

**U.S. NUCLEAR REGULATORY COMMISSION
NOTICE OF GRANT/ASSISTANCE AWARD**

1. GRANT/AGREEMENT NO. NRC-HQ-11-G-38-0054		2. MODIFICATION NO.		3. PERIOD OF PERFORMANCE FROM: 8/22/2011 TO: 8/31/2013		4. AUTHORITY Pursuant to Section 31b and 141b of the Atomic Energy Act of 1954, as amended	
5. TYPE OF AWARD <input checked="" type="checkbox"/> GRANT <input type="checkbox"/> COOPERATIVE AGREEMENT		6. ORGANIZATION TYPE Public State-Controlled Institution of Higher ED DUNS: 010628170 NAICS:811310		7. RECIPIENT NAME, ADDRESS, and EMAIL ADDRESS Colorado School of Mines 1500 Illinois St. Golden, CO 80401-1887			
8. PROJECT TITLE: Nuclear Science and Engineering Program at the Colorado School of Mines: Dosimetry and Measurement Techniques Curricular Content							
9. PROJECT WILL BE CONDUCTED PER GOVERNMENT'S/RECIPIENT'S PROPOSAL(S) DATED See Program Description AND APPENDIX A-PROJECT GRANT PROVISIONS		10. TECHNICAL REPORTS ARE REQUIRED <input checked="" type="checkbox"/> PROGRESS AND FINAL <input type="checkbox"/> FINAL ONLY <input type="checkbox"/> OTHER (Conference Proceedings)		11. PRINCIPAL INVESTIGATOR(S) NAME, ADDRESS and EMAIL ADDRESS Prof: Uwe Greife Department of Physics and Nuclear Science and Engineering Email: ugreife@mines.edu Phone: 303-273-3919			
12. NRC PROGRAM OFFICE (NAME and ADDRESS) NRC Attn: Tanya Parwani-Jaimes Office of Human Resources MS: GW5A06 (301) 492-2308 11545 Rockville Pike Rockville, Maryland 20852 Email: Tanya.Parwani-Jaimes@NRC.GOV		13. ACCOUNTING and APPROPRIATION DATA APPN. NO: 31X0200 B&R NO: 2011-84-51-K-134 JOB CODE: T8453 BOC NO: 4110 OFFICE ID NO: RFPA: HR-11-265 FAIMS 680053		14. METHOD OF PAYMENT <input type="checkbox"/> ADVANCE BY TREASURY CHECK <input type="checkbox"/> REIMBURSEMENT BY TREASURY CHECK <input type="checkbox"/> LETTER OF CREDIT <input checked="" type="checkbox"/> OTHER (SPECIFY) Electronic ASAP.gov (See Remarks in Item #20 "Payment Information")			
15. NRC OBLIGATION FUNDS THIS ACTION <u>\$210,000.00</u> PREVIOUS OBLIGATION _____ TOTAL <u>\$210,000.00</u>		16. TOTAL FUNDING AGREEMENT NRC <u>\$210,000.00</u> RECIPIENT <u>0.00</u> TOTAL <u>\$210,000.00</u> This action provides funds for Fiscal Year in the amount of See Page Two					
17. NRC ISSUING OFFICE (NAME, ADDRESS and EMAIL ADDRESS) U.S. Nuclear Regulatory Commission Div. of Contracts Attn: Shashi Malhotra Email: Shashi.Malhotra@NRC.GOV Mail Stop: TWB-01-B10M Rockville MD 20852							
18. Signature Not Required				19. NRC CONTRACTING OFFICER <u>Sheila Bumpass</u> <u>8/22/2011</u> (Signature) (Date) NAME (TYPED) <u>Sheila Bumpass</u> TITLE <u>Contracting Officer</u> TELEPHONE NO. <u>301-492-3484</u>			
20. PAYMENT INFORMATION Payment will be made through the Automated Standard Application for Payment (ASAP.gov) unless the recipient has failed to comply with the program objectives, award conditions, Federal reporting requirements or other conditions specified in 2 CFR 215 (OMB Circular A110).							
21. Attached is a copy of the "NRC General Provisions for Grants and Cooperative Agreements Awarded to Non-Government Recipients. Acceptance of these terms and conditions is acknowledged when Federal funds are used on this project.							
22. ORDER OF PRECEDENCE In the event of a conflict between the recipient's proposal and this award, the terms of the Award shall prevail.							
23. By this award, the Recipient certifies that payment of any audit-related debt will not reduce the level of performance of any Federal Program.							

TEMPLATE - ADM001

SUNSI REVIEW COMPLETE

ADM002

ATTACHMENT A - SCHEDULE

A.1 PURPOSE OF GRANT

The purpose of this Grant is to provide support to the "Nuclear Science and Engineering Program at the Colorado School of Mines: Dosimetry and Measurement Techniques Curricular Content" as described in Attachment B entitled "Program Description."

A.2 PERIOD OF GRANT

1. The effective date of this Grant is August 22, 2011. The estimated completion date of this Grant is August 31, 2013.
2. Funds obligated hereunder are available for program expenditures for the estimated period: August 22, 2011 – August 31, 2013.

A. GENERAL

- | | |
|--------------------------------|---|
| 1. Total Estimated NRC Amount: | \$210,000.00 |
| 2. Total Obligated Amount: | \$210,000.00 |
| 3. Cost-Sharing Amount: | \$0.00 |
| 4. Activity Title: | Nuclear Science and Engineering Program
at the Colorado School of Mines: Dosimetry
and Measurement Techniques Curricular
Content |
| 5. NRC Project Officer: | Tanya Parwani-Jaimes |
| 6. DUNS No.: | 010628170 |

B. SPECIFIC

RFPA No.:	HR-11-265
FAIMIS:	GR0053
Job Code:	T8453
BOC:	4110
B&R Number:	2011-84-51-K-134
Appropriation #:	31X0200
Amount Obligated:	\$210,000.00

A.3 BUDGET

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

Personnel	\$102,480.00
Fringe Benefits	30,913.00
Supplies	<u>11,433.00</u>
Total Direct Cost	144,826.00
Indirect Cost	<u>65,174.00</u>
Total	\$210,000.00

A.4 AMOUNT OF AWARD AND PAYMENT PROCEDURES

1. The total estimated amount of this Award is \$210,000 for the two-year period.
2. NRC hereby obligates the amount of \$210,000 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 Contracting 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

The Nuclear Science and Engineering Program at the Colorado School of Mines is now in its forth year of existence and has exceeded our expectation by growing rapidly in size to already 24 nuclear engineering graduate students. As a new program, there is a strong and clear need for continued course alignment and development to support the new mission. We propose to develop new core course content focusing on dosimetry and measurement techniques, an area of special interest to the NRC, health physics and the nuclear industry. The newly developed course will also include more experiential learning components as we tried some hands-on content in the existing course and are strongly encouraged by the student responses to increase it. Additionally, we will add a significant amount of computer simulation of detector and dosimeter responses. The simulation components of the course will be fully exportable and will be available for sharing with other academic institutions. It is our intent to offer the theoretical and simulation parts of the course in an online setting in the future.

1. Academic Focus

The Nuclear Regulatory Commission (NRC) has identified a critical need for skilled manpower in the face of significant anticipated growth in nuclear power in the U.S. over the next several decades. In 2007 the Colorado School of Mines (CSM), with the approval of the State of Colorado's Colorado Commission of Higher Education, created a new masters and doctoral graduate degree program in Nuclear Engineering that is intended to be well-aligned with NRC, nuclear industry, and national security needs. To implement the new degree programs, the school's administration and faculty have embarked on an ambitious effort to develop the needed core and specialized courses, develop existing faculty expertise, hire new faculty, and improve and expand infrastructure and experimental capacities. The program is now in its forth year and has rapidly grown in size to include 24 nuclear engineering graduate students (adding approximately 5-7 new students per year; we have graduated the first 2 M.S. students). As a

new program, there is a strong and clear need for continued course alignment and development to support the new mission. We propose to develop new core course content focusing on dosimetry and measurements techniques, an area of special interest to the NRC, health physics and the nuclear industry. Section 2 of this proposal describes CSM's Nuclear Science and Engineering Program, Section 3 summarizes the new content of the course "Radiation Detection and Measurement", Section 4 explains the innovative approaches to be developed for the delivery of the new content, Section 5 outlines the timeline for the implementation of the re-organized course, Section 6 presents the qualifications of the P.I. and co-P.I. as they relate to the proposed program, and Section 7 documents CSM's commitment to the proposed coursework and the sustainability of the Nuclear Science and Engineering program.

2. CSM's Nuclear Science and Engineering Program

The Colorado School of Mines (CSM) is a public research university founded under state law specifically designated to provide engineering education and applied research related to "Earth, Energy, Materials and the Environment". Currently, approximately 3600 undergraduate (predominantly Colorado residents) and 1000 graduate students are educated on its Golden, Colorado campus. CSM is the university with the highest undergraduate admission standards and academic ranking in Colorado.

With the academic year 2007/08, CSM started offering programs of study leading to graduate degrees in nuclear engineering (the only nuclear engineering program in the state of Colorado). As part of CSM's Nuclear Science and Engineering initiative, the nuclear engineering degree program is interdisciplinary in nature and draws substantial contributions from the Department of Chemistry, Division of Engineering, the Division of Environmental Science and Engineering, the Department of Geology and Geological Engineering, the Division of Liberal Arts and International Studies, the Department of Metallurgical and Materials Engineering, the Department of Mining Engineering, and the Department of Physics. While delivering a traditional Nuclear Engineering course core, the CSM program in Nuclear Science and Engineering emphasizes the nuclear fuel life cycle. Faculty bring to the program expertise in all aspects of the nuclear fuel life cycle; fuel exploration and processing, nuclear power systems production, design and operation, fuel recycling, storage and waste remediation, radiation detection and radiation damage as well as the policy issues surrounding each of these activities. Research is conducted in the participating departments, at the USGS (U.S. Geological Survey) TRIGA reactor (Federal Center, Lakewood, 10 min from CSM campus), and the new CSM High

Performance Computing cluster. In addition, a Nuclear Science and Engineering Center has been established to integrate all nuclear related research efforts. CSM research groups are part of NEUP and NERI-C funded collaborations in nuclear energy research with LANL, LLNL and INL.

In the spring of 2007, the Colorado Commission of Higher Education (CCHE) approved the following degrees to be offered at CSM:

- *Master of Science (Nuclear Engineering)*, Thesis option 36 total credit hours, consisting of core coursework (21 h), seminar in a participating department (2h) and research (13 h). Students must write and orally defend a research thesis.
- *Master of Science (Nuclear Engineering)*, Non-thesis option 36 total credit hours, consisting of core coursework (21 h), seminar in a participating department (2h), additional elective courses (9 h) and Independent Study (4 h) working on a research project with a faculty member working in nuclear science and engineering.
- *Doctor of Philosophy (Nuclear Engineering)*

72 total credit hours, consisting of coursework (21 h of core and at least 12 h electives), seminar in a participating department (4h) and research (at least 24 h). Ph.D. students must also successfully complete the program's quality control process (which includes a dissertation proposal and defense) as well as write and defend a doctoral dissertation. The quality of the research is expected to rise to the level where it can be submitted for publication in scholarly journals.

For both the MS and PhD degrees, students in nuclear engineering are exposed to a broad systems overview of the complete nuclear fuel cycle and will acquire detailed expertise in a particular component of the cycle. Breadth is assured by requiring all students to complete a rigorous set of core courses. The current core consists of a 21 credit-hour course sequence:

- Introduction to Nuclear Reactor Physics (NUGN510)
- Radiation Detection and Measurement (PGHN504)
- Nuclear Reactor Laboratory (NUGN580 – taught in collaboration with the USGS reactor)
- Materials Science and Engineering of Nuclear Materials (MTGN590)
- Stewardship of Nuclear Resources (ESEG511)
- Reactor Design (NUGN585)
- Nuclear Power and Public Policy (LAIS589)

The Introduction to Nuclear Reactor Physics and the Nuclear Laboratory courses were developed with previous NRC Curriculum Development support and the other courses were

developed using internal CSM resources.

PhD and non-thesis MS students specialize in a particular aspect of Nuclear Engineering under the guidance of a student advisory committee by selecting additional coursework beyond the required core. This additional coursework may include offerings from all of the academic units participating in the degree program: Engineering, Environmental Sciences and Engineering, Geology and Geological Engineering, Liberal Arts and International Studies, Metallurgical and Materials Engineering, Mining Engineering and Physics. Through these additional courses, students gain in-depth knowledge of one particular facet of the nuclear engineering enterprise. In this academic year 2010/11 8 Ph.D. and 16 M.S. students (predominantly U.S. citizens) are pursuing a graduate degree in nuclear engineering at CSM. One search for a junior nuclear engineering faculty member has been concluded with the hiring of Dr. Jeff King (supported by an NRC Faculty Development grant). Another search for a nuclear engineering faculty is in its final phase and is expected to be filled by Spring 11. CSM is fully committed to the success and sustainable development of the nuclear engineering degree program as detailed in Section 7 of this proposal.

CSM undergraduate students have the opportunity to begin work on an M.S. degree in Nuclear Engineering while completing their Bachelor's degree. The CSM Combined Degree Program provides the vehicle for students to use up to 6 credit hours of undergraduate coursework (senior level courses and above) to fulfill part of their CSM Graduate Degree curriculum (if degree requires 36 credit hours or more). Several undergraduate programs (Chemical Engineering, Engineering Physics, Mechanical Engineering, Electrical Engineering, Civil Engineering, Metallurgical Engineering and Chemistry) provide curricula, which include most of the prerequisites for entering the nuclear engineering program. Combined degree program tracks are developed to prescribe the remaining prerequisites as electives to participating students (currently ~15 students, all U.S. Citizens, our main recruitment base).

The prerequisites for entering the nuclear engineering graduate program are:

- A baccalaureate degree in a science or engineering discipline,
- Mathematics coursework up to and including differential equations,
- Physics coursework up to and including courses in modern physics and introductory nuclear physics, and
- Engineering thermodynamics, heat transfer and fluid flow or equivalent.

In addition, graduate students majoring in science and engineering fields may complete a minor degree program, consisting of 12 credit hours of coursework, through the Nuclear

Science and Engineering Program. Minor programs are designed to allow students in allied fields to acquire and then indicate, in a formal way, specialization in a nuclear-related area of expertise.

To launch the new program, CSM has recruited nuclear engineering graduate students primarily from its own residential undergraduate population for M.S. studies, but five of the eight current Ph.D. candidates were recruited from outside CSM. In order to be accessible for students from different undergraduate engineering fields, the CSM graduate nuclear engineering curriculum has been designed for engineers and scientists with diverse backgrounds. Since CSM does not have an undergraduate NE program, the new graduate program was specifically designed to accommodate engineers from other disciplines such as Engineering Physics, Metallurgical and Materials Engineering, Environmental Engineering, Electrical and Mechanical Engineering. As such, the CSM NE program is well aligned with the NRC's recognized strategy for expanding their technical staff by enhancing the capabilities of engineers from other disciplines. Since the students targeted for the program are not expected to have a nuclear background, the core curriculum places heavy and early emphasis on nuclear science and engineering, including courses in Nuclear Reactor Physics, Nuclear Reactor Laboratory, Radiation Detection and Measurement, Nuclear Materials, Reactor Design, and Radioactive Materials Management. We recognize however that courses originally developed for students in other degree tracks (e.g. physics: Radiation Detection and Measurement) should be significantly re-oriented (not just up-dated) to better service the NE students and their prospective employers. This proposal seeks to address this goal by modifying the existing course to include a significant dosimetry content. The newly developed course will also focus more on experiential learning (we tried some hands-on content in the existing course and are strongly encouraged by the student responses to increase it) and computer simulation of the detector and dosimeter responses. The simulation components of the course will be fully exportable and will be available for sharing with other academic institutions.

3. Proposed Dosimetry and Measurements Techniques Course Development

The effects of ionizing radiation on human health and the environment from nuclear installations in the entire fuel cycle length from mining and milling up to the storage of the spent fuel have been a serious public concern. These public concerns emerged in response to the unknown health consequences of exposure to radioactive materials and the potential for extensive environmental contamination. Growing public interest regarding exposures at or near

nuclear facilities was a major impetus for many of the early epidemiologic studies that examined the health effects of radioactive material exposures of former and current workers and the public living near the nuclear facilities. Theoretical and/or experimental radiological characterization methods are extensively and regularly used in controlling every aspect of the nuclear industry. This proposal will address the development of a course to include dosimetry and measurement techniques to train nuclear professionals to work in a variety of areas.

Existing standards on activity measurements

International standards exist in the field of radioactivity measurement and mainly concentrate on measurements procedures, for example:

- Measurement methods (e.g. ISO 7503-1 to 7503-3 on estimating surface contamination).
 - Measuring instruments (e.g. IEC 325:1981 on alpha, beta and alpha-beta contamination meters and contamination monitors – IEC 846:1989 on beta, X and gamma radiation dose equivalent and dose equivalent rate meters for use in radiation protection).
 - Measurement uncertainty (e.g. ISO/DIS 11929-1 to -8 on determining the decision threshold and detection limit for ionizing radiation measurement).
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The re-oriented course will address measurement technologies, techniques and standards, including the NRC rules and guidance to radiological measurements related to the human health, contaminated equipments and environmental risks associated with the use of radioactive material, and will include the following main subjects:

Nuclear Radiation detection and Measurements (currently the main emphasis of the existing "Radiation Detection and Measurement" course): Radiation sources; statistics of radiation counting; characteristics and utilization of various radiation detectors; radiation spectroscopy with scintillation detector; semiconductor detector; neutron detection and spectroscopy of fast neutrons (new content added).

Environmental Radiation and Measurements (new content): Natural and artificial environmental radioactivity; devices needed for radiation measurement; sampling and samples preparation for analysis in laboratory; laboratory and field radiation measurements.

Radiation Dosimetry (new content): Basic principle of radiation dosimetry for various kinds of radiation: charged particle radiation, gamma radiation and neutron; low and high level radiation dosimetry; various types of radiation dosimeter.

The course will be broken down into weeks; these weeks will build upon each other. Each week has class instructional activities, presentations, demonstrations, and short actual measurements that will be performed by students at various scenarios in the laboratory and/or field.

Throughout the course, students will work on radionuclides encountered in real life i.e. in mining and milling process of uranium ore. Incremental evaluations of the students throughout the course will be administered as progressive feedback. There may be written assessment as well as a demonstrable evaluation when appropriate.

At the completion of the course, the participants should be able to:

- The students will achieve the ability to conduct radiation measurements at various stages of the nuclear fuel cycle, with large variety of detectors and methods (modified course achievement goal; emphasis on nuclear fuel cycle).
 - The students will familiarize themselves with various measurement standards, statistical treatment of measured data, error propagation and uncertainty.
 - This course also will promote critical thinking among the professional involved in the dosimetry and measurement techniques and their interpretation (new achievement goal).
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- This course also enables the students to develop research skills required for the collection, analysis and presentation of information in the context of radiation measurements, and further improvement in measurement techniques and data analysis. Familiarity with NRC regulations on the handling of radioactive sources (new achievement goal). Experience with working on a team with individual responsibilities but a common goal.

Existing University Attributes to Support the Project.

The Colorado School of Mines (CSM) is a public research university devoted to engineering and applied science. Realizing the need for trained professionals in the area of nuclear energy, the Colorado School of Mines has started in the 2007/08 academic year a graduate program in "Nuclear Science and Engineering". The program offers M.S. and Ph.D. degrees in nuclear engineering, which are geared at drawing its student base from our traditional undergraduate science and engineering programs. Additionally, we offer four graduate minor degrees "Nuclear Engineering, Nuclear Materials Processing, Nuclear Detection and Nuclear Geosciences" that are open to graduate students in allied fields and aim at providing them with the background to succeed in the nuclear industry. We see the class proposed here as of special interest and use also for these minor degree students. There are several departments (Metallurgy, Engineering Physics, Mining, Environmental Science and Engineering, Geology and Liberal Arts) at the Colorado School of Mines that are supporting the curriculum and research development. In order to include the more specific requirements of the regulatory authorities we are drawing on the expertise of adjunct faculty with backgrounds in the nuclear industry. The proposed course geared at dosimetry and measurements techniques draws on the existing curriculum and equipment in the CSM physics department and will be modified and re-oriented to be more relevant for NE students and their prospective employers. Additionally, more hands-on experience and computer simulation will be used to enhance the student's experience. It is our intent to offer the course in the future also through CSM's Continuing Education Program as part of Graduate Certificates in the Nuclear Science and Engineering Program. We will therefore work also on the development of a distance-learning curriculum divided into a theoretical part available via the web and an on-site laboratory block component. A key goal of the proposed course is to provide the students with a broad understanding of dosimetry and measurements techniques in the context of NRC regulation requirements during the process of the entire nuclear fuel cycle. To do this, an experiential learning approach will be used with hands-on activities but also computational models of the various detectors and dosimeter responses introduced as surrogates for actual physical systems. The intention of the proposed course is to

present a complete exposition of dosimetry and measurements techniques and analysis of each step in the fuel cycle; rather. Table 1 presents the 12 learning modules that will be contained in the proposed course, based on 45 hours of instructions (a 15week, 3-credit hour course).

Table 1: Proposed module in the Dosimetry and Measurements Techniques course.

Instructional Proposed Course Module Hours

The deliverable products from the proposed course are documented course curricular materials including learning objectives and outcomes, lesson plans, lecture materials, course assessment and feedback tools, and computer simulations and models. The simulations and related modules will be easily exportable and will be available upon request to other academic

I. Over view of radioactive sources in the fuel cycle (natural and artificial)	3
II. Safety and regulation (NRC, NCRP, ICRP, BEIR, UNSCEAR, etc), models of exposure and dose rate and their impact on the regulation process	6
III. Various radiation detectors	6
IV. Experimental data acquisition, data analysis and statistics of radiation counting	3
V. Radiation dosimetry principles and types	6
VI. Using analytical tools (i.e. Monte Carlo) to estimate the detector responses and detectors position methodology.	6
VII. Laboratory experiments (particle detection)	3
VIII. Laboratory experiments (gamma detection)	3
IX. Laboratory Experiments (neutron detection)	3
X. Laboratory Experiments (neutron activation analysis)	3
XI. Comparison between the experimenters and analytical calculations	3
XII. Team project presentation	
Total Instructional Hours	45

institutions as advertised through a CSM-hosted web-page.

4. Innovative Instructional Approaches The course will be innovative in the use of computer codes as a surrogate for actual experiments and as a tool for optimization of the measurement process. Each course module will be based around detailed simulation models constructed using Monte Carlo to simulate the detector and dosimeter responses. The computer simulations will provide the students with a detailed study of the properties of the radiation field of interest and detectors responses to this field in a hazard-free environment that allows for extreme-case testing and demonstration of principles. The detailed modules will be pre-constructed and provided to the students to use as the basis for building an experiential understanding of the relationships between actual measurement and simulation tools and the errors & uncertainty associated of using each tool. Another key goal of the proposed course is for the students to develop a basic understanding on how to set up the detection instruments, and in what kind of background signal they are working, the limits of detection and their cause, where to place the detectors in order to have meaningful counting, and the differences between passive and active measurements.

On the hands-on side the students will perform an environmental monitoring exercise aimed at illustrating the depth and difficulty of detecting a signal in a large and highly variable background. Additionally, the new course will place a stronger emphasis on experiments with and dosimetry of neutrons.

To achieve this, the proposed new course content will be integrated with the more traditional Radiation Detection and Measurement course taught now. This combination will provide students with a detailed understanding of the dosimetry and measurement techniques concepts involved in the entire fuel cycle process from the mining process up to the decommissioning. Currently the course description for PHGN504 "Radiation Detection and Measurement" reads:

-Physical principles and methodology of the instrumentation used in the detection and measurement of ionizing radiation.

After the reorganization the course description will read:

-Standards and measurement techniques in nuclear science and engineering for particle detection and dosimetry.

The course will also be cross-listed as NUGN5XY in the Nuclear Science and Engineering Program.

In our development of the online course content we will first investigate the use of Blackboard software as this is the current standad for online faculty-student interaction on campus. As some

faculty at CSM appear unhappy with the video capabilities of this software, we will also explore several other packages like Adobe E-Learning and Connect, Moodle, WizIQ and Articulate. A specific point of interest will be how to best integrate the simulation content.

5. Development Timeline

The proposed new course will be developed over the course of two years, with a plan to deliver the first iteration of the course in the spring 2012 semester. The course materials and detailed simulations will be developed during the summer of 2011 and refined over the fall 2011 semester. The course will be offered in the spring Semester of 2012. Following this initial delivery, the course content will be evaluated and revised based on the results of student feedback and knowledge assessment. The course is part of the core nuclear engineering curriculum, to be taught every spring semester. As one of the core courses in the nuclear engineering program curriculum, the new course will be subject to all of the quality control and improvement mechanisms embedded in the CSM academic program, including student evaluations, peer teaching evaluations, and yearly performance reviews. Annual offering of this class is part of the duties of the CSM Physics department.

6. Personnel Qualifications

The curricular details will be developed and implemented by Drs Zeev Shayer and Uwe Greife from the Physics Department and Nuclear Science and Engineering Program at CSM, Golden, Colorado. As a former technical reviewer for NRC Dr. Shayer is familiar with measurements standards applied to the workers health safety and the environment. His research ranges from reactor development to fission physics. Dr. Greife specializes in low energy nuclear physics and instrumentation and manages the Radiation Detection and Measurement Laboratory in the Physics Department. He oversaw as Interim Director the start up of the Nuclear Science and Engineering Program for its first 3 years. A graduate student assistant will be employed hourly for the web and laboratory equipment development.

7. Institutional Support and Sustainability

The single largest measure of the sustainability of the proposed coursework is the commitment to maintain the modified resulting course within the core curriculum for the Nuclear Engineering graduate degrees. The improvement proposed will significantly strengthen the quality of CSM's Nuclear Engineering graduates and will ensure that NRC's investment will result in a course that will be delivered yearly for the foreseeable future. The re-oriented course will be taught on a developmental basis in the spring 2012 semester, with the intention that it will remain in its final form in the Nuclear Engineering core curriculum. The sustainability of the proposed course thus becomes intimately tied with the sustainability of the Nuclear Science and Engineering Program at CSM. A key measure of the sustainability of the Nuclear Science and Engineering program is the number of students entering the program and the number of students graduating with graduate degrees. The Nuclear Engineering program currently has 24 graduate students and ~15 undergraduates pursuing a Combined Program B.S./M.S. degree. The current growth rate is approximately 5-7 students/year. The first 2 M.S. students have graduated in 2010, and the first Ph.D.s are expected in the 2011/12 academic year. Concurrent with the growth in the number of students, CSM is also pursuing targeted faculty hires to bolster the program.

Strategic planning for the program, which has been informed by discussions with the US Nuclear Regulatory Commission, the Department of Energy, and nuclear energy industry representatives, has established a goal of hiring three more core Nuclear Science and Engineering faculty over the next two years. In keeping with theme of having a broad, fuel-cycle focused program.

CSM envisions expanding the nuclear engineering program recruiting base to include also professionals from other engineering disciplines. Indeed, several former students, now working in non-nuclear and nuclear industries, have expressed interest in program offerings delivered in forms suitable for part-time studies. As a future expansion phase of the nuclear engineering program it is therefore planned to fill this need through evening and weekend as well as on-line course offerings.

As detailed in the attached letter of support from the Dean of Graduate studies, CSM will continue to provide leveraged funding and support to the Nuclear Science and Engineering Program. While still new, Mines is fully committed to building the NSE program into the premier graduate enterprise specializing in nuclear fuel-cycle issues. To this end, Mines has:

- provided salary support for adjunct and research professors who are contributing to program development and implementation;
- continued to provide \$40,000/academic year to the NSE Program for student support;
- hired, with NRC support, a new tenure-track Nuclear Engineering faculty member who started Fall 2009;
- approved, and is currently conducting the search for, a second Nuclear Engineering hire to start Spring 2011;
- received substantive commitment to the Nuclear Science and Engineering Program from about 20 faculty across eight academic departments;
- established a Nuclear Science and Engineering Center (NuSEC) to coordinate all nuclear science and engineering related research efforts across campus;
- implemented an agreement with the United States Geological Survey (USGS) for access to their TRIGA research reactor for research and instructional use;
- developed, with NRC support, Nuclear Reactor Physics and Nuclear Reactor Laboratory graduate courses;
- developed, using internal funding, graduate courses in Materials Science and Engineering of Nuclear Materials, Stewardship of Nuclear Resources, Nuclear Reactor Design, and Nuclear Power and Public Policy;
- established a five-year combined BS/MS nuclear engineering degree program as a pipeline into our graduate program;
- founded a Colorado School of Mines Student Chapter of the American Nuclear Society and participated in the revitalization of the Colorado Chapter of the American Nuclear Society;
- focused campus advancement activities related to the NSE program in order to identify potential donors who can support the new program; and
- begun actively exploiting contacts with its partners in the uranium mining, milling, fuel production and environmental remediation industries to support and enhance the program.

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.
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To assist with finding additional guidance for selected items of cost as required in 2 CFR 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 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

a. Grantee Financial Management systems must comply with the established provisions in 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 quarterly basis for the periods ending March 31, June 30, September 30, and December 31, 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.

As part of the FY 2010 HR grant awards, in addition to the customary performance progress report requested on the SF-PPR, SF-PPR-B, and SF-PPR-E forms, HR requires the following metrics to be reported on by the awardees as follows:

Curriculum Development Awards

1. Overall number of new courses developed in NRC designated STEM areas;
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 from 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)).

Award Term

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.
