

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

1. GRANT/AGREEMENT NO. NRC-HQ-11-G-38-0066	2. MODIFICATION NO.	3. PERIOD OF PERFORMANCE FROM: 8/22/2011 TO: 8/21/2013	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 Private Institution of Higher ED DUNS: 072933393 NAICS:611310	7. RECIPIENT NAME, ADDRESS, and EMAIL ADDRESS University of Southern California USC University Gardens, Suite 203 Los Angeles, CA 900890001	
8. PROJECT TITLE: New Graduate Program Development in Nuclear Engineering Delivered Via USC Distance Education Network			
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 University of Southern California, Aerospace & Mechanical Engineering Attn: Professor Satwindar Singh Sadhal, 3650 McClintock Ave. OHE 400G Los Angeles, CA 90089 Email: sadhal@usc.edu (213) 740-0492	
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-11-268 FAMIS 620056	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>\$200,000.00</u> PREVIOUS OBLIGATION <u>\$ 00.0</u> TOTAL <u>\$200,000.00</u>		16. TOTAL FUNDING AGREEMENT NRC <u>\$200,000.00</u> RECIPIENT <u>\$ 0.00</u> TOTAL <u>\$200,000.00</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 <div style="text-align: right;"><i>Sheila Bumpass</i> <u>8/32/2011</u> (Signature) (Date) NAME (TYPED) Sheila Bumpass TITLE Contracting Officer TELEPHONE NO. 301-492-3484</div>	
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 "New Graduate Program Development in Nuclear Engineering Delivered via USC Distance Education Network" with the University of Southern California, 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 21, 2013.
2. Funds obligated hereunder are available for program expenditures for the estimated period: August 22, 2011 – August 21, 2013.

A. GENERAL

1. Total Estimated NRC Amount: \$200,000
2. Total Obligated Amount: \$200,000
3. Cost-Sharing Amount: \$0
4. Activity Title: "New Graduate Program Development in Nuclear Engineering Delivered Via USC Distance Education Network"
5. NRC Project Officer: Tanya Parwani-Jaimes
6. DUNS No.: 072933393

B. SPECIFIC

- RFPA No.: HR-11-268
FAIMIS: GR0056
Job Code: T8453
BOC: 4110
B&R Number: 2011-84-51-K-134
Appropriation #: 31X0200
Amount Obligated: \$200,000

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
Direct Participant Cost	\$ 61,377.00	\$60,886.00
Indirect Cost (F & A)	\$ 38,770.00	\$38,968.00
Yearly Total	\$100,147.00	\$99,853.00

A.4 AMOUNT OF AWARD AND PAYMENT PROCEDURES

1. The total estimated amount of this Award is \$200,000.00 for the two-year period.
2. NRC hereby obligates the amount of \$200,000 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

PROJECT DESCRIPTION

B.1 ASSESSMENT PLAN

It is of utmost importance to evaluate the effectiveness of the education program and its delivery via the Distance Education Network (DEN). We shall model our assessment on outcome-based education (OBE) and use a variety of assessment methods to properly evaluate the program quality and success in accomplishing the goals. This is a methodology for curriculum development and teaching that focuses on the students' acquired ability after the completion of a course and/or a program, and for the Program to undergo continuous improvement. For this purpose, an assessment committee consisting of the PIs and at least one other faculty member will be set up. Additionally, an Industrial Advisory Board (IAB, See Section B.6.5, Collaborative Linkages) will be assigned duties to assess the Educational Objectives of the Program. Besides these tools, important components will be student exit surveys, employer surveys, and at the Program's maturation, we shall implement an alumni survey. In addition, it is the investigators' intention to acquire information directly from students to properly evaluate the effectiveness of the distance education program, properly identify the weaknesses, and then seek methods to improve on them. This process will need to rely mostly on questionnaires given to students. These tools, together with the appropriate responsible body are tabulated below:

Assessment method	Component assessed	Responsible body
Specific course assessment	Course outcomes	Instructor
Curriculum evaluation	Program outcomes	Curriculum Assessment Committee/ Industrial Advisory Board (IAB)/ Aerospace & Mechanical Engineering Department
Employer survey	Program objectives and outcomes	Distance Education Network (DEN) Masters and Professional Programs (MAPP)
Student exit survey	Program outcomes	DEN/MAPP
Alumni survey (after program maturation)	Program objectives and outcomes	DEN/MAPP

Table 1: Assessment methods summary

The Curriculum Assessment Committee will take the overall responsibility to conduct the assessment procedures. Metrics for assessing the effectiveness of the education program will

include measures of teaching efficacy, student grades, DEN efficacy for both on-campus and off-campus students, internship placements and supervisor performance evaluations, industry job placements, etc. Upon input from the surveys, the committee will review the findings and report to the Industrial Advisory Board for further input to improve the curriculum and provide updates in line with the technological advancements in the industry, and towards the Nuclear Engineering Education infrastructure improvement (see also Section B.8).

B.2 LETTERS OF ENDORSEMENT AND SUPPORT

Letters of support have been received from Harold Blackman (INL), Joseph Wambold and Edward Quinn. We also received a letter of support from Dr. Yannis Yortsos, Dean of the USC Viterbi School of Engineering. These letters of support have been transcribed to save space, and the ***signed originals on the letterheads are provided as attachments.***

B.2.1 Blackman

January 20, 2010

Dear Professor Sadhal,

I am delighted to support your effort with Drs. Meshkati and Maya to develop a Nuclear Engineering graduate curriculum and degree program at the University of Southern California (USC). With the revitalization of nuclear energy, this is a timely and a necessary contribution to our country. The materials you provided, illustrate a comprehensive program that will produce high quality graduates ready to materially contribute to the nuclear industry. As a member of the nation's nuclear energy laboratory, the Idaho National Laboratory and the Director of the Center for Advanced Energy Studies I strongly support such an effort. We would look forward to collaborating with your program through internships, experiential learning opportunities as well as sharing of curriculum.

It is well known that the nuclear industry will face a severe shortage of university-trained personnel, in both the government and private sectors. In our own laboratory the average age of our nuclear engineering and science staff is over 50 years. If the Nation is to meet its electricity goals in the coming decades with the two critical objectives of US energy security and supply diversity, nuclear power will surely serve as a key component. I believe that USC is geographically positioned to well serve the expected demand for qualified nuclear engineering personnel in the Southern California area and elsewhere. Having access to quality education via USC's Distance Education Network (DEN) would ensure that a shortage of qualified personnel is not a limit to the appropriate deployment of the nuclear industry.

I would also be pleased to serve on your Industrial Advisory Board (IAB). I commend you on a very innovative approach to ensuring the curriculum maintains pace with the rapid rate of changes in new technologies and reactor designs, and safety and licensing approaches. I look forward to contributing to this body.

Sincerely,

(signed copy in the attachments)

Harold S. Blackman, PhD
Director of the Center for Advanced Energy Studies
Director of Laboratory Integration, Idaho National Laboratory

B.2.2 Wambold

January 13, 2010

Dear Prof. Sadhal,

I am very pleased to learn about your effort with Drs. Meshkati and Maya to develop a Nuclear Engineering graduate curriculum and a degree program at the University of Southern California (USC). Such an effort is indeed a timely contribution to the nuclear industry's needs to provide qualified personnel. I have reviewed the materials you provided, and based on my 35 plus years as a practitioner in the nuclear industry, including my experience as Vice President at the San Onofre Nuclear Generating Station, the curriculum addresses the key training needs of the future workforce of the nuclear industry.

Undoubtedly, without the curriculum development efforts, the nuclear industry faces a considerable shortage of university-trained personnel in Nuclear Engineering, in both the government and private sectors. If the country is to meet its electricity goals in the coming decades with critical objectives of US energy security, supply diversity, and reduction of Greenhouse Gas (GHG) emissions, nuclear power will surely serve as a key component. I believe USC is geographically positioned to well serve the expected demand for qualified

nuclear engineering in the Southern California area and elsewhere. Having access to quality education via USC's Distance Education Network (DEN) would help ensure that a shortage of qualified personnel is not a limit to the appropriate deployment of the nuclear industry.

I would be pleased to serve on your Industrial (IAB). I commend you on your very innovative approach to ensuring the curriculum maintains pace with the rapid change in new technologies and reactor design, and safety and licensing approaches. I look forward to contribute to this board.

Sincerely,

(signed copy in the attachments)

Joseph J. Wambold

B.2.3 Quinn

January 10, 2010

Dear Professor Sadhal,

The purpose of this letter is to follow up the very exciting news on this new program for USC to develop a nuclear engineering graduate program and curriculum!!! I am very excited about this prospect and look forward to working with you and your staff in building the infrastructure for the program.

Based on my experience as Chair for the Nuclear Engineering Advisory Board for the Ohio State University and as an instructor for the MIT Summer Reactor Safety Course for over 15 years, the curriculum needs to address the educational and training needs for the future workforce for engineers and management personnel for the nuclear industry.

I believe that USC is geographically very well to support this demand. I am pleased to serve on your Industrial Advisory Board (IAB) and to help you in every way to bring the program to fruition.

Sincerely,

(signed copy in the attachments)

Edward (Ted) L. Quinn

President,

Technology Resources

B.2.4 Yortsos, USC Viterbi Dean of Engineering

October 27, 2010

Re: NRC Nuclear Engineering Education Proposal

Dear Sati,

I am pleased to strongly endorse your initiative to develop a Master's-level Nuclear Engineering Education Program for the Viterbi School of Engineering. I have reviewed the expected growing trends in nuclear power development in the United States and other countries, and recognize the need for nuclear engineering education and training. As I have indicated in my meetings with you on this subject, the Viterbi School of Engineering is fully committed to the development and continued sustenance of this program.

Furthermore, the School is willing to commit additional resources in terms of new full-time tenure-track faculty to build the program. As for the curriculum development and its passage for approval through the School and the University Curriculum Committees, you can again count on my unwavering support.

I commend the initiative that you, along with Drs. Meshkati and Maya, have taken to develop this effort. Please feel free to contact me for further assistance.

Sincerely,

(signed copy in the attachments)

Yannis C. Yortsos, Dean

B.3. PROGRAM OUTLINE

The program will be at the GRADUATE level, directed towards Master's-degree students seeking specialization in Nuclear Engineering. It is intended to be permanent, and based on the current enrollment of 35 students in the introductory course (AME 581), we anticipate that we shall have at least 50 students in the program, once it is fully developed.

B.3.1 Academic Focus

With a timeframe of only two years, the scope of the current proposal has to be limited to Mechanical Engineering. The long-term academic focus, however, is to create a Nuclear Engineering concentration with the breadth and flexibility to fit within the various existing Master's degree programs. In future development, the participating Master's degree programs will include Chemical Engineering, Materials Science, and Industrial Systems Engineering.

Presently, USC does not have any program in Nuclear Engineering Education, and this proposal will be the first step towards a subsequent full-fledged MS degree in Nuclear Engineering. The project will be focused largely on new course development (specifically four new core courses) and the expansion of several of the existing courses into the distance-education environment. At the same time, the investigators will keep in sight the important theme of providing an entire Master's degree by distance education in the nuclear engineering concentration. This is a significant challenge in terms of maintaining high-quality graduate education in the virtual classroom environment.

Besides the addition of several new courses specific to Nuclear Engineering, an effort will be made towards the restructuring of existing ones to include material relevant to nuclear technology. For example, among existing courses such as Hazardous Waste Management (ENE 516) offered by the Environmental Engineering program will be revised to include a nuclear component before being included as an elective.

B.3.2. Courses of Study

The program will be at the GRADUATE level and be permanent. Based on the current enrollment of 35 students in the first offering of an introductory course in nuclear engineering (AME 581), we can expect the full program to attract at least 50 students after a full-fledged marketing effort. The focus of this proposal is to develop within the MSME degree program, a concentration in Nuclear Engineering (Table 2). At the conclusion of this project, the program will be expanded to having a similar concentration in Chemical Engineering, Industrial Systems Engineering and Materials Science. The long-term goal is to develop a full degree program for MS in Nuclear Engineering.

B.3.3 New Course Development

The courses listed in Table 2 with specific courses number are already in place. AME 581, which has been approved and is being taught for the first time this semester (Fall 2010). The

others written in bold italics will be developed by the PI's and other personnel. The development will be phased over two years, and for this effort, the expertise exists within USC (see Section B.5.1 for the PIs' qualifications).

BASIC:	UNITS
AME 525: Engineering Analysis (Linear Algebra and Complex Variables)	3
AME 526: Engineering Analytical Methods (PDEs)	3
CORE:	
Introduction to Nuclear Engineering (currently offered, 35 students)	3
<i>Nuclear Reactor Physics</i> (to be developed)	3
<i>Human Performance, Safety Culture and Nuclear Safety</i> (to be developed)	3
<i>Nuclear Thermal-Hydraulics</i> (to be developed)	3
<i>Effects of Radiation on Health</i> (to be developed)	3
ELECTIVES. CHOOSE 6 UNITS FROM:	
AME 530b: Incompressible Flow	3
AME 535a: Computational Fluid Dynamics	3
AME 515: Heat Conduction	3
AME 516: Convective Processes	3
CHE 502: Numerical Methods in Diffusive and Convective Transport	3
AME 518: Radiation Heat Transfer	3
AME 577: Survey of Energy and Power for a Sustainable Future	3
EE 516: Electrical Power Distribution	3
AME 533: Two-Phase Flow	3
ENE 516: Hazardous Waste Management	3
AME 578: Modern Alternative Energy Conversion Devices	3
TOTAL	27

Table 2: Nuclear Engineering concentration within MSME program of study.

B.3.4 New Course Outlines

B.3.4.1 Effects of Radiation on Health (ENG 5xx, 3 units) – Sadhal/Maya

Objectives: The course will start with fundamental nuclear physics as a basis and build on applications relevant to human health. Besides the development of an understanding of the biological effects of radiation, course will emphasize problem solving and application to situations in a variety of health physics specialty areas. Students will experience the utilization of the basic concepts and principles to address a range of practical problems dealing with, for example, measurement, biological effects, radiation protection, nuclear accidents.

Topics	
Structure of Matter	Radiation Protection Principles
Nuclear Transformation	Radiation Shielding Principles
Ionizing Radiation Production	Environmental Monitoring and Dose Models
Interactions of Ionizing Radiation with Matter	Reactor Waste Management
Biological Effects of Radiation	Nuclear Power Accidents, Radiological
Measurement of Ionizing Radiation	Consequences and Changes to Regulations
Radiation Quantities and Units	Regulations and Industry Guidelines
Measurement of Absorbed Dose	Applications of ALARA
-Internal and External Dosimetry	Emergency Response Training
	Decommissioning and Decontamination

Textbooks and References:

1. Introduction to Health Physics ,by Herman Cember
2. Basic Health Physics: Problems and Solutions by Joseph John Bevelacqua
3. Radiation Protection and Dosimetry: An Introduction to Health Physics by Michael G. Stabin
4. Radiation Protection: A Guide for Scientists, Regulators and Physicians, by Jacob Shapiro

B.3.4.2 Nuclear Reactor Physics for Engineers (ENG 5xx, 3 units)

Isaac Maya, Ph.D., P.E. (Nuclear)

Course Objectives: This course will provide the nuclear reactor physics fundamentals on which nuclear reactor engineering is based. It will present the theory of nuclear fission and the fission energy production process, and relate these to the technological bases for reactor core design. Reactor physics problems will be introduced along with the relationship of neutron transport to energy production and removal. These will then be related to homogeneous and heterogeneous core configuration concepts. Reactor kinetics and dynamics and reactivity feedback and their relationship to reactor control and the safety behavior of nuclear reactors will be covered. The course will also cover the effect of neutron irradiation on materials, along with the basics of the nuclear fuel cycle and the issues of safeguards, environmental impact and waste disposal.

Topics (e.g., from Lewis)

- | | |
|------------------------------------|--------------------------------------|
| 1. Nuclear Reactions | 6. Spatial Diffusion of Neutrons |
| 2. Neutron Interactions | 7. Neutron Distributions in Reactors |
| 3. Neutron Distributions in Energy | 8. Energy Transport |
| 4. The Power Reactor Core | 9. Reactivity Feedback |
| 5. Reactor Kinetics | 10. Long Term Core Behavior |

Candidate Textbook and References

Fundamentals of Nuclear Reactor Physics by Elmer E. Lewis

Nuclear Reactor Physics by Weston M. Stacey

Introduction to Nuclear Reactor Theory by John R. Lamarsh

Nuclear Reactor Analysis by J.J. Duderstadt, L.J. Hamilton

B.3.4.3 Nuclear Thermal Hydraulics (AME 5xx, 3 units) – S.S. Sadhal

Course Objectives: The purpose of developing this course is to provide the students with sound technical knowledge about the thermo-fluid dynamic phenomena and analysis methods for nuclear power stations. The course will present topics on heat generation by nuclear reactions, conduction in fuel rods, and transport of generated heat by convective transport, including boiling and condensation. The students will be provided with a development of the equations of fluid flow and heat transfer, and their application to PWRs and BWRs with thermal transport aspects for steam generation, safety and containment.

Topics:

- | | |
|--|--|
| 1. Thermal Hydraulic Characteristics of Power Reactors | 6. Nuclear Energy Conversion: First & Second Law |
| 2. Thermal Design Principles | 7. Thermal Analysis of Fuel Elements |
| 3. Reactor Heat Generation | 8. Channel Flows |
| 4. Single-Phase Transport (Fluid and Heat) | 9. Application to BWRs and PWRs |
| 5. Two-Phase Flow | 10. Safety Issues (LOCA), containment, spray systems |

Textbook: Nuclear Systems Volume I: Thermal Hydraulic Fundamentals, Todreas & Kazimi

References: "Nuclear Systems II: Elements of Thermal Hydraulic Design," Todreas & Kazimi
"The Thermal-Hydraulics of a Boiling Water Nuclear Reactor, Lahey & Moody

B.3.4.4 Human Performance, Safety Culture, and Nuclear Safety (ISE 5xx, 3 units) – N. Meshkati

Course Objectives: This course provides an overview of human-systems integration considerations, human performance and safety culture in the nuclear power operations. The Nuclear Regulatory Commission (NRC) has recognized the importance of human performance in its Reactor Oversight Process (ROP) and ensured that nuclear plant operators establishing and maintaining a strong safety culture – a work environment where management and employees are dedicated to putting safety first. Following the 2002 Davis-Besse reactor vessel head degradation event plant where the licensee determined that the causes that led to the event were indicative of a weak safety culture, NRC lessons learned pointed toward the need for additional NRC efforts to evaluate a licensee's safety culture. In May 2009, the NRC's *Draft Safety Culture Policy Statement* was submitted and the nuclear power industry, through the Nuclear Energy Institute (NEI), released *Fostering a Strong Nuclear Safety Culture* (June 2009) study. These documents provide roadmap for this course.

Topics

1. Human factors, micro- and macroergonomics
2. Human-systems integration
3. Examples of human factors and ergonomics considerations (in Nuclear Safety)
4. Human performance factors in accident causation
5. Case study: TMI Accident
6. Human error causation
7. Safety culture; concepts and determinants
8. Case study: Davis-Besse 2002
9. Work practices
10. Work planning and control
11. Safety conscious work environment
12. Problem identification and evaluation
13. Problem resolution
14. Resources
15. Licensee decision-making
16. Accountability
17. Continuous learning environment

Candidate Textbooks and References:

Safety Culture in Nuclear Power Operations, Wilpert & Itoigawa (Eds.) (2001).
Safety Culture: An NRC Perspective. Meserve 2002 INPO CEO Conference. Atlanta,
Nuclear Safety: A Human Factors Perspective. Misumi, Wilpert, & Miller (Eds.) (1999)
Fostering a Strong Nuclear Safety Culture, Nuclear Energy Institute (June 2009). (NEI 09-07).
Internal Safety Culture Task Force, NRC Final Report, April 2009.

B.3.5 Program Startup and Implementation Timeline (Milestones)

The target date for the startup of the program is Fall 2012. By this time, there will be enough courses developed and being offered so that a typical full-time student may begin with a sequence. A sample course plan for a Mechanical Engineer may be as follows:

Semester	COURSE	TITLE	COURSE TYPE
Fall 2012	AME 526	Engineering Analytical Methods (PDEs)	Basic
	AME 581	Introduction to Nuclear Engineering	Core Elective
	AME 515	Heat Conduction	
Spring 2013	AME 525	Engineering Analysis (Linear Algebra)	Basic
	AME 5xx	<i>Nuclear Reactor Physics</i>	Core
	ENG 5xx	<i>Effects of Radiation on Health</i>	Core
Fall 2013	AME 5xx	<i>Nuclear Thermal-Hydraulics</i>	Core
	ISE 5xx	<i>Human Performance, Safety Culture and Nuclear Safety</i>	Core
	AME 577	Survey of Energy and Power for a Sustainable Future	Elective

Table 3: A sample study plan for a Mechanical Engineering graduate student

To meet such a plan, we will work with a course-development timeline whereby course development begins in Fall 2011, and all the core courses are developed by Fall 2013. The new basic course, Introduction to Nuclear Engineering (AME 581) is already being offered in the current semester (Fall 2011) and has 20 students enrolled. The course development will take the following path, along with names of responsible parties:

Development Period	COURSE	TITLE	INSTRUCTOR/ COORDINATOR
Spring 2012	ENG 5xx	<i>Nuclear Reactor Physics</i>	Maya
Summer 2012	AME 5xx	<i>Effects of Radiation on Health</i>	Sadhal/Maya
Summer 2012	ISE 5xx	<i>Human Performance, Safety Culture and Nuclear Safety</i>	Meshkati
Summer 2013	AME 5xx	<i>Nuclear Thermal-Hydraulics</i>	Sadhal

Table 4: Course development timeline

Timeline for curriculum changes approval:

Already completed	Approval MSME (Nuclear Engineering) program by the Department of Aerospace & Mechanical Engineering. See Section B.3.2. "Courses of Study"
October 2011	Submission of MSME (Nuclear Engineering) program for approval by the School of Engineering Curriculum Committee. for program details. This submission will be inclusive of all four new courses.
December 2011	Approval by the Engineering Curriculum Committee and submission to the University Curriculum Committee
February 2012	Approval by the University Curriculum Committee.
April 2012	Start of program publicity.
August 2012	Launch of program

Table 5: Curriculum approval timeline

B.4. INSTITUTIONAL CAPABILITY, SUPPORT AND LONG-TERM SUSTENANCE

As a first indicator of success, the offering of a single introductory graduate-level course in Nuclear Engineering (AME 581) in Fall 2010 has attracted 35 students without much advertisement. In addition, the School's administration has made a commitment to support the program and its growth (see letter of support from Dean Yortsos, Section B.2.4).

Besides the expertise of the PIs who will develop some of the key core courses to launch the program in Mechanical Engineering, the other departments involved (Physics, and Chemical Engineering & Materials Sciences) have expressed support and advice for this venture. Therefore, in terms of course development beyond the two-year period of the proposed project, the capability exists to carry this out. In addition, experts from the nuclear industry will be sought to teach some of the specialized courses. Before going into a full-fledged Master's degree in Nuclear Engineering, a three-step approach will be taken. The first step will be the development a Nuclear Engineering concentration within the Mechanical Engineering Master's program (Current proposal, 2011-13). The next phase (2013-15) will be the expansion to other Master's programs in Engineering (Chemical, Industrial Systems and Materials Science). Upon successful implementation of this second phase, the next phase will grow into a Nuclear Engineering degree program.

B.4.1 Distance Education Support:

USC's Viterbi School of Engineering has one of the largest distance education programs in the nation. The Distance Education Network (DEN) currently offers over 30 Master of Science degrees **entirely online**. DEN is part of the Office of Master's and Professional Programs (MAPP) and fully supports credit and non-credit courses online. DEN also offers six unique graduate certificates. Furthermore, several degrees and certificate options include interdisciplinary studies with the Marshall School of Business, Gould School of Law, and the School of Public Policy and Development. DEN also supports the Viterbi School's continuing education efforts with our division of professional development. These non-credit and custom courses provide additional flexibility and customized learning for professional engineers.

The infrastructure for DEN is very well established. The PI has 27 years of experience with teaching in this system from its infancy (as a televised directional broadcast) up to now as a webcast online program. The co-PIs also have extensive experience teaching in DEN's education delivery system. USC has a commitment to support this growing system and it has become a model that many other institutions tend to follow. After 2002, the internet became the primary delivery method. The number of degrees and students have increased dramatically and

instructional and collaboration support became DEN's new focus. DEN continues to offer courses to more some 1000 DEN students each year and 120 courses each Fall and Spring semester. The system is fully set up to webcast a class being given on campus. The feedback system (homework submissions and examinations) is fully set up to work for the instructor and teaching assistants entirely through online submission with full instructor access to submitted and graded material for the entire semester. In addition, DEN takes the responsibility to place the lecture material from the classroom smart-board to the online system, besides the live webcast. The one item open for improvement, as mentioned earlier, is in the area of one-to-one communication between the instructor and the DEN students. This will be addressed to improve the system as discussed in Section B.3.2 (Virtual Office Hours). Overall, DEN is a major strength for the proposed program, and the DEN program director has assured support for it.

B.4.2 Long-Term Sustainability

The program once established will continue to enjoy the institutional support and the PIs are committed to keeping it strong, active and growing. The administration has given a commitment to maintain the program. Much of the sustainability depends on student demand for the program. Already, the interest in the introductory course (AME 581) is well beyond expectations (35 students enrolled). Since this is expected to grow, the risk from a survival standpoint is very low. Furthermore, USC's DEN program has an outreach effort that is able to draw students from the industry all around the country. In terms of supporting the educational program at the MS level, there is sufficient in-house technical expertise to offer the core courses. In addition, contacts have been made with experts in the Southern California area who are willing to serve the program as part-time instructors. With the development of the core-course infrastructure with the resources from the proposed grant funding, the program at the proposed level (Nuclear Engineering concentration in various departments) will become self-sustaining.

As an indication of the Viterbi School of Engineering's commitment to development and growth in the energy area, an Energy Initiative has been established. The School considers the energy area very important and nuclear engineering a strong component of it. Additionally, the school is committed to be a significant player in this effort, and faculty hires in the future will be very much influenced by the energy initiative and focus of the school, including nuclear engineering.

B.4.3 Marketing the Program

USC's Distance Education Network has established links with the industry with a strong outreach program. Therefore, the for the purpose of extending knowledge about the launch of a new program, the DEN infrastructure is set up to properly disseminate the information among potential students. Their approach for publicity includes booth set-ups at professional conferences and trade shows, corporate site visits with the local industry and utilization of corporate contacts. In addition, DEN is well-equipped to publish brochures for mailing and also has a large emailing database. Also available are the services of the Communications Office for issuing press releases. These facilities will be used the fullest extent to provide the necessary publicity for this new program.

B.5 DEMONSTRATION OF PROGRAM SUCCESS

The Viterbi School of Engineering at the University of Southern California has a very large student population in the Master's degree programs both on-campus as well as online. Out of approximately 3,000 Master's-degree students, a third are DEN-based. With the success that DEN has demonstrated in attracting students by providing high-quality distance education, the PIs are confident of the viability and sustainability of the proposed program.

B.5.1 Investigators' Educational Program Development Experience

B.5.1.1 Sadhal: The PI (Sadhal) has an undergraduate degree in Nuclear/Thermal Power Engineering from the University of Toronto. As an undergraduate, he worked as a summer intern with the Whiteshell Nuclear Research Establishment (Atomic Energy of Canada Limited). After completing his doctorate at Caltech in 1978, he started as an educator at the University of Pennsylvania where he embarked on the development of undergraduate and graduate courses in Nuclear Engineering. Over his academic career, he has developed ten courses and taught sixteen different courses. In addition, since joining USC in 1982, he has some new programs (e.g., he developed the MEMS program and restructured the Thermal Sciences curriculum). He has been an active participant with the undergraduate accreditation (ABET) planning and preparation in 1991, 1997 and 2003. His most recent efforts with curriculum development have been with the Center for the Instruction of Mathematics to Engineering Students (CIMES) for which he has been a co-director since 2007.

B.5.1.2 Meshkati: Dr. Meshkati has more than twenty-five years of experience in complex systems safety and his interdisciplinary research is concerned primarily with the risk reduction and reliability enhancement of complex and large-scale technological systems such as nuclear power plants. He investigated and written about major industrial accidents such as the TMI, Bhopal, and Chernobyl which he visited and inspected in 1997. He has been awarded two research grants from the NRC for his research on the critical role of human performance, information process and decision making in the safety of nuclear power plants and he conducted parts of this research at the Experimental Breeder Reactor (EBR-II) in Idaho Falls. He has also consulted for the nuclear power industry and his most recent project for EPRI which dealt with a major multifaceted root-cause investigation of the industry's action regarding the Wolf Creek situation. He has been a member of the research proposal Review Panel for the Nuclear Energy Research Initiative University Program (NERI), selected by the US Department of Energy, Office of Nuclear Energy (2003-2005) and a member of the Evaluation Committee for the "R&D Enterprises" and the Laboratory Directed Research and Development Program at the Idaho National Engineering and Environmental Laboratory (INEEL) (August 1999). While at USC, Dr. Meshkati has significantly contributed to the program and curriculum development of two (new) graduate degrees – Master of Science and Doctor of Philosophy in Human Factors. He has also developed the curriculums and launched two state-of-the-art professional (continuing education) programs: Process Safety Management and Transportations Safety.

B.5.1.3 Maya: Dr. Maya has undergraduate, master's and doctorate degrees in Nuclear Engineering Sciences from the University of Florida. He also has 15 year of working experience in the nuclear industry, at General Atomics on advanced fusion reactors, at the Innovative Nuclear Space Power Institute (INSPI) at the University of Florida and California State University, Long Beach (CSULB), and Rockwell International on nuclear space power reactors. While at General Atomic, Dr. Maya developed and co-taught a full 4-month curriculum covering all the areas tested for professional engineer certification in the State of California (which he and three other attendees all passed). While at INSPI, Dr. Maya revamped and delivered the graduate-level Introduction to Nuclear Power Engineering course offered at CSULB. In addition, while at USC, Dr. Maya totally re-developed, upgraded and taught the Engineering Project Management course on DEN.

B.5.2 Qualifications and Support of Other Participants

Besides the PIs, several interested parties have agreed to participate in the program development effort. These are listed next.

B.5.2.1 Sergio Guarro: For the future development and teaching of courses in Neutron Transport and Reactor Control (after the proposed phase), Dr. Sergio Guarro has agreed to be of service on a part-time basis. Presently, Dr. Guarro will serve as a consultant to the development of the curriculum, particularly on the four new courses being added. His current

activity and experience in Nuclear Engineering will be very valuable towards the curricular effort. Dr. Guarro is the president and chief scientist at ASCA Inc., an engineering consulting company that specializes in risk, reliability and safety modeling of advanced aerospace and nuclear systems, presently conducting both production and research projects for NASA and the U.S. Nuclear Regulatory Commission. Dr. Guarro has also been awarded the special title of Distinguished Engineer in the Systems Engineering Division of the Aerospace Corporation, where he has worked for nearly twenty years, holding both technical and managerial responsibilities, leading a number of projects related to risk assessment and mission assurance for military and surveillance spacecraft. In earlier periods of his career he has worked for: the Lawrence Berkeley Lab, NIRA (an Italian nuclear plant engineering company), the Nuclear Engineering Department at UCLA, the Nuclear Regulatory Commission, and the Lawrence Livermore National Laboratory.

Dr. Guarro's professional background and accomplishments in the field of nuclear science and engineering have spanned, over a period of over 35 years the fields of neutron transport theory, nuclear materials, nuclear plant thermal-hydraulics and control system design, nuclear plant safety and risk assessment. Dr. Guarro has developed academic and professional course materials on the subjects of risk management, risk assessment and reliability. He has taught an upper division course on these subjects at the University of California, Los Angeles, as well as periodic professional courses and tutorials organized by the Aerospace Institute, the educational organization of the Aerospace Corporation. See Dr. Guarro's CV for his publication list and other technical qualifications.

B.5.2.2 Majid Motamed: For education in Nuclear Thermal-Hydraulics, Dr. Majid Motamed will be a part-time instructor in addition being a member on the Industrial Advisory Board. He will also serve as a consultant on the proposed curriculum development effort since his long experience with the nuclear industry will be highly beneficial towards course development. He is presently a Principal Scientists at Advanced System Concept Associates (ASCA, Inc.) where he has worked since 2001. He is engaged in technical and project management of NASA Space Mission PRA Projects, Including the development and application of PRA methodology for NASA Space Missions carrying nuclear components. He has also been involved with Southern California Edison (SCE) in the development of Probabilistic Risk Assessment (PRA) models at SONGS (San Onofre Nuclear Generating Station) where he had sixteen years of hands-on

experience. Among his contributions at SONGS, he has developed methodologies and computer models to perform thermal hydraulic simulation and accident analysis and has been a member of SCE High Impact Teams tasked with resolving technical and operational problems. He has also supported the development of software for safety analysis of digital control systems in advanced reactors under contract with the US Nuclear Regulatory Commission. Besides his high-level technical experience, he has experience as an educator. At USC, he has taught a course on human reliability and human error analysis based on methodologies developed for nuclear industry and at UCLA, he conducted an upper division course on the Thermal design of Nuclear Power Plants. Dr. Motamed's curriculum vitae is included in the proposal

B.5.2.3 Angus McColl: As mentioned in Section B.1.3 under Experiential Learning, the active participation of Mr. Angus McColl (Executive Director, Corporate & Foundation Relations at the USC Viterbi School of Engineering) will be highly useful in an advisory capacity to bring the perspective of application of nuclear power for naval propulsion. As a graduate of the United States Naval Academy, and the Naval Postgraduate School and a veteran of the Nuclear Navy, the Mr. McColl brings more than 20 years of experience in the US nuclear submarine fleet. He has had many functions during his career with the Navy, such as Naval Nuclear Propulsion Engineer, Executive Office (USS OHIO (SSBN-726)(BLUE), and Naval Nuclear Power Program Recruiter. His curriculum vitae is provided.

B.5.2.4 Professor Walter Wolf, Ph.D., a Distinguished Professor of Pharmaceutical Sciences, founder and Director of Pharmacokinetic Imaging Program Department of Pharmaceutical Sciences in the School of Pharmacy, and Chair of the Biomedical Imaging Science Initiative, has given the present initiative full support. His experience with Nuclear Medicine will be beneficial towards synthesizing a broader long-term program in the Nuclear Sciences at USC. Over the years, his research has focused on pharmacokinetic imaging, a novel approach that allows noninvasive studies of drug biodistribution, targeting and metabolism using both nuclear medicine imaging (including positron emission tomography) and magnetic resonance spectroscopy techniques. In 2006, he was the recipient of the Georg Charles de Hevesy Nuclear Pioneer Award for his contributions to nuclear medicine.

B.5.2.5 Dr. Javad Rahimian, Ph.D., a graduate of UCLA Medical Physics program, has over 28 years experience in handling radioactive materials, radiation safety, radiation protection, and application of ionizing radiation in diagnostic and therapeutic radiology. He is board certified by the American Board of Science in Nuclear Medicine and the American Board of Radiology in Therapeutic Radiologic Physics. Dr. Rahimian is on the list of State of California Approved Medical Physicists, Department of Health Services to Conduct Therapy Machine Calibrations, and Radiation Protection Surveys.

He has developed and taught three courses in physics of radiation oncology, physics of diagnostic radiology and medical image processing, and nuclear medicine instrumentation, and radiation protection. He is currently teaching physics of radiation oncology to the medical residents at the Southern California Permanente Medical Group (SCPMG). He has received the "Teacher of the Year Award" for the Academic Year 2006-2007, Presented by the Association of

Residents in Radiation Oncology. He has worked as acting radiation safety officer for Kaiser Permanente medical center, Los Angeles, and is currently a member of the radiation safety committee at Kaiser Permanente, and a past member of UCLA-Olive View Medical Center radiation safety committee. He is a lecturer at UCLA department of Radiation Oncology. He has published over 80 peer-reviewed articles, book chapters, scientific exhibitions, and abstracts in the field of radiological sciences.

As the Nuclear Medicine Technical Cooperation Expert for the International Atomic Energy Agency (IAEA), Vienna, Austria he was posted for a One-Month Mission in the Nuclear Medicine Center, Hospital de Clinicas, Montevideo, Uruguay to teach nuclear medicine imaging technology, radiation safety, and protection to the physicians and physicists from South American Countries. He was invited by the atomic energy commission of Argentina, Buenos Aires to deliver lectures and teach applications of Single Photon Emission Computed Tomography Imaging Techniques in the Clinical and Research Nuclear Medicine.

B.5.3 Endorsement of Nuclear Experts

The investigators have received very strong support and endorsement (see Section B.2) for the proposed program from the following national experts:

1. Harold S. Blackman, INL
2. Joseph J. Wambold, SC Edison, SONGS
3. Edward Quinn, Longenecker & Associates, past president of ANS

These experts have also agreed to serve on an Industrial Advisory Board for the Nuclear Engineering Educational program at USC. Their qualifications are summarized in Table 6 (Section B.6.5), and more detailed biosketches are given. The letters of support are attached.

B.6. INNOVATIVE INSTRUCTIONAL APPROACHES

B.6.1 Distance Learning

One of the several innovative instructional approaches in this proposal to enhance the educational outreach for Nuclear Engineering students is the use of USC's Distance Education Network (DEN). DEN is a long-established program at USC, the largest of its kind in the nation, and with a strong track record of effectiveness. DEN has over 1,300 students enrolled each semester, providing access to 34 Master of Science degrees in eight major engineering disciplines. Since its inception in 1972 DEN (formerly known as Instructional Television Network) has graduated more than 18,000 professional engineers.

The proposed Nuclear Engineering concentration will be unique in that students will have the option to either attend classes on campus, or complete the entire course offerings and degree program option via DEN in the virtual classroom environment. As such, the nationwide availability for nuclear engineering graduate education at this level represents an important avenue for students and practicing engineers wanting to move into the nuclear field, and/or enhance their technical skills and knowledge. The DEN Nuclear Engineering program at USC will represent a full package of graduate education that both new graduate students as well as engineering professionals at various career stages will be able to initiate. It will attract students in various disciplines and is designed to fit into the existing Master's degree programs in five disciplines.

B.6.2 Interactive Delivery Systems

DEN operates ten studio classrooms capable of capturing classroom lectures and supporting remote interactivity. Lectures are streamed as live video, and captured and archived throughout the semester as webcasts and downloads. Live interactivity is provided by integrating web, phone, and video conference options. These live components within a class allow remote

students to engage in presentations and discussion with the entire classroom. DEN also provides an online course management system for all faculty, staff, and students.

B.6.3 Virtual Classroom Environment

Within the existing framework of DEN (Distance Education Network), the instructor's visual and oral communication is transmitted and the actively written material is also available live in transcript form. However, simultaneous projection of several pages of transcript is not currently available, and this will be a target for improvement. In addition, many of the DEN classrooms provide three smart-boards (LCD hand-writable boards), and advanced software to selectively display written pages of smart-board material simultaneously in the same classroom will be explored to effectively meet the demands of engineering instructors.

B.6.4 Experiential Learning

The second innovative element of this proposal is the experiential learning component of the curriculum. This component will augment the classroom lectures and instruction with practical lectures, supplemental videos, hands-on modules and site visits with experienced nuclear industry practitioners. USC has excellent relationships with nearby nuclear facilities and industrial firms that have agreed to lend their expertise to this endeavor.

The experiential learning component of this nuclear engineering training program will be enhanced by the active participation of USC's Angus McColl, Executive Director, Corporate & Foundation Relations at the USC Viterbi School of Engineering. Mr. McColl is a graduate of the United States Naval Academy, and the Naval Postgraduate School and a veteran of the Nuclear Navy, with more than 20 years of experience in the US nuclear submarine fleet. He has had many functions during his career with the Navy, such as Naval Nuclear Propulsion Engineer, Executive Office (*USS OHIO (SSBN-726, BLUE)*), and Naval Nuclear Power Program Recruiter.

With the presence of San Onofre Nuclear Generating Station (SONGS) in close vicinity to USC, we will interact with active nuclear engineers who can participate in providing up-to-date input on current activities and problems. We expect to further enhance our already strong ties with the SONGS for this effort under the guidance of Mr. Joseph Wambold, who has agreed to be a member of our Industrial Advisory Board. He has been the Vice President of Nuclear Generation for Southern California Edison 1999-2005, where he was responsible for SONGS plant operations, maintenance, plant security. With his offer to share his expertise in an advisory capacity, we plan to cultivate specific experiential learning opportunities and collaborative projects. Also, the Center for Advanced Energy Studies (CAES) at the Idaho National Laboratory, which integrates resources, capabilities and expertise to create new research capabilities, expand researcher-to-researcher collaborations, and enhance energy-related educational opportunities, provides many opportunities for experiential learning and enrichment education. [Dr. Harold Blackman, who is the Director of Laboratory Integration as well as the CAES Director at the INL has also agreed to serve on the Industrial Advisory Board of this effort.] Based on our ongoing dialogue with CAES, we also expect to develop a strategic partnership with the Advanced Test Reactor National Scientific User Facility (ATR-NSUF) at the INL to enable our students and faculty to utilize its resources and to conduct basic and applied nuclear research and development at this facility.

In terms of research activity, the PIs are in close contact with key personnel at the Brookhaven National Laboratory (Dr. John O'Hara) and in the US nuclear power industry (Mr. Harold Blackman, Director of the Center for Advanced Energy Studies, INL) who would provide strategic direction for education in Nuclear Engineering, especially in Nuclear Safety-related areas. For future development of the program, the PIs also plan to initiate activities in collaboration with both of these facilities to set up short-term internship programs that full-time students can benefit with hands-on experience. Currently available simulations codes will be

made accessible to the students to virtually visualize the operation of a reactor, including, e.g., control, accident response, nuclear core analysis with full core modeling.

In addition, USC, through its Department of Homeland Security (DHS) sponsored National Center for Risk and Economic Analysis of Terrorism Events (CREATE), is an active participant in nuclear detector development, deployment and risk assessment activities associated with the local waterways. CREATE has ongoing projects in collaboration with the Ports of Los Angeles and Long Beach, and the nuclear aspects of radiation detection to prevent illegal transport of nuclear materials can be integrated into the curriculum. CREATE has also been working with the detector development companies, such as ORTEC, and the national labs in improving the design of the detectors for the marine environment. The curriculum will thus have access to the very latest in radiation detection methodology and practical application.

B.6.5 Collaborative Linkages

The third innovative feature of this proposal will be its **Industrial Advisory Board (IAB)**. Supplementing our collaborative effort with the local utility (SONGS), a national laboratory (INL) and other consultants, to the IAB will provide regular advice to USC's educational program developers on the latest demands on the industry, and how to best serve them through high-quality technical education. Several individuals have already expressed an interest and willingness in serving in this capacity, including. In addition, we have recruited four very prominent local nuclear engineering experts (Mr. Harold Blackman, Dr. Majid Motamed, Dr. Sergio Guarro, Mr. Ted Quinn, and Mr. Joseph Wambold) with extensive experience in the nuclear power industry to serve on our IAB, and as part-time instructors and guest lecturers to complement the curriculum, both from a fulfillment standpoint as well as bringing industry experience to the classroom. We hope to have a kick-off meeting with the Board in June 2011. A listing of the panel members is included here.

BOARD-MEMBER	AFFILIATION	EXPERTISE
Harold S. Blackman	CAED Director, INL	Nuclear Safety, Human Performance, Safety Culture, Laboratory integration,
Sergio Guarro	ASCA Inc. and Aerospace Corp.	Nuclear safety and risk assessment, high-level technical expertise, educational experience
Majid Motamed	ASCA Inc.	High-level technical expertise in nuclear thermal hydraulics, risk assessment, educational experience
Edward Quinn	Longenecker & Associates, past president of ANS.	Nuclear and fossil fuels utility contracts management, nuclear projects licensing, electrical and controls design, standard development.
Joseph Wambold	SCEdison/SONGS	Nuclear plant operations, maintenance and security.

Table 6: Industrial Advisory Board (the names are in alphabetical order)

B.7 MILESTONES: SEE SECTION B.3.5

B.8 EDUCATION INFRASTRUCTURE IMPROVEMENT

The Nuclear Engineering education infrastructure is presently not offered in any degree programs that may be completed by distance learning. This is exactly what will be addressed under the current proposal, and the new program is expected to reach out to a wide spectrum of audiences, both geographically and technically. The program will develop a concentration in Nuclear Engineering within the existing MS degree program (Mechanical Engineering). Besides the distance education, the basic philosophy of the program consists of sound training in

engineering fundamentals (including engineering mathematics) and rigorous education in engineering principles, together with a significant exposure to practical problems in the nuclear field. Under the proposed effort, we will be adding the Nuclear Engineering courses which will make up the concentration.

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 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)).

Executive Compensation

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.