

6.3 Revising Existing Courses

The Department of Technology at JSU will revise two existing courses, ITHM 300 (Principles of Hazardous Materials Management) and ITHM 520 (Introduction to Hazardous Material Management), to emphasize nuclear waste. The ***Environmental Health Program at MVSU will also revise one of its*** required courses: EH 418 (Solid and Hazardous Waste Management). The new topics will include: nuclear waste transportation, the ***nuclear*** fuel cycle, methods of storage and disposal of nuclear waste, and chemistry of nuclear waste. These three courses will help students develop a working knowledge of the technology necessary to address issues such as ***security and safeguards*** of ***radioactive waste*** as well as environmental and health challenges. This new emphasis will motivate both graduate and undergraduate students to learn various aspects of nuclear technology. At JSU, ITHM 300 and ITHM 520 are required courses for the EMT and HMM programs, respectively.

Jackson State, Alcorn State, and Mississippi Valley State will work together to re-structure each of their own Risk Assessment course. In the revised Risk Assessment course, a great deal of emphasis will be placed on Probabilistic Risk Assessment (PRA) techniques. PRA (also known as probabilistic safety assessment) is used to predict the future behavior of processes generally in terms of likelihood and outcome (severity). PRA has been used to assess the designs of high hazard, complex, low risk systems (such as chemical manufacturing plants and nuclear power plants). PRA examines events that contribute to adverse outcomes through the use of event tree analysis and determines the likelihood of event occurrence through fault tree analysis.

This 3-credit course will cover the following: methods for risk analysis of complex engineered technological systems; fault tree and event tree analysis methods; mathematical basics for dealing with reliability data, theory, and analysis; and case studies of accidents in nuclear power systems. This course ***will be offered*** on-***campus at each participating university. The course will also be available on-line.*** Development of the on-line "Risk Assessment" ***course*** will be a ***joint effort*** among JSU, ASU, and MVSU.

6.4 Distance Learning Program

The technology program at JSU has been working to accommodate a variety of course formats (traditional classroom, on-line/distance education, etc.) to make coursework accessible to a much broader student community, and to flexibly meet the needs of each individual student. The new (and ***revised***) courses and course modules developed under this project will also be expanded to include on-line learning. The courses will be delivered to the student groups in two learning environments: (1) traditional classroom environment and (2) on-line or distant learning environment.

By including an on-line component, the nuclear technology courses will be available to broader audiences. Thus, students will have the option to take courses either by attending classes on campus or via distance learning network. Some classes will be designed for so called "Hybird" to accommodate hands–on laboratory sessions. Students ***at Alcorn State and Mississippi Valley State*** will have access to the JSU's on-line courses.

6.5 Virtual Reality Teaching Program

The greatest challenge facing emergency response personnel is the ability to train effectively. Recent information technologies make it possible to have a wide set of innovative training tools [3,4]. Among these, virtual reality and environments have a great potential to enhance the learning process. Virtual environments (like Second Life) can provide users with the opportunity to create an emergency situation that could not otherwise be experienced due to safety, cost, and environmental factors [5,6]. This can provide students with a hands-on experience that is more realistic and immersive than any classroom scenario can provide. Thus, students have the opportunity to become better equipped to handle real life situations. Students can make appropriate decisions on urgent matters because virtual environments have given them a tool through which they have developed skills in a safe yet virtually real environment. Due to these advantages in practice, virtual reality and visual simulation have been widely used in emergency training.

This project will use Second Life to develop computer-based training materials and exercises. The training materials will offer a variety of environments with customized buildings, objects, and scripting tailored to various scenarios of nuclear emergencies. Students will have the chance to learn by reading, listening, and seeing. By using Second Life, instructors can involve a group of students to conduct a virtual live nuclear emergency exercise. Thus, students will have the chance to practice the skill that they are taught through exercises. The virtual reality training program can pique student interest and create an enjoyable interactive experience. ***Virtual reality program*** will also be used as a tool to ***educate*** the ***general public and*** schoolchildren.

6.6 Enhance Student Learning

Most of the STEM courses focus mainly on disciplinary topics. The traditional STEM education systems promote the acquisition of knowledge but do not help students learn how to acquire knowledge. Students who failed in their studies may attribute their failures to lack of ability in learning rather than a lack of effective use of strategies. Students quit from STEM programs due to frustrations from their setbacks in learning.

The formal schooling system cannot possibly prepare students for all the skills and knowledge needs they will have during their lives. With rapid changes in technology and the growth of information, students need to be able to learn on their own, not only as a college survival skill but also to survive in the workplace and as a life skill. Students have to know how to manage their learning (e.g. by setting goals, planning their learning, monitoring their progress, and responding appropriately to the challenges) as they progress through higher education. Therefore, there is an onus on instructors in higher education to assume more responsibility for helping students to develop these capabilities.

To be successful in college, students have to have a variety of Self-Regulated Learning (SRL) and Self-Directed Learning (SDL) skills. Self-regulated learning focuses on the use of self-evaluation and self-motivation to aid the student in developing the correct study habits, techniques, and tools necessary for success in learning environment. Zimmerman defined self-regulated learners as those students who are "metacognitively, motivationally, and behaviorally active participants in their own learning process" [7].

One of the primary goals of self-regulated learning is to get the students to take the time and effort to carry out self-evaluation and self-examination in regard to the learning habits and their effectiveness. From the evaluation, the individual is then prepared to create a plan to change habits and establish methods for improvement. Once the plan is established, then an effort is carried out to implement the plan, along with a feedback mechanism that will provide input into self improvement and continuous improvement in the learning process.

This project team will develop a course module which will introduce SRL and SDL strategies to students. Thus, students will have an arsenal of strategies they can choose from to match their level of learning to the demands of the performance task. Students will be able to better self-monitor their understanding.

To further enhance student learning and increase the retention rate of students, this program will provide constant support to students. For instance, social support will be provided by setting up a student network that primarily focuses on undergraduates. The students within this network will have opportunities to partake in a number of activities throughout the academic school year. The activities will range from social outings to periodic forums and focus groups. Providing students with social support will build morale by allowing them to share their undergraduate experiences with individuals who may understand them better. Building morale among the students has the potential to motivate them to do well and meet the challenges of their program.

E-learning environments can have the potential to improve both the students' subject matter knowledge and learning strategy application. To enhance student learning, some technology courses (such as ITHM 300: Principles of Hazardous Materials Management) will combine lecture-based classes with online components. Study shows that the pre-instructional strategy can facilitate the development of cognitive preparedness for classroom learning [8]. In the EMT technology courses, before starting a new chapter (or topic), instructors will post the pre-instructional overview on web. Students are required to read the "overview" before their classroom learning. The overview includes the definitions of new concepts and explanations of basic principles. This knowledge can prepare students to fully process new information during actual classroom instruction. After students study the overview, they also have to answer several on-line questions. The instructors then can use the results of those questions to establish areas of weakness and to determine the focus of the classroom teaching. This way can target students' needs and level of understanding [9].

Web-based tools (such as Blackboard) can provide feedback through online quizzes. Students will be presented with online quizzes after the classroom lectures. In addition to answering the quiz questions, students have to rate their confidence in their answer [10]. Thus, students can step back and reflect deeply on whether there is good justification for the answer. When the corrected quiz is received, students will have the opportunity to learn from their errors by completing the "Self-Reflection Form". Students can compare their confidence ratings with their graded performance to learn which strategies or processes were (or were not) working. This will get students involved in evaluative judgments of their own work and learning process, develop their metacognitive skills, and improve their learning. The web-based tests and assessment keep students engaged in out of class activities. Thus, instructors can facilitate student learning without using any class time.

6.7 Faculty and Facilities

Current faculty members from Jackson State, Alcorn State, and Mississippi Valley State have the expertise to offer the courses in the curriculum. These faculty members include Drs. P. C. Yuan, HR Shih, and John Colonias from JSU's Technology Department, as well as Dr. Voletta Williams (ASU) and Dr. Louis Hall (MVSU). These faculty members have the necessary technical competence and the substantive knowledge to produce graduates who can effectively apply the technology, methods, and techniques to protect the environment, nuclear security, and public safety.

The infrastructure, which includes the computing labs and library resources, is sufficient to handle the demands of this new proposed project. Equipment will be purchased to support the proposed laboratory module. The requested equipment will allow faculty to provide students with hands-on opportunities.

7. PARTNERSHIPS

Partnerships and collaborations with industry and government are vital for course development and faculty self-education. JAM CDA will partner with Mississippi Radiation Response Volunteer Corps (MRRVC) [11], which is sponsored by Mississippi State Department of Health (MSDH). MRRVC is composed of a group of professionals whose expertise is in the field of radiation safety and control. The MRRVC was developed to serve the public during radiological emergencies. The mission of the MRRVC volunteer is to aid community through preparedness by educating, training, and assisting during a radiological incident. While population monitoring during a mass causality will be the foremost role that the group will perform, all trained volunteers will be available to provide assistance as needed.

Dr. P.C. Yuan (Professor at JSU) has been a member of MRRVC. All JSU students concentrating in Emergency Management Technology and Hazardous Materials Management are encouraged to join MRRVC. After receiving proper training, the students can help the public in emergency response during a radiological event. They can provide assistance at community reception centers, shelters for displaced populations, emergency operations centers, hospitals, and communications facilities. ASU and MVSU students who are interested in emergency management and nuclear technology are also encouraged to participate in the MRRVC training.

8. ORGANIZATION, MANAGEMENT, AND INSTITUTIONAL COMMITMENT

This proposed project is a collaborative effort among Jackson State University, Alcorn State University, and Mississippi Valley State University. ASU and MUSU will serve as the subcontractors to JSU. At JSU, the project will be staffed by one Principal Investigator (Dr. P.C. Yuan) and two Co-Investigators (Dr. John Colonias and Dr. H.R. Shih). The ASU and MSVU course development effort will be lead by Dr. Voletta Williams and Dr. Louis Hall, respectively. The Principal Investigator (Dr. Yuan) will oversee all project activities.

Dr. Yuan has been working in the Emergency Preparedness and Hazardous Materials areas for more than twenty years. He has also completed many nuclear-related training courses that are offered by FEMA, Mississippi State Department of Health, and Center for Radiological/Nuclear Training. He has taught and developed courses related to hazardous materials and emergency management. Dr. Yuan has both the theoretical and practical experience required to participate effectively as the PI of this team.

One administrative assistant (Ms. Paullette Bridge) will be needed to help with project activities. She has many years of experience in project management. She will work closely with the JSU Office of Grants and Contracts as well as the Office of Sponsored Programs to ensure effective management of the grant resources.

All investigators will participate in the project development. All investigators will teach courses, setup laboratory, and develop the virtual reality training program. An advisory committee will be formed to monitor and advise the program activities. A group of experienced engineers and scientists will be invited to serve on the committee. The committee will include

Ms. S. Stringfellow of the Mississippi State Department of Health, Mr. Bobby Shakespeare of Exelon Nuclear, and others. The investigators will collect and analyze assessment data. The project team will meet, coordinate their efforts, and exchange their experiences on a regular basis, and also interact with the advisory committee members periodically to seek their input.

8.1 Program Sustainability

This proposed program is designed to support undergraduate and graduate students in developing the skills to become prominent professionals in nuclear safety and nuclear emergency response and preparedness. Jackson State University has been selected by the U.S. Department of Homeland Security as a Center of Excellence. This proposed project fits well with the ongoing developmental plan of Jackson State University to become one of the region's foremost educational and research centers for Disaster and Emergency Management.

8.2 Overview of Jackson State University

Jackson State University is an urban university and a state-funded institution of higher learning located in the center of Mississippi. Jackson State University has an enrollment of approximately 9000 students in a wide range of graduate and undergraduate degree programs.

The purpose of the Department of Technology is to provide a nationally accredited program, which serves the technical, managerial, and communication needs of persons desiring to enter or advance professionally in an industrial technology related career. The department includes four undergraduate concentration programs (Electronics Technology, Manufacturing & Design Technology, Computer Technology, and Emergency Management Technology), and two graduate programs, (Technology Education and Hazardous Materials Management).

9. EXPECTED OUTCOMES

This proposed project will introduce nuclear related subjects to curriculum, increase the number of students graduating with skills in nuclear technology, and supply new well-trained scientists/technologists to fill nuclear industry and homeland security positions. This funding opportunity will provide the necessary support to enrich both the content of lectures and laboratory exercises as well as the way in which they are taught. From a course-offerings perspective, this proposed program is unique. It will be the only program offered in Mississippi. The impact of this project on education infrastructure will be substantial. The development and delivery of the new teaching materials can ***improve*** faculty teaching competencies. This project will be the first step in cultivating future nuclear related research efforts ***among universities***. This project will also allow JSU and MVSU to start interaction with the staff at the nuclear power plant in the region (Grand Gulf Nuclear Station).

10. PROJECT EVALUATION

The goal of the evaluation plan is to systematically examine the impact of the project and to determine whether the outcomes have been achieved through the use of formative and summative evaluation processes, and qualitative and quantitative information. The evaluation will investigate students' learning, knowledge, achievement, attitudes, and perceptions, as well as faculty development. The data will facilitate the understanding of the project impact from design to implementation and the interpretation of the final outcomes [12-14].

Following consultation with the evaluator (Dr. Golden W. Skelton), the PI will manage the evaluation process. The PI and Co-PIs will be responsible for data collection, analysis, and writing evaluation reports for formative evaluation. The evaluator (Dr. Skelton) will also guide and assist PIs in the overall summative evaluation. The evaluator will review collected data, documents, and work products and will use an interview protocol to interview students and faculty to ascertain that the project is responding to the specified needs.

10.1 Formative Evaluation

This stage of evaluation will focus on implementation and progress. The implementation evaluation phase will track whether the project is being conducted as planned. Progress evaluation will determine to what extent the project's objectives are being met. Formative evaluation of the new courses and lab module will begin during the design of the course components and activities for field testing and will be ongoing. During the pilot testing of the course, project team members will meet periodically to review findings from various assessments. The following assessment tools will be used: (1) students' work, including quizzes, exams, and projects, (2) end of course evaluations by students, (3) pre- and post-course assessments, (4) formal and informal surveys, (5) in-class observations of students conducted by instructors, and (6) student employment and internship records.

The formative evaluation will facilitate the continuous improvement in all the activities by providing a vehicle for ongoing and immediate feedback about the effectiveness of the project components [15]. Thus, these components can be modified for the next implementation cycle if necessary.

10.2 Summative Evaluation

The evaluator (Dr. Skelton) will be used to assure objectivity. This evaluator will assist PIs in the overall summative evaluation, which will answer the following questions:

- Was the project successful?
- What components were most effective?
- Did the project meet all goals?
- Is the project replicable and transferable?
- How could this project be improved?

This component of evaluation will be based on cumulative findings in all areas and will determine the overall impact, including intended and unintended outcomes of the project. Results gathered from this evaluation will assist us in determining the course of action we should undertake to improve the quality of the proposed project.

Dr. Skelton is the Interim Chair of Computer Science Department at JSU. He is also the director of the Center for Defense Integrated Data (CDID), where he manages a portfolio of applied research in software engineering, decision support, computer security, and disaster response. Dr. Skelton has a wide range of experiences in software development, database management, undergraduate and graduate teaching, and project management.

11. DISSEMINATION PLAN

The impact of this project will be measured, recorded, and published. The successes and lessons-learned from this project will be shared nationally through several methods. First, the PI will include the teaching materials on the website. Second, the PI and co-PIs will disseminate the project's results and products by presenting findings at national conferences. The nature of the project, the processes used to develop the teaching materials, and the project's outcomes will be highlighted in the presentations. Examples of the targeted conferences include Nuclear Regulatory Commission (NRC) Conferences and Symposia, ***American Nuclear Society*** Annual ***Meeting***, National Council on Radiation Protection and Measurements (NCRP) Annual Meeting, and FEMA Annual Emergency Management Higher Education Conference.

12. TIME LINE

The goals of this project are to develop an environment and curriculum that encourages creative learning experience. We propose to develop two new courses, one lab module, and a virtual reality training program, revise four existing courses, as well as introduce new teaching strategies into several existing courses over the two years of grant support. The new and revised courses will be accessible to multiple disciplines ***across three universities*** and are expected to engage about 60 students annually.

Each semester is a benchmark. The project team will make sure that all the tasks are completed in a timely manner. The first semester will be devoted to laboratory set up. Concurrent with this activity, in the first semester, all the courses will be developed. Each of these courses will be offered at least twice during the life of the grant. This will enable a meaningful evaluation of the courses' outcomes. Essential tasks at JSU are planned as follows.

Year 1		Year 2	
Semester 1	Semester 2	Semester 1	Semester 2
Setup Laboratory & develop lab module	Offer lab module	Revise the new courses and lab module	Offer revised "new courses" and "lab module"
Develop two new courses, & virtual reality training program	Offer the newly developed courses	Offer ITHM 300, ITHM 405 & ITHM 520 (with new contents)	Offer ITHM 300, ITHM 405 & ITHM 520
Develop the SRL training module (new teaching strategies)	Offer courses with new teaching strategies	Offer the on-line version of courses	Offer the on-line version of courses
Revise existing courses (ITHM 300, ITHM 405: Risk Assessment & ITHM 520)	Develop on-line version of the courses	Offer courses with new teaching strategies	Offer courses with new teaching strategies
Develop Assessment Plan	Collect assessment data and prepare Annual Report	Collect and analyze assessment data	Prepare publications & Annual Report

Attachment C – Standard Terms and Conditions

The Nuclear Regulatory Commission's
Standard Terms and Conditions for U.S. Nongovernmental Grantees

Preface

This award is based on the application submitted to, and as approved by, the Nuclear Regulatory Commission (NRC) under the authorization 42 USC 2051(b) pursuant to section 31b and 141b of the Atomic Energy Act of 1954, as amended, and is subject to the terms and conditions incorporated either directly or by reference in the following:

- Grant program legislation and program regulation cited in this Notice of Grant Award.
- Restrictions on the expenditure of Federal funds in appropriation acts, to the extent those restrictions are pertinent to the award.
- Code of Federal Regulations/Regulatory Requirements - 2 CFR 215 Uniform Administrative Requirements For Grants And Agreements With Institutions Of Higher Education, Hospitals, And Other Non-Profit Organizations (OMB Circulars), as applicable.

To assist with finding additional guidance for selected items of cost as required in 2 CRF 220, 2 CFR 225, and 2 CFR 230 this URL to the Office of Management and Budget Cost Circulars is included for reference to:

A-21 (now 2 CFR 220)
A-87 (now 2 CFR 225)
A-122 (now 2 CFR 230
A-102:

http://www.whitehouse.gov/omb/circulars_index-ffm

Any inconsistency or conflict in terms and conditions specified in the award will be resolved according to the following order of precedence: public laws, regulations, applicable notices published in the Federal Register, Executive Orders (EOs), Office of Management and Budget (OMB) Circulars, the Nuclear Regulatory Commission's (NRC) Mandatory Standard Provisions, special award conditions, and standard award conditions.

Certifications and Representations: These terms incorporate the certifications and representations required by statute, executive order, or regulation that were submitted with the SF424B application through Grants.gov.

I. Mandatory General Requirements
The order of these requirements does not make one requirement more important than any other requirement.

1. Applicability of 2 CFR Part 215

a. All provisions of 2 CFR Part 215 and all Standard Provisions attached to this grant/cooperative agreement are applicable to the Grantee and to sub-recipients which meet the definition of "Grantee" in Part 215, unless a section specifically excludes a sub-recipient from coverage. The Grantee and any sub-recipients must, in addition to the assurances made as part of the application, comply and require each of its sub-awardees employed in the completion of the project to comply with Subpart C of 2 CFR 215 and include this term in lower-tier (subaward) covered transactions.

b. Grantees must comply with monitoring procedures and audit requirements in accordance with OMB Circular A-133.
http://www.whitehouse.gov/omb/circulars/a133_compliance/08/08toc.aspx

2. Award Package

§ 215.41 Grantee responsibilities.
The Grantee is obligated to conduct such project oversight as may be appropriate, to manage the funds with prudence, and to comply with the provisions outlined in 2 CFR 215.41 Within this framework, the Principal Investigator (PI) named on the award face page, Block 11, is responsible for the scientific or technical direction of the project and for preparation of the project performance reports. This award is funded on a cost reimbursement basis not to exceed the amount awarded as indicated on the face page, Block 16., and is subject to a refund of unexpended funds to NRC.

The standards contained in this section do not relieve the Grantee of the contractual responsibilities arising under its contract(s). The Grantee is the responsible authority, without recourse to the NRC, regarding the settlement and satisfaction of all contractual and administrative issues arising out of procurements entered into in support of an award or other agreement. This includes disputes, claims, protests of award, source evaluation or other matters

of a contractual nature. Matters concerning violation of statute are to be referred to such Federal, State or local authority as may have proper jurisdiction.

Subgrants
Appendix A to Part 215—Contract Provisions

Sub-recipients, sub-awardees, and contractors have no relationship with NRC under the terms of this grant/cooperative agreement. All required NRC approvals must be directed through the Grantee to NRC. See 2 CFR 215 and 2 CFR 215.41

Nondiscrimination
(This provision is applicable when work under the grant/cooperative agreement is performed in the U.S. or when employees are recruited in the U.S.)

No U.S. citizen or legal resident shall be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity funded by this award on the basis of race, color, national origin, age, religion, handicap, or sex. The Grantee agrees to comply with the non-discrimination requirements below:

Title VI of the Civil Rights Act of 1964 (42 USC §§ 2000d et seq)
Title IX of the Education Amendments of 1972 (20 USC §§ 1681 et seq)
Section 504 of the Rehabilitation Act of 1973,as amended (29 USC § 794)
The Age Discrimination Act of 1975, as amended (42 USC §§ 6101 et seq)
The Americans with Disabilities Act of 1990 (42 USC §§ 12101 et seq)
Parts II and III of EO 11246 as amended by EO 11375 and 12086.
EO 13166, "Improving Access to Services for Persons with Limited English Proficiency."
Any other applicable non-discrimination law(s).

Generally, Title VI of the Civil Rights Act of 1964, 42 USC § 2000e et seq, provides that it shall be an unlawful employment practice for an employer to discharge any individual or otherwise to discriminate against an individual with respect to compensation, terms, conditions, or privileges of employment because of such individual's race, color, religion, sex, or national origin. However, Title VI, 42 USC § 2000e-1(a), expressly exempts from the prohibition against discrimination on the basis of religion, a religious corporation, association, educational institution, or society with respect to the employment of individuals of a particular religion to perform work connected with the carrying on by such corporation, association, educational institution, or society of its activities.

Modifications/Prior Approval
NRC's prior written approval may be required before a Grantee makes certain budget modifications or undertakes particular activities. If NRC approval is required for changes in the grant or cooperative agreement, it must be requested of, and obtained from, the NRC Grants Officer in advance of the change or obligation of funds. All requests for NRC prior approval should be made, in writing (which includes submission by e-mail), to the designated Grants Specialist and Program Office no later than 30 days before the proposed change. The request must be signed by both the PI and the authorized organizational official. Failure to obtain prior approval, when required, from the NRC Grants Officer may result in the disallowance of costs, or other enforcement action within NRC's authority.

Lobbying Restrictions

The Grantee will comply, as applicable, with provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

The Grantee shall comply with provisions of 31 USC § 1352. This provision generally prohibits the use of Federal funds for lobbying in the Executive or Legislative Branches of the Federal Government in connection with the award, and requires disclosure of the use of non-Federal funds for lobbying.

The Grantee receiving in excess of $100,000 in Federal funding shall submit a completed Standard Form (SF) LLL, "Disclosure of Lobbying Activities," regarding the use of non-Federal funds for lobbying within 30 days following the end of the calendar quarter in which there occurs any event that requires disclosure or that materially affects the accuracy of the information contained in any disclosure form previously filed. The Grantee must submit the SF-LLL, including those received from sub-recipients, contractors, and subcontractors, to the Grants Officer.

§ 215.13 Debarment And Suspension.
The Grantee agrees to notify the Grants Officer immediately upon learning that it or any of its principals:

(1) Are presently excluded or disqualified from covered transactions by any Federal department or agency;

(2) Have been convicted within the preceding three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, receiving stolen property, making false claims, or obstruction of justice; commission of any other offense indicating a lack of business integrity or business honesty that seriously and directly affects your present responsibility;

(3) Are presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1)(b); and

(4) Have had one or more public transactions (Federal, State, or local) terminated for cause or default within the preceding three years.

b. The Grantee agrees that, unless authorized by the Grants Officer, it will not knowingly enter into any subgrant or contracts under this grant/cooperative agreement with a person or entity that is included on the Excluded Parties List System (http://epls.arnet.gov).

The Grantee further agrees to include the following provision in any subgrant or contracts entered into under this award:

'Debarment, Suspension, Ineligibility, and Voluntary Exclusion

The Grantee certifies that neither it nor its principals is presently excluded or disqualified from participation in this transaction by any Federal department or agency. The policies and procedures applicable to debarment, suspension, and ineligibility under NRC-financed transactions are set forth in 2 CFR Part 180.'

Drug-Free Workplace
The Grantee must be in compliance with The Federal Drug Free Workplace Act of 1988. The policies and procedures applicable to violations of these requirements are set forth in 41 USC 702.

Implementation of E.O. 13224 -- Executive Order On Terrorist Financing
The Grantee is reminded that U.S. Executive Orders and U.S. law prohibits transactions with, and the provision of resources and support to, individuals and organizations associated with terrorism. It is the legal responsibility of the Grantee to ensure compliance with these Executive Orders and laws. This provision must be included in all contracts/sub-awards issued under this grant/cooperative agreement.

Award Grantees must comply with Executive Order 13224, Blocking Property and Prohibiting Transactions with Persons who Commit, Threaten to Commit, or Support Terrorism. Information about this Executive Order can be found at: www.fas.org/irp/offdocs/eo/eo-13224.htm.

Procurement Standards. § 215.40-48
Sections 215.41 through 215.48 set forth standards for use by Grantees in establishing procedures for the procurement of supplies and other expendable property, equipment, real property and other services with Federal funds. These standards are furnished to ensure that such materials and services are obtained in an effective manner and in compliance with the provisions of applicable Federal statutes and executive orders. No additional procurement standards or requirements shall be imposed by the Federal awarding agencies upon Grantees, unless specifically required by Federal statute or executive order or approved by OMB.

Travel
Travel must be in accordance with the Grantee's Travel Regulations or the US Government Travel Policy and Regulations at: www.gsa.gov/federaltravelregulation and the per diem rates set forth at: www.gsa.gov/perdiem, absent Grantee's travel regulation. Travel costs for the grant must be consistent with provisions as established in Appendix A to 2 CFR 220 (J.53). All other travel, domestic or international, must not increase the total estimated award amount.

Domestic Travel:
Domestic travel is an appropriate charge to this award and prior authorization for specific trips are not required, if the trip is identified in the Grantee's approved program description and approved budget. Domestic trips not stated in the approved budget require the written prior approval of the Grants Officer, and must not increase the total estimated award amount.

All common carrier travel reimbursable hereunder shall be via the least expensive class rates consistent with achieving the objective of the travel and in accordance with the Grantee's policies and practices. Travel by first-class travel is not authorized unless prior approval is obtained from the Grants Officer.

International Travel:

International travel requires PRIOR written approval by the Project Officer and the Grants Officer, even if the international travel is stated in the approved program description and the approved budget.

The Grantee shall comply with the provisions of the Fly American Act (49 USC 40118) as implemented through 41 CFR 301-10.131 through 301-10.143.

Property and Equipment Management Standards
Property and equipment standards of this award shall follow provisions as established in 2 CFR 215.30-37.

Procurement Standards
Procurement standards of this award shall follow provisions as established in 2 CFR 215.40-48

Intangible and Intellectual Property
Intangible and intellectual property of this award shall generally follow provisions established in 2 CFR 215.36.

Inventions Report - The Bayh-Dole Act (P.L. 96-517) affords Grantees the right to elect and retain title to inventions they develop with funding under an NRC grant award ("subject inventions"). In accepting an award, the Grantee agrees to comply with applicable NRC policies, the Bayh-Dole Act, and its Government-wide implementing regulations found at Title 37, Code of Federal Regulations (CFR) Part 401. A significant part of the regulations require that the Grantee report all subject inventions to the awarding agency (NRC) as well as include an acknowledgement of federal support in any patents. NRC participates in the trans-government Interagency Edison system (http://www.iedison.gov) and expects NRC funding Grantees to use this system to comply with Bayh-Dole and related intellectual property reporting requirements. The system allows for Grantees to submit reports electronically via the Internet. In addition, the invention must be reported in continuation applications (competing or non-competing).

Patent Notification Procedures- Pursuant to EO 12889, NRC is required to notify the owner of any valid patent covering technology whenever the NRC or its financial assistance Grantees, without making a patent search, knows (or has demonstrable reasonable grounds to know) that technology covered by a valid United States patent has been or will be used without a license from the owner. To ensure proper notification, if the Grantee uses or has used patented technology under this award without license or permission from the owner, the Grantee must notify the Grants Officer. This notice does not necessarily mean that the Government authorizes and consents to any copyright or patent infringement occurring under the financial assistance.

Data, Databases, and Software - The rights to any work produced or purchased under a NRC federal financial assistance award are determined by 2 CFR 215.36. Such works may include data, databases or software. The Grantee owns any work produced or purchased under a NRC federal financial assistance award subject to NRC's right to obtain, reproduce, publish or otherwise use the work or authorize others to receive, reproduce, publish or otherwise use the data for Government purposes.

Copyright - The Grantee may copyright any work produced under a NRC federal financial assistance award subject to NRC's royalty-free nonexclusive and irrevocable right to reproduce, publish or otherwise use the work or authorize others to do so for Government purposes.

Works jointly authored by NRC and Grantee employees may be copyrighted but only the part authored by the Grantee is protected because, under 17 USC § 105, works produced by Government employees are not copyrightable in the United States. On occasion, NRC may ask the Grantee to transfer to NRC its copyright in a particular work when NRC is undertaking the primary dissemination of the work. Ownership of copyright by the Government through assignment is permitted under 17 USC § 105.

Records Retention and Access Requirements for records of the Grantee shall follow established provisions in 2 CFR 215.53.

Organizational Prior Approval System
In order to carry out its responsibilities for monitoring project performance and for adhering to award terms and conditions, each Grantee organization shall have a system to ensure that appropriate authorized officials provide necessary organizational reviews and approvals in advance of any action that would result in either the performance or modification of an NRC supported activity where prior approvals are required, including the obligation or expenditure of funds where the governing cost principles either prescribe conditions or require approvals.

The Grantee shall designate an appropriate official or officials to review and approve the actions requiring NRC prior approval. Preferably, the authorized official(s) should be the same official(s) who sign(s) or countersign(s) those types of requests that require prior approval by NRC. The authorized organization official(s) shall not be the principal investigator or any official having direct responsibility for the actual conduct of the project, or a subordinate of such individual.

Conflict Of Interest Standards for this award shall follow OCOI requirements set forth in Section 170A of the Atomic Energy Act of 1954, as amended, and provisions set forth at 2 CFR 215.42 Codes of Conduct.

Dispute Review Procedures

a. Any request for review of a notice of termination or other adverse decision should be addressed to the Grants Officer. It must be postmarked or transmitted electronically no later than 30 days after the postmarked date of such termination or adverse decision from the Grants Officer.

b. The request for review must contain a full statement of the Grantee's position and the pertinent facts and reasons in support of such position.

c. The Grants Officer will promptly acknowledge receipt of the request for review and shall forward it to the Director, Office of Administration, who shall appoint an intra-agency Appeal Board to review a grantee appeal of an agency action, if required, which will consist of the program office director, the Deputy Director of Office of Administration, and the Office of General Counsel.

d. Pending resolution of the request for review, the NRC may withhold or defer payments under the award during the review proceedings.

e. The review committee will request the Grants Officer who issued the notice of termination or adverse action to provide copies of all relevant background materials and documents. The committee may, at its discretion, invite representatives of the Grantee and the

NRC program office to discuss pertinent issues and to submit such additional information as it deems appropriate. The chairman of the review committee will insure that all review activities or proceedings are adequately documented.

f. Based on its review, the committee will prepare its recommendation to the Director, Office of Administration, who will advise the parties concerned of his/her decision.

Termination and Enforcement. Termination of this award by default or by mutual consent shall follow provisions as established in 2 CFR 215.60-62,

Monitoring and Reporting § 215.50-53

Grantee Financial Management systems must comply with the established provisions 2 CFR 215.21

- Payment – 2 CFR 215.22
- Cost Share – 2 CFR 215.23
- Program Income – 2 CFR 215.24
    - Earned program income, if any, shall be added to funds committed to the project by the NRC and Grantee and used to further eligible project or program objectives or deducted from the total project cost allowable cost as directed by the Grants Officer or the terms and conditions of award.
- Budget Revision – 2 CFR 215.25
    - The Grantee is required to report deviations from the approved budget and program descriptions in accordance with 2 CFR 215.25,and request prior written approval from the Program Officer and the Grants Officer.
    - The Grantee is not authorized to rebudget between direct costs and indirect costs without written approval of the Grants Officer.
    - The Grantee is authorized to transfer funds among direct cost categories up to a cumulative 10 percent of the total approved budget. The Grantee is not allowed to transfer funds if the transfer would cause any Federal appropriation to be used for purposes other than those consistent with the original intent of the appropriation.
    - Allowable Costs – 2 CFR 215.27

b. **Federal Financial Reports**

The Grantee shall submit a "Federal Financial Report" (SF-425) on a semi-annual basis for the periods ending March 31 and September 30, or any portion thereof, unless otherwise specified in a special award condition. Reports are due no later than 30 days following the end of each reporting period. A final SF-425 is due within 90 days after expiration of the award. The report should be submitted electronically to: Grants_FFR@NRC.GOV. ***(NOTE: There is an underscore between Grants and FFR).***

Period of Availability of Funds 2 CFR § 215.28

a. Where a funding period is specified, a Grantee may charge to the grant only allowable costs resulting from obligations incurred during the funding period and any pre-award costs authorized by the NRC.

b. Unless otherwise authorized in 2 CFR 215.25(e)(2) or a special award condition, any extension of the award period can only be authorized by the Grants Officer in writing. Verbal or written assurances of funding from other than the Grants Officer shall not constitute authority to obligate funds for programmatic activities beyond the expiration date.

c. The NRC has no obligation to provide any additional prospective or incremental funding. Any modification of the award to increase funding and to extend the period of performance is at the sole discretion of the NRC.

d. Requests for extensions to the period of performance should be sent to the Grants Officer at least 30 days prior to the grant/cooperative agreement expiration date. Any request for extension after the expiration date may not be honored.

Automated Standard Application For Payments (ASAP) Procedures

Unless otherwise provided for in the award document, payments under this award will be made using the Department of Treasury's Automated Standard Application for Payment (ASAP) system < http://www.fms.treas.gov/asap/ >. Under the ASAP system, payments are made through preauthorized electronic funds transfers, in accordance with the requirements of the Debt Collection Improvement Act of 1996. In order to receive payments under ASAP, Grantees are required to enroll with the Department of Treasury, Financial Management Service, and Regional Financial Centers, which allows them to use the on-line method of withdrawing funds from their ASAP established accounts. The following information will be required to make withdrawals under ASAP: (1) ASAP account number – the award number found on the cover sheet of the award; (2) Agency Location Code (ALC) – 31000001; and Region Code. Grantees enrolled in the ASAP system do not need to submit a "Request for Advance or Reimbursement" (SF-270), for payments relating to their award.

Audit Requirements

Organization-wide or program-specific audits shall be performed in accordance with the Single Audit Act Amendments of 1996, as implemented by OMB Circular A-133, "Audits of States, Local Governments, and Non-Profit Organizations." http://www.whitehouse.gov/omb/circulars/a133/a133.html Grantees are subject to the provisions of OMB Circular A-133 if they expend $500,000 or more in a year in Federal awards.

The Form SF-SAC and the Single Audit Reporting packages for fiscal periods ending on or after January 1, 2008 must be submitted online.

1. Create your online report ID at http://harvester.census.gov/fac/collect/ddeindex.html
2. Complete the Form SF-SAC
3. Upload the Single Audit
4. Certify the Submission
5. Click "Submit."

Organizations expending less than $500,000 a year are not required to have an annual audit for that year but must make their grant-related records available to NRC or other designated officials for review or audit.

III. Programmatic Requirements

Performance (Technical) Reports

a. The Grantee shall submit performance (technical) reports electronically to the NRC Project Officer and Grants Officer on a semi-annual basis unless otherwise authorized by the Grants Officer. Performance reports should be sent to the Program Officer at the email address indicated in Block 12 of the Notice of Award, and to Grants Officer at: Grants_PPR.Resource@NRC.GOV. ***(NOTE: There is an underscore between Grants and PPR).***

b. Unless otherwise specified in the award provisions, performance (technical) reports shall contain brief information as prescribed in the applicable uniform administrative requirements 2 CFR §215.51 which are incorporated in the award.

c. The Office of Human Resources requires the submission of the semi-annual progress report on the SF-PPR, SF-PPR-B, and the SF-PPR-E forms. The submission for the six month period ending March 31st is due by April 30th, or any portion thereof. The submission for the six month period ending September 30th is due by October 31st or any portion thereof.

d. Grant Performance Metrics:

The Office of Management and Budget requires all Federal Agencies providing funding for educational scholarships and fellowships as well as other educational related funding to report on specific metrics. These metrics are part of the Academic Competitiveness Council's (ACC) 2007 report and specifically relates to Science, Technology, Engineering, and Mathematics (STEM) curricula. Therefore, in addition to the above customary performance progress report requested on the SF-PPR, SF-PPR-B, and SF-PPR-E forms, NRC requires the following metrics to be reported on by the awardee as follows:

Curriculum Development Awards

1. Overall number of new courses developed in NRC designated STEM areas (including the names of the courses);
2. Number of students enrolled in new STEM courses;
3. Number of these enrolled students retained in STEM major.

Unsatisfactory Performance

Failure to perform the work in accordance with the terms of the award and maintain at least a satisfactory performance rating or equivalent evaluation may result in designation of the Grantee as high risk and assignment of special award conditions or other further action as specified in the standard term and condition entitled "Termination."

Failure to comply with any or all of the provisions of the award may have a negative impact on future funding by NRC and may be considered grounds for any or all of the following actions: establishment of an accounts receivable, withholding of payments under any NRC award, changing the method of payment from advance to reimbursement only, or the imposition of other special award conditions, suspension of any NRC active awards, and termination of any NRC award.

Other Federal Awards With Similar Programmatic Activities

The Grantee shall immediately provide written notification to the NRC Project Officer and the Grants Officer in the event that, subsequent to receipt of the NRC award, other financial

assistance is received to support or fund any portion of the program description incorporated into the NRC award. NRC will not pay for costs that are funded by other sources.

Prohibition Against Assignment By The Grantee
The Grantee shall not transfer, pledge, mortgage, or otherwise assign the award, or any interest therein, or any claim arising thereunder, to any party or parties, banks, trust companies, or other financing or financial institutions without the express written approval of the Grants Officer.

Site Visits
The NRC, through authorized representatives, has the right, at all reasonable times, to make site visits to review project accomplishments and management control systems and to provide such technical assistance as may be required. If any site visit is made by the NRC on the premises of the Grantee or contractor under an award, the Grantee shall provide and shall require his/her contractors to provide all reasonable facilities and assistance for the safety and convenience of the Government representative in the performance of their duties. All site visits and evaluations shall be performed in such a manner as will not unduly delay the work.

IV. Miscellaneous Requirements

Criminal and Prohibited Activities
a. The Program Fraud Civil Remedies Act (31 USC §§ 3801-3812), provides for the imposition of civil penalties against persons who make false, fictitious, or fraudulent claims to the Federal government for money (including money representing grant/cooperative agreements, loans, or other benefits.)

b. False statements (18 USC § 287), provides that whoever makes or presents any false, fictitious, or fraudulent statements, representations, or claims against the United States shall be subject to imprisonment of not more than five years and shall be subject to a fine in the amount provided by 18 USC § 287.

c. False Claims Act (31 USC 3729 et seq), provides that suits under this Act can be brought by the government, or a person on behalf of the government, for false claims under federal assistance programs.

d. Copeland "Anti-Kickback" Act (18 USC § 874), prohibits a person or organization engaged in a federally supported project from enticing an employee working on the project from giving up a part of his compensation under an employment contract.

American-Made Equipment And Products
Grantees are hereby notified that they are encouraged, to the greatest extent practicable, to purchase American-made equipment and products with funding provided under this award.

Increasing Seat Belt Use in the United States
Pursuant to EO 13043, Grantees should encourage employees and contractors to enforce on-the-job seat belt policies and programs when operating company-owned, rented or personally-owned vehicle.

Federal Leadership of Reducing Text Messaging While Driving
Pursuant to EO 13513, Grantees should encourage employees, sub-awardees, and contractors to adopt and enforce policies that ban text messaging while driving company-owned, rented

vehicles or privately owned vehicles when on official Government business or when performing any work for or on behalf of the Federal Government.

Federal Employee Expenses

Federal agencies are generally barred from accepting funds from a Grantee to pay transportation, travel, or other expenses for any Federal employee unless specifically approved in the terms of the award. Use of award funds (Federal or non-Federal) or the Grantee's provision of in-kind goods or services, for the purposes of transportation, travel, or any other expenses for any Federal employee may raise appropriation augmentation issues. In addition, NRC policy prohibits the acceptance of gifts, including travel payments for Federal employees, from Grantees or applicants regardless of the source.

Minority Serving Institutions (MSIs) Initiative

Pursuant to EOs 13256, 13230, and 13270, NRC is strongly committed to broadening the participation of MSIs in its financial assistance program. NRC's goals include achieving full participation of MSIs in order to advance the development of human potential, strengthen the Nation's capacity to provide high-quality education, and increase opportunities for MSIs to participate in and benefit form Federal financial assistance programs. NRC encourages all applicants and Grantees to include meaningful participations of MSIs. Institutions eligible to be considered MSIs are listed on the Department of Education website: http://www.ed.gov/about/offices/list/ocr/edlite-minorityinst.html

Research Misconduct

Scientific or research misconduct refers to the fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. It does not include honest errors or differences of opinions. The Grantee organization has the primary responsibility to investigate allegations and provide reports to the Federal Government. Funds expended on an activity that is determined to be invalid or unreliable because of scientific misconduct may result in a disallowance of costs for which the institution may be liable for repayment to the awarding agency. The Office of Science and Technology Policy at the White House published in the Federal Register on December 6, 2000, a final policy that addressed research misconduct. The policy was developed by the National Science and Technology Council (65 FR 76260). The NRC requires that any allegation be submitted to the Grants Officer, who will also notify the OIG of such allegation. Generally, the Grantee organization shall investigate the allegation and submit its findings to the Grants Officer. The NRC may accept the Grantee's findings or proceed with its own investigation. The Grants Officer shall inform the Grantee of the NRC's final determination.

Publications, Videos, and Acknowledgment of Sponsorship

Publication of the results or findings of a research project in appropriate professional journals and production of video or other media is encouraged as an important method of recording and reporting scientific information. It is also a constructive means to expand access to federally funded research. The Grantee is required to submit a copy to the NRC and when releasing information related to a funded project include a statement that the project or effort undertaken was or is sponsored by the NRC. The Grantee is also responsible for assuring that every publication of material (including Internet sites and videos) based on or developed under an award, except scientific articles or papers appearing in scientific, technical or professional journals, contains the following disclaimer:

> "This [report/video] was prepared by [Grantee name] under award [number] from [name of operating unit], Nuclear Regulatory Commission. The statements, findings, conclusions,

and recommendations are those of the author(s) and do not necessarily reflect the view of the [name of operating unit] or the US Nuclear Regulatory Commission."

Trafficking In Victims Protection Act Of 2000 (as amended by the Trafficking Victims Protection Reauthorization Act of 2003)

Section 106(g) of the Trafficking In Victims Protection Act Of 2000 (as amended as amended, directs on a government-wide basis that:

"any grant, contract, or cooperative agreement provided or entered into by a Federal department or agency under which funds are to be provided to a private entity, in whole or in part, shall include a condition that authorizes the department or agency to terminate the grant, contract, or cooperative agreement, without penalty, if the grantee or any subgrantee, or the contractor or any subcontractor (i) engages in severe forms of trafficking in persons or has procured a commercial sex act during the period of time that the grant, contract, or cooperative agreement is in effect, or (ii) uses forced labor in the performance of the grant, contract, or cooperative agreement." (22 U.S.C. § 7104(g)).

Executive Compensation Reporting

2 CFR 170.220 directs agencies to include the following text to each grant award to a non-federal entity if the total funding is $25,000 or more in Federal funding.

Reporting Subawards and Executive Compensation.

a. *Reporting of first-tier subawards.*

1. *Applicability.* Unless you are exempt as provided in paragraph d. of this award term, you must report each action that obligates $25,000 or more in Federal funds that does not include Recovery funds (as defined in section 1512(a)(2) of the American Recovery and Reinvestment Act of 2009, Pub. L. 111–5) for a subaward to an entity (see definitions in paragraph e. of this award term).

2. *Where and when to report.*

i. You must report each obligating action described in paragraph a.1. of this award term to *http://www.fsrs.gov*.

ii. For subaward information, report no later than the end of the month following the month in which the obligation was made. (For example, if the obligation was made on November 7, 2010, the obligation must be reported by no later than December 31, 2010.)

3. *What to report.* You must report the information about each obligating action that the submission instructions posted at *http://www.fsrs.gov specify.*

b. *Reporting Total Compensation of Recipient Executives.*

1. *Applicability and what to report.* You must report total compensation for each of your five most highly compensated executives for the preceding completed fiscal year, if—

i. the total Federal funding authorized to date under this award is $25,000 or more;

ii. in the preceding fiscal year, you received—

(A) 80 percent or more of your annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and

(B) $25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and

iii. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at *http://www.sec.gov/answers/execomp.htm*

2. *Where and when to report.* You must report executive total compensation described in paragraph b.1. of this award term:

i. As part of your registration profile at *http://www.ccr.gov*

ii. By the end of the month following the month in which this award is made, and annually thereafter.

c. *Reporting of Total Compensation of Subrecipient Executives.*

1. *Applicability and what to report.* Unless you are exempt as provided in paragraph d. of this award term, for each first-tier subrecipient under this award, you shall report the names and total compensation of each of the subrecipient's five most highly compensated executives for the subrecipient's preceding completed fiscal year, if—

i. in the subrecipient's preceding fiscal year, the subrecipient received—

(A) 80 percent or more of its annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and

(B) $25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts), and Federal financial assistance subject to the Transparency Act (and subawards); and

ii. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at *http://www.sec.gov/answers/execomp.htm).*

2. *Where and when to report.* You must report subrecipient executive total compensation described in paragraph c.1. of this award term:

i. To the recipient.

ii. By the end of the month following the month during which you make the subaward. For example, if a subaward is obligated on any date during the month of October of a given year (*i.e.,* between October 1 and 31), you must report any required compensation information of the subrecipient by November 30 of that year.

d. *Exemptions*

If, in the previous tax year, you had gross income, from all sources, under $300,000, you are exempt from the requirements to report:

i. Subawards,

and

ii. The total compensation of the five most highly compensated executives of any subrecipient.

e. *Definitions.* For purposes of this award term:

1. *Entity* means all of the following, as defined in 2 CFR part 25:

i. A Governmental organization, which is a State, local government, or Indian tribe;

ii. A foreign public entity;

iii. A domestic or foreign nonprofit organization;

iv. A domestic or foreign for-profit organization;

v. A Federal agency, but only as a subrecipient under an award or subaward to a non-Federal entity.

2. *Executive* means officers, managing partners, or any other employees in management positions.

3. *Subaward:*

i. This term means a legal instrument to provide support for the performance of any portion of the substantive project or program for which you received this award and that you as the recipient award to an eligible subrecipient.

ii. The term does not include your procurement of property and services needed to carry out the project or program (for further explanation, see Sec. __ .210 of the attachment to OMB Circular A–133, "Audits of States, Local Governments, and Non-Profit Organizations").

iii. A subaward may be provided through any legal agreement, including an agreement that you or a subrecipient considers a contract.

4. *Subrecipient* means an entity that:

i. Receives a subaward from you (the recipient) under this award; and

ii. Is accountable to you for the use of the Federal funds provided by the subaward.

5. *Total compensation* means the cash and noncash dollar value earned by the executive during the recipient's or subrecipient's preceding fiscal year and includes the following (for more information see 17 CFR 229.402(c)(2)):

i. *Salary and bonus.*

ii. *Awards of stock, stock options, and stock appreciation rights.* Use the dollar amount recognized for financial statement reporting purposes with respect to the fiscal year in accordance with the Statement of Financial Accounting Standards No. 123 (Revised 2004) (FAS 123R), Shared Based Payments.

iii. *Earnings for services under non-equity incentive plans.* This does not include group life, health, hospitalization or medical reimbursement plans that do not discriminate in favor of executives, and are available generally to all salaried employees.

iv. *Change in pension value.* This is the change in present value of defined benefit and actuarial pension plans.

v. *Above-market earnings on deferred compensation which is not tax-qualified.*

vi. Other compensation, if the aggregate value of all such other compensation (e.g. severance, termination payments, value of life insurance paid on behalf of the employee, perquisites or property) for the executive exceeds $10,000.