

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

1. GRANT/AGREEMENT NO. NRC-HQ-12-G-38-0075	2. MODIFICATION NO.	3. PERIOD OF PERFORMANCE FROM: 08/31/2012 TO: 08/31/2014	4. AUTHORITY Pursuant to Section 31b and 141b of the Atomic Energy Act of 1954, as amended															
5. TYPE OF AWARD <input checked="" type="checkbox"/> GRANT <input type="checkbox"/> COOPERATIVE AGREEMENT	6. ORGANIZATION TYPE Public State-Controlled Institution of Higher ED DUNS: 804883767 NAICS: 611310	7. RECIPIENT NAME, ADDRESS, and EMAIL ADDRESS The Curators of the University of Missouri 300 W. 12th Street 202 Centennial Hall Rolla, MO 65409 Mendy Kell Email: mkell@mst.edu																
8. PROJECT TITLE: Laboratory on Corrosion of Nuclear Materials toward Understanding Ageing Mitigation in Light Water Reactors at Missouri S & T																		
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 Dr. Carlos H. Castano The Curators of the University of Missouri 300 W. 12th Street 202 Centennial Hall Rolla, MO 65409, Email: castanoc@mst.edu																
12. NRC PROGRAM OFFICE (NAME and ADDRESS) NRC Attn: Tanya Parwani-Jaimes Office of the Chief Human Capital Officer 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: 2012-84-51-K-134 JOB CODE: T8453 BOC NO: 4110 OFFICE ID NO: HR-12-299 FAMIS: GR0212	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 <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:30%;">THIS ACTION</td> <td style="width:30%; text-align: right;">\$194,447.00</td> </tr> <tr> <td>PREVIOUS OBLIGATION</td> <td style="text-align: right;">_____</td> </tr> <tr> <td>TOTAL</td> <td style="text-align: right;">\$194,447.00</td> </tr> </table>		THIS ACTION	\$194,447.00	PREVIOUS OBLIGATION	_____	TOTAL	\$194,447.00	16. TOTAL FUNDING AGREEMENT <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:30%;">NRC</td> <td style="width:30%; text-align: right;">\$194,447.00</td> <td style="width:40%;"></td> </tr> <tr> <td>RECIPIENT</td> <td style="text-align: right;">_____</td> <td></td> </tr> <tr> <td>TOTAL</td> <td style="text-align: right;">\$194,447.00</td> <td></td> </tr> </table> <p style="text-align: right; margin-top: 10px;">This action provides funds for Fiscal Year 2012 in the amount of \$194,447.00</p>		NRC	\$194,447.00		RECIPIENT	_____		TOTAL	\$194,447.00	
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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 <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:60%; text-align: center;"><i>Sheila Bumpass</i></td> <td style="width:40%; text-align: right;">08/31/12</td> </tr> <tr> <td style="text-align: center;">(Signature)</td> <td style="text-align: right;">(Date)</td> </tr> <tr> <td>NAME (TYPED)</td> <td style="text-align: right;">Sheila Bumpass</td> </tr> <tr> <td>TITLE</td> <td style="text-align: right;">Grants Officer</td> </tr> <tr> <td>TELEPHONE NO.</td> <td style="text-align: right;">301-492-3484</td> </tr> </table>		<i>Sheila Bumpass</i>	08/31/12	(Signature)	(Date)	NAME (TYPED)	Sheila Bumpass	TITLE	Grants Officer	TELEPHONE NO.	301-492-3484					
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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.																		

ATTACHMENT A - SCHEDULE

A.1 PURPOSE OF GRANT

The purpose of this Grant is to provide support to the "The Curators of the University of Missouri – Laboratory on Corrosion of Nuclear Materials toward Understanding Ageing Mitigation in Light Water Reactors at Missouri S & T" as described in Attachment B entitled "Program Description."

A.2 PERIOD OF GRANT

1. The effective date of this Grant is August 31, 2012. The estimated completion date of this Grant is August 31, 2014.
2. Funds obligated hereunder are available for program expenditures for the estimated period: August 31, 2012 – August 31, 2014.

A. GENERAL

- | | |
|--------------------------------|---|
| 1. Total Estimated NRC Amount: | \$194,447.00 |
| 2. Total Obligated Amount: | \$194,447.00 |
| 3. Cost-Sharing Amount: | \$0.00 |
| 4. Activity Title: | Laboratory on Corrosion of Nuclear Materials toward Understanding Ageing Mitigation in Light Water Reactors at Missouri S & T |
| 5. NRC Project Officer: | Tanya Parwani-Jaimes |
| 6. DUNS No.: | 804883767 |

B. SPECIFIC

- | | |
|-------------------|------------------|
| RFPA No.: | HR-12-299 |
| FAIMIS: | GR0212 |
| Job Code: | T8453 |
| BOC: | 4110 |
| B&R Number: | 2012-84-51-K-164 |
| Appropriation #: | 31X0200 |
| Amount Obligated: | \$194,447.00 |

A.3 BUDGET

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

	Year 1	Year 2
Personnel	\$ 38,794.00	\$ 41,337.00
Fringe Benefits	\$ 2,797.00	\$ 2,937.00
Travel	\$ 3,330.00	\$ 3,670.00
Supplies	\$ 7,444.00	\$ 7,444.00
Equipment	\$ 14,400.00	\$ 16,800.00
Total Direct Charges	\$ 66,765.00	\$ 72,188.00
Indirect Charges	<u>\$ 26,968.00</u>	<u>\$ 28,525.00</u>
Yearly Total	\$93,733.00	\$100,713.00

A.4 AMOUNT OF AWARD AND PAYMENT PROCEDURES

1. The total estimated amount of this Award is \$194,447.00 for a two year period.
2. NRC hereby obligates the amount of \$194,447.00 for program expenditures during the period set forth above and in support of the Budget above. The Grantee will be given written notice by the Grants Officer when additional funds will be added. NRC is not obligated to reimburse the Grantee for the expenditure of amounts in excess of the total obligated amount.
3. Payment shall be made to the Grantee in accordance with procedures set forth in the Automated Standard Application For Payments (ASAP) Procedures set forth below.

Attachment B – Program Description

B.1. Elective vs. Permanent Course:

The set of proposed lectures/practices are part of a **permanent** obligatory course in our Nuclear Engineering Program (NE-341 – Nuclear Materials I). Given the rising importance of understanding potential issues in ageing nuclear power plants, these lectures will be a requirement of all students enrolled in our program.

B.2. Undergraduate vs. Graduate:

NE-341 – Nuclear Materials 1, is a mixed course taken by **both** undergraduate and graduate students. The course is obligatory for undergraduates and many graduate students register it as well (although it is not required for graduate students).

B.3. Discussion of the Project's Emphasis:

We propose here to create a set of lecture/laboratory practices on corrosion and ageing mitigation of nuclear materials where students will receive besides the fundamentals of corrosion (electrochemistry) of nuclear components, also a practical component on electrochemical instrumentation and applicability of those principles. This series of lectures will be complemented with experiments done in a laboratory and will provide the students with an understanding of the ageing mechanisms on light water reactors systems and components. These lectures and lab practices will have a total duration of **4 to 6 weeks** of class time ending with a project presented by students, where they demonstrate, by groups, a practical aspect of environmental degradation, corrosion, or mitigation of damage in nuclear materials. The effort will consist of 3 components:

1. First there will be a theoretical presentation of the fundamentals of corrosion including thermodynamics, and basic kinetic principles of electrochemical corrosion (galvanic series, corrosion kinetics, Pourbaix diagrams, passivation, etc) including the different types of corrosion (galvanic pairs, denting, crevice, pitting, hydrogen embrittlement, etc).
2. There will be 4-6 lab practices where the students will observe the application of the principles. In the practices, we will show the effect of stress on producing anodic and cathodic areas in the same material, how improperly applied protective coating can lead to localized corrosion, and fundamentals of potentiostat measurements (corrosion potentials), stress corrosion cracking, passivation, and basic cathodic protection using

sacrificial anodes. And finally new materials will be introduced (ODS steels).

3. The students will be asked to research and demonstrate cases where corrosion can be identified as issues and identify the importance in nuclear power plant operation, examples in the specialized literature are abundant (e.g. [1], [2], [3]).

B.4. Number of students you are planning to reach

All undergraduates of the nuclear engineering program are required to take NE-341. Besides some mechanical engineers (the course is double listed as Metallurgical Engineering: Met Eng-341 – Nuclear Materials I). Besides the undergraduate students many nuclear engineering graduate students register for the course as well. The current enrolment in the course is 41 students. Previous enrolments have been 25, 29, and 22 students in 2010, 2009, and 2008 respectively.

B.5. Improvement of the Education Infrastructure, Teaching Competencies, Subject Matter Expertise, and Skills of Students in Nuclear Engineering:

In the Davis-Besse Nuclear Power Plant a small crack in the SS lining of a PWR, produced a leaking nozzle which eventually created a 4" hole in the reactor head steel (see figure 1d), at the time the damage was discovered less than a 1" of stainless steel remained (beyond yield stress) and the reactor was close to catastrophic failure. The NRC reported that "Boric acid deposits were not properly removed and indications of reactor vessel head corrosion were not recognized or evaluated". It is perplexing that such failure was not addressed before, considering that there were previous experience. In particular a similar leakage had caused corrosion (wastage) in Turkey Point Unit 4 in the early 80's (see figure 2, taken from [1]).

Figure 2. Areas of the reactor vessel head fo Turkey Point Unit 4 affected by boric acid (taken from [1]).

Considering we had previous operational experience with such issues, no doubt the lack of corrosion/electrochemistry awareness of the inspectors [4], and operatives is to blame. Therefore, educating nuclear engineers at all levels (operators, designers, researchers, policy makers, etc) both as undergraduate and graduate students with deeper knowledge on corrosion/age mitigation techniques is clearly of great importance for the safe and reliable operation of both our nuclear reactor fleet and the new reactor models being approved for construction in the United States and abroad. Currently a brief and limited introduction to the subject is presented in modern textbooks (e.g. [5]), but students do not learn to do real measurements, or in fact understand the techniques to study corrosion systems.

The Missouri S&T Nuclear Engineering Department being one of the biggest undergraduate nuclear engineering programs in the United States (8th in the nation [6]), and given its strong traditional emphasis on the field of power generation, is the ideal place for establishing this initiative to form the new generation of nuclear engineers with a more complete understanding of corrosion, and material interactions as well as the initiatives for mitigation of ageing in light water reactors.

There are many instances where a better understanding of electrochemical processes is fundamental to better assess the safety and long term performance of a nuclear system. Examples abound, but include primary and secondary stress corrosion cracking (SCC), irradiation assisted SCC, water cladding interactions, corrosion during aqueous storage, as well as crevice, denting, concentration cells, CRUD formation and evolution, and a great many more

[Nuclear engineers should have a specialized understanding of the potential for enhanced corrosion and other electrochemical reactions in nuclear systems and subsystems due to the effect of radiolysis. Because nuclear reactors continuously operate under differential pressures, hot electrolytes, and under a radiation environment which further alters chemical and electrochemical equilibrium and kinetics. Failures of materials in nuclear systems (catastrophic or not) are harder to handle given the specialty issues involved (containment, doses, public opinion, etc).

B.6. Instructional Approach and Enhanced Student Learning:

The practical components of the course will be done in such a way that understanding of the applications would be emphasized. The lab practices will be conducted as a **discovery instruction laboratory** [8], presenting little theory before the laboratory, and emphasizing understanding and comparison with previous knowledge. After the students have discovered the behavior of interest, a correlation with the theory will be done, followed by a prediction of the system behavior to reassess the understanding of the principles learned. Students are attracted to the idea of discovering new information and every student try to discover the fundamental principles that make the experiment work (rather than following a recipe).

The lab practices will at the same time be conducted to demonstrate electrochemical instrumentation. For example, students learn how to use a potentiostat (instrument to measure corrosion potentials, such as that shown in figure 1b) by presenting the instrument to the students and giving them the task calibrating the instrument (e.g. ASTM G5-94 [9]). The practice would be then conducted as a discovery session where the students would need to make functional meaning of the instrument and the measurements obtained. After they are familiar with the controls and behavior of the system, theoretical connections are established by bringing the equations that express the functionality they have observed (galvanic potential, more and less noble metals, etc). Inquiries are then conducted to expand the current knowledge and predictions are made as to what should happen if we modify parameters in the system. This technique provides better engagement and faster feedback.

This practical approach is a well tested instructional approach (**problem-based learning**), when correctly implemented it helps enhance student understanding and comprehension of the material, as well as encourage future learning.

The PI is known for using a number of innovative techniques in his classes in both lecture and laboratory formats. The PI is also well aware of modern teaching techniques, having taken graduate courses on teaching philosophy and having studied the research on teaching techniques in the Center for Teaching Excellence of the University of Illinois at Urbana Champaign. The PI's motto about teaching is: "**nobody can teach anybody anything**", that is to say a professor can only help students learn. Techniques currently being used by the PI that will be incorporated into this educational effort include: **Personal Response System ("Clickers")** [11]. This personal response system colloquially called by students "clickers" consist of a RF voting system incorporated into PowerPoint presentations. This allows the professor to interact with the students during class time and assess understanding on the spot, continuously as the class progresses, such that if a number of students are providing erroneous answers (not following, rushing material, misunderstanding, etc) the professor can stop, obtain feedback from the students, and clarify concepts on the spot.

Another technique currently in use that will be incorporated is the use of Learning Enhanced Across Disciplines (LEAD) sessions [12]. These are learning forums where interested students

come to learn from peers within an atmosphere of cooperation. Students do homework, help each other, and clarify concepts. The idea is that students learn better from a peer than from a figure of authority, and also students that learn better when they work as a cooperative group, rather than isolated units. The professor or an assistant is present, but refrains from solving problems or simply explaining concepts and participates only if absolutely necessary. Otherwise the professor keeps as low a profile as possible, only helping when new students arrive to be incorporated in a group to help maximize time-on-task. LEAD sessions follow as much as possible the seven principles of good practice in undergraduate education (<http://lead.mst.edu/sevenprinciples/commentary.html>).

B.7. Timeline:

The expected timeline is presented in table 1. The first step to develop the program is the procurement of a Pine bipotentiostat and metal samples of suitable materials including zirconium to simulate cladding, titanium as heat exchanger of modern reactors, bronze and copper as heat material of old reactors, ferritic steel as reactor pressure vessel (RPV) material, SS 316, 304, and 316L, 304L, to study heat affected zones (HAZ) and fatigue of reactor internals after interaction with electrolytes (SCC), alloy 600 (Inconel) and 800 to simulate reactor internals. Suitable electrolytes will be procured as well to conduct demonstration experiments. Sacrificial anodes of Zn, Sn, etc would be used as well.

In the second year, the graduate student helping with the project will modify a Krouse bending fatigue machine to work on submerged samples. Bending fatigue machines are particularly useful for instruction because they are simple to operate and relatively inexpensive. The modified fatigue machine will be besides of a useful teaching tool, a suitable research machine as well. We plan to introduce in the second offering of this program new materials, including oxide dispersion strengthened steel (ODS), which are likely to become cladding material in future applications (materials highly resilient to radiation damage).

B.8. Course Outline:

There subject introduced in the program will include:

1. Electrochemical solutions (galvanic series).
2. Speed of electrode processes (kinetics).
3. Polarization, faraday laws, half-cell potentials.
4. Butler-Volmer and Tafel equations.
5. Corrosion Types
 - a. Pitting
 - b. Crevice
 - c. Galvanic
 - d. Microbial
 - e. Hydrogen embrittlement
 - f. High temperature
 - g. Coatings.
6. Stability diagrams (Pourbaix Diagrams).
7. Oxygen effect and passivation.
8. Corrosive environments.

There are a variety of textbooks that can be used to introduce the fundamentals of electrochemistry [13], [14], including some classic ones [15] and some developed from an industrial perspective [16]. Books specializing on the nuclear field are more rare [17] and

expensive [18]. To emphasize the practical aspects of the course and its specialized context, we will use as industrial examples taken from material from every major system of nuclear power plants both in PWRs and BWRs (as seen in [1]) complemented by other books [7], [2], [3], [18], and suitable papers in specialized journals. Since it is not feasible to cover subjects in great depth a substantial effort will be directed to present the most important aspect of each subject and their interrelationship in ageing of nuclear plants.

The practices to be demonstrated include how anodic and cathodic areas can be produced in the same material due to stresses (figure 1a) which is a dramatic demonstration that corrosion is not possible to completely prevent in any system, but can be managed.

FEM measurements of a few characteristic metals with a potentiostat will demonstrate both the galvanic series, and introduce the workings and used of reference electrodes. Reference electrodes in nuclear power plants are different due to the environment they operate at, but the principle is the same [18]. Practices will then compare the behavior of ferritic steel and stainless steel, copper (or bronze), and Zircaloy in suitable electrolytes. Particularly. Everyone of these materials representing suitable materials of interest to nuclear engineers.

We will proceed from introducing the galvanic series to perform potential measurements (potentiostat) to demonstrate the Faraday laws (current/material), leading logically other applications, including corrosion management and protection of materials.

At the beginning of the class all students will be required to research an instance in which corrosion or other ageing processes have proved important for nuclear systems. There are many instances where an understanding of electrochemical processes is required for safety and long term stability of operations. For example, nuclear fuel elements subject to aqueous storage following discharge from reactor, stress corrosion cracking (SCC) and intergranular attack (IGA), steam generator tubes PWSCC, Microbiologically Influenced Corrosion (MIC) on the water systems of cooling water, Hydrogen radiochemistry in BWR's and corrosion effects [19], mechanisms of corrosion in nuclear waste repositories [20] [21], hydrogen embrittlement of cladding material, including Zircaloy hydridization, CRUD formation [22], fretting (due to vibrations), erosion-corrosion (a.k.a. flow assisted corrosion in PWR's [23], or flow corrosion), thermal fatigue due to mix of fluids. All of these particular applications would make excellent subjects for a student project. Permitting the students to choose their project also improves their motivation and interest in continuing their education.

B.9. Assessment Plan of the Program, Benchmarks, and Milestones:

The PI will constantly evaluate the performance of the graduate student assigned to this project to guarantee his timely graduation and satisfactory progress. A number of practices will be adapted from other references [24] to accurately address the most important topics and issues present in nuclear power plants. The PI and CoPI will write a progress report every six months and submit it to the grant administrator detailing progress. The PI or CoPI and the graduate student will besides present progress reports and disseminate results at the Conference on Nuclear Training and Education (CONTE). Organized by the American Nuclear Society in 2012 and 2013.

In the second year the graduate student will prepare as his MS thesis, the adaptation of the bending fatigue machine and use it to study a real engineering case on novel nuclear materials. The first step will include the benchmarking of the machine on well known sample behavior (recreate the well-known HT-9 fatigue curve). This benchmarking process will be a milestone to be achieved, before the SCC attachment is developed. Sample preparation (electropolishing, and electroplating will be attempted) will be studied and the results studied and shared as one

of the practices in the developed program on the second year.

In the progress report we will present a performance matrix which can be used to determine our success rate in the implementation of simulated materials in materials of nuclear power plants. The students in the class will also be asked to provide feedback to determine the degree to which each practice is helping them understand the subject matter and achieve a better learning of the material. The anonymous student evaluations will be submitted with the progress reports at the end of both years of the project (after NE-341 is offered).

B.10. Quantifiable Criteria of Program Sustainability:

The nuclear engineering program at Missouri S&T just celebrated 50 years in 2010, and is currently one of the biggest undergraduate programs in the nation (8th biggest [6]), and is the only undergraduate program in the state of Missouri. The university administration is committed to the improvement and growth of our program, and as proof of this we just hired our 7th faculty member (Dr. Xin Liu, who will join us in Sept 26, 2011). This net program growth was achieved in tough economic times and under a "hiring freeze" due to state fund cuts imposed to our university. Our faculty growth was required because our program is growing in size (see figure 3). We currently have a total of 191 students in our program total (61 freshman, 104 undergraduates, and 26 graduate students). The current enrollment in NE-341 is 41 students. Every factor mentioned bespeaks of the sustainability of our program. The proposed lecture/laboratory project is part of a required course (NE-341 – Nuclear Materials 1) for our undergraduate students. This curriculum development will benefit our students giving them a comparative advantage with respect to most other programs where environmental/corrosion/electrochemistry factors are not covered. Besides

On the other hand, at the campus level, the global strategic plan of Missouri S&T indicating its long term commitment is called E3 (e-cubed) which means Education, Energy and Environment (<http://e3.mst.edu/energy.html>). The University has a commitment to the fields of energy (including nuclear energy), a clean and protected environment, and Education (directly related to the focus of this proposal). Missouri S&T is a technological research institution, with a firm, unwavering commitment for more than 138 years to the advancement of science and engineering in the state and the nation. We are one of the biggest nuclear engineering undergraduate programs by number of degrees awarded every year and are poised to continue our good work with an increase in the number of students joining our program consistently year after year.

We are the only accredited program in Nuclear Engineering in the state of Missouri, and our 200kW nuclear reactor was the first nuclear reactor in the state of Missouri, and has been operating continuously since 1961. Our reactor is also made continuously available for educational endeavor and soon will be made available with distance education tools to other programs across the nation and the world. Our students across all disciplines have unfettered access to the reactor for their academic projects, and currently we inaugurated a internet accessible hot cell facility, which is the only irradiation facility for neutron remotely accessible to users in the world. Notice besides that Missouri S&T is an internationally recognized, primarily engineering university with 6,518 students. The university was established in 1870. About 25% of Missouri S&T's students are from outside Missouri (**29 states** represented), and 10% are international students (**47 countries** represented). The education material created with this grant will be accessible to **everybody**, through our wiki.

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

Preface

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

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

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

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

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

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

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

I. Mandatory General Requirements

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

1. Applicability of 2 CFR Part 215

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

of the project to comply with Subpart C of 2 CFR 215 and include this term in lower-tier (subaward) covered transactions.

b. Grantees must comply with monitoring procedures and audit requirements in accordance with OMB Circular A-133.

http://www.whitehouse.gov/omb/circulars/a133_compliance/08/08toc.aspx

2. Award Package

§ 215.41 Grantee responsibilities.

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

The standards contained in this section do not relieve the Grantee of the contractual responsibilities arising under its contract(s). The Grantee is the responsible authority, without recourse to the NRC, regarding the settlement and satisfaction of all contractual and administrative issues arising out of procurements entered into in support of an award or other agreement. This includes disputes, claims, protests of award, source evaluation or other matters of a contractual nature. Matters concerning violation of statute are to be referred to such Federal, State or local authority as may have proper jurisdiction.

Subgrants

Appendix A to Part 215—Contract Provisions

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

Nondiscrimination

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

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

Title VI of the Civil Rights Act of 1964 (42 USC §§ 2000d et seq)

Title IX of the Education Amendments of 1972 (20 USC §§ 1681 et seq)

Section 504 of the Rehabilitation Act of 1973, as amended (29 USC § 794)

The Age Discrimination Act of 1975, as amended (42 USC §§ 6101 et seq)

The Americans with Disabilities Act of 1990 (42 USC §§ 12101 et seq)

Parts II and III of EO 11246 as amended by EO 11375 and 12086.

EO 13166, "Improving Access to Services for Persons with Limited English Proficiency."

Any other applicable non-discrimination law(s).

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

Modifications/Prior Approval

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

Lobbying Restrictions

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

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

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

§ 215.13 Debarment And Suspension.

The Grantee agrees to notify the Grants Officer immediately upon learning that it or any of its principals:

- (1) Are presently excluded or disqualified from covered transactions by any Federal department or agency;
- (2) Have been convicted within the preceding three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or

destruction of records, making false statements, tax evasion, receiving stolen property, making false claims, or obstruction of justice; commission of any other offense indicating a lack of business integrity or business honesty that seriously and directly affects your present responsibility;

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

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

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

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

'Debarment, Suspension, Ineligibility, and Voluntary Exclusion

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

Drug-Free Workplace

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

Implementation of E.O. 13224 -- Executive Order On Terrorist Financing

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

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

Procurement Standards. § 215.40-48

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

Travel

Travel must be in accordance with the Grantee's Travel Regulations or the US Government Travel Policy and Regulations at: www.gsa.gov/federaltravelregulation and the per diem rates set forth at: www.gsa.gov/perdiem, absent Grantee's travel regulation. Travel costs for the grant must be consistent with provisions as established in Appendix A to 2 CFR 220 (J.53).

All other travel, domestic or international, must not increase the total estimated award amount.

Domestic Travel:

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

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

International Travel:

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

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

Property and Equipment Management Standards

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

Procurement Standards

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

Intangible and Intellectual Property

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

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

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

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

Copyright - The Grantee may copyright any work produced under a NRC federal financial assistance award subject to NRC's royalty-free nonexclusive and irrevocable right to reproduce, publish or otherwise use the work or authorize others to do so for Government purposes. Works jointly authored by NRC and Grantee employees may be copyrighted but only the part authored by the Grantee is protected because, under 17 USC § 105, works produced by Government employees are not copyrightable in the United States. On occasion, NRC may ask the Grantee to transfer to NRC its copyright in a particular work when NRC is undertaking the primary dissemination of the work. Ownership of copyright by the Government through assignment is permitted under 17 USC § 105.

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

Organizational Prior Approval System

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

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

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

Dispute Review Procedures

- a. Any request for review of a notice of termination or other adverse decision should be addressed to the Grants Officer. It must be postmarked or transmitted electronically no later than 30 days after the postmarked date of such termination or adverse decision from the Grants Officer.
- b. The request for review must contain a full statement of the Grantee's position and the pertinent facts and reasons in support of such position.
- c. The Grants Officer will promptly acknowledge receipt of the request for review and shall forward it to the Director, Office of Administration, who shall appoint an intra-agency Appeal Board to review a grantee appeal of an agency action, if required, which will consist of the program office director, the Deputy Director of Office of Administration, and the Office of General Counsel.
- d. Pending resolution of the request for review, the NRC may withhold or defer payments under the award during the review proceedings.
- e. The review committee will request the Grants Officer who issued the notice of termination or adverse action to provide copies of all relevant background materials and documents. The committee may, at its discretion, invite representatives of the Grantee and the NRC program office to discuss pertinent issues and to submit such additional information as it deems appropriate. The chairman of the review committee will insure that all review activities or proceedings are adequately documented.
- f. Based on its review, the committee will prepare its recommendation to the Director, Office of Administration, who will advise the parties concerned of his/her decision.

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

Monitoring and Reporting § 215.50-53

Grantee Financial Management systems must comply with the established provisions 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 semi-annual basis for the periods ending March 31 and September 30, or any portion thereof, unless otherwise specified in a special award condition. Reports are due no later than 30 days following the end of each reporting period. A final SF-425 is due within 90 days after expiration of the award. The report should be submitted electronically to: Grants_FFR@NRC.GOV.

(NOTE: There is an underscore between Grants and FFR).

Period of Availability of Funds 2 CFR § 215.28

- a. Where a funding period is specified, a Grantee may charge to the grant only allowable costs resulting from obligations incurred during the funding period and any pre-award costs authorized by the NRC.
- b. Unless otherwise authorized in 2 CFR 215.25(e)(2) or a special award condition, any extension of the award period can only be authorized by the Grants Officer in writing. Verbal or written assurances of funding from other than the Grants Officer shall not constitute authority to obligate funds for programmatic activities beyond the expiration date.
- c. The NRC has no obligation to provide any additional prospective or incremental funding. Any modification of the award to increase funding and to extend the period of performance is at the sole discretion of the NRC.
- d. Requests for extensions to the period of performance should be sent to the Grants Officer at least 30 days prior to the grant/cooperative agreement expiration date. Any request for extension after the expiration date may not be honored.

Automated Standard Application For Payments (ASAP) Procedures

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

Audit Requirements

Organization-wide or program-specific audits shall be performed in accordance with the Single Audit Act Amendments of 1996, as implemented by OMB Circular A-133, "Audits of States, Local Governments, and Non-Profit Organizations."

<http://www.whitehouse.gov/omb/circulars/a133/a133.html> Grantees are subject to the provisions of OMB Circular A-133 if they expend \$500,000 or more in a year in Federal awards.

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

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

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

III. Programmatic Requirements

Performance (Technical) Reports

a. The Grantee shall submit performance (technical) reports electronically to the NRC Project Officer and Grants Officer on a semi-annual basis unless otherwise authorized by the Grants Officer. Performance reports should be sent to the Program Officer at the email address indicated in Block 12 of the Notice of Award, and to Grants Officer at:

Grants_PPR.Resource@NRC.GOV. (***NOTE: There is an underscore between Grants and PPR.***)

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

c. The Office of the Chief Human Capital Officer (OCHCO) 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 OCHCO grant awards, in addition to the customary performance progress report requested on the SF-PPR, SF-PPR-B, and SF-PPR-E forms, OCHCO 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 (including the names of the courses);
2. Number of students enrolled in new STEM courses;
3. Number of these enrolled students retained in STEM major.

Unsatisfactory Performance

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

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

Other Federal Awards With Similar Programmatic Activities

The Grantee shall immediately provide written notification to the NRC Project Officer and the Grants Officer in the event that, subsequent to receipt of the NRC award, other financial assistance is received to support or fund any portion of the program description incorporated into the NRC award. NRC will not pay for costs that are funded by other sources.

Prohibition Against Assignment By The Grantee

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

Site Visits

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

IV. Miscellaneous Requirements

Criminal and Prohibited Activities

- a. The Program Fraud Civil Remedies Act (31 USC §§ 3801-3812), provides for the imposition of civil penalties against persons who make false, fictitious, or fraudulent claims to the

Federal government for money (including money representing grant/cooperative agreements, loans, or other benefits.)

- b. False statements (18 USC § 287), provides that whoever makes or presents any false, fictitious, or fraudulent statements, representations, or claims against the United States shall be subject to imprisonment of not more than five years and shall be subject to a fine in the amount provided by 18 USC § 287.
- c. False Claims Act (31 USC 3729 et seq), provides that suits under this Act can be brought by the government, or a person on behalf of the government, for false claims under federal assistance programs.
- d. Copeland "Anti-Kickback" Act (18 USC § 874), prohibits a person or organization engaged in a federally supported project from enticing an employee working on the project from giving up a part of his compensation under an employment contract.

American-Made Equipment And Products

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

Increasing Seat Belt Use in the United States

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

Federal Leadership of Reducing Text Messaging While Driving

Pursuant to EO 13513, Grantees should encourage employees, sub-awardees, and contractors to adopt and enforce policies that ban text messaging while driving company-owned, rented vehicles or privately owned vehicles when on official Government business or when performing any work for or on behalf of the Federal Government.

Federal Employee Expenses

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

Minority Serving Institutions (MSIs) Initiative

Pursuant to EOs 13256, 13230, and 13270, NRC is strongly committed to broadening the participation of MSIs in its financial assistance program. NRC's goals include achieving full participation of MSIs in order to advance the development of human potential, strengthen the Nation's capacity to provide high-quality education, and increase opportunities for MSIs to participate in and benefit 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, directs on a government-wide basis that:

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

Executive Compensation Reporting

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

Reporting Subawards and Executive Compensation.

a. Reporting of first-tier subawards.

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

2. Where and when to report.

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

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

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

b. Reporting Total Compensation of Recipient Executives.

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

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

ii. in the preceding fiscal year, you received—

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

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

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

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

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

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

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

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

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

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

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

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

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

i. To the recipient.

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

d. *Exemptions*

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

i. Subawards,

and

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

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

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

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

ii. A foreign public entity;

iii. A domestic or foreign nonprofit organization;

iv. A domestic or foreign for-profit organization;

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

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

3. *Subaward:*

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

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

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

4. *Subrecipient* means an entity that:

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

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

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

i. *Salary and bonus.*

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

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

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

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

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