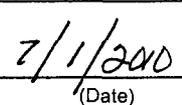
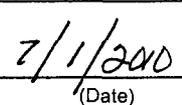
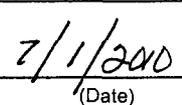


**U.S. NUCLEAR REGULATORY COMMISSION  
NOTICE OF GRANT/ASSISTANCE AWARD**

<b>1. GRANT/AGREEMENT NO.</b> NRC-38-10-966	<b>2. MODIFICATION NO.</b>	<b>3. PERIOD OF PERFORMANCE</b> FROM: 7/1/2010 TO: 6/30/2011	<b>4. AUTHORITY</b> Pursuant to Section 31b and 141b of the Atomic Energy Act of 1954, as amended															
<b>5. TYPE OF AWARD</b>  <input checked="" type="checkbox"/> GRANT <input type="checkbox"/> COOPERATIVE AGREEMENT	<b>6. ORGANIZATION TYPE</b>  Public State-Controlled Institution of Higher ED  DUNS: 804883767	<b>7. RECIPIENT NAME, ADDRESS, and EMAIL ADDRESS</b> Missouri University of Science and Technology Office of Sponsored Programs 224 Fulton Hall 301 West 14th Street Rolla, MO 65409																
<b>8. PROJECT TITLE:</b> <p align="center">Creation of a Radiochemistry Teaching Program in Nuclear Engineering at Missouri S&amp;T</p>																		
<b>9. PROJECT WILL BE CONDUCTED PER GOVERNMENT'S/RECIPIENT'S PROPOSAL(S) DATED</b>  See Program Description AND APPENDIX A-PROJECT GRANT PROVISIONS	<b>10. TECHNICAL REPORTS ARE REQUIRED</b>  <input checked="" type="checkbox"/> PROGRESS AND FINAL <input type="checkbox"/> FINAL ONLY <input type="checkbox"/> OTHER (Conference Proceedings)	<b>11. PRINCIPAL INVESTIGATOR(S) NAME, ADDRESS and EMAIL ADDRESS</b> Missouri University of Science and Technology Attn: Carlos Castano Email: castanoc@mst.edu  573- 341-6766																
<b>12. NRC PROGRAM OFFICE (NAME and ADDRESS)</b> NRC Attn: Randi Neff Office of Human Resources MS: GW5A6 (301) 492-2301 11545 Rockville Pike Rockville, Maryland 20852	<b>13. ACCOUNTING and APPROPRIATION DATA</b> APPN. NO: 31X0200 B&R NO: 0-8415-5C1116 JOB CODE: T8453 BOC NO: 4110 OFFICE ID NO: RFPA: HR-10-966	<b>14. METHOD OF PAYMENT</b>  <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")																
<b>15. NRC OBLIGATION FUNDS</b>  <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:30%;">THIS ACTION</td> <td style="width:30%; text-align: right;">\$125,000</td> </tr> <tr> <td>PREVIOUS OBLIGATION</td> <td style="text-align: right;">_____</td> </tr> <tr> <td><b>TOTAL</b></td> <td style="text-align: right;"><b>\$125,000</b></td> </tr> </table>		THIS ACTION	\$125,000	PREVIOUS OBLIGATION	_____	<b>TOTAL</b>	<b>\$125,000</b>	<b>16. TOTAL FUNDING AGREEMENT</b>  <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:30%;">NRC</td> <td style="width:30%; text-align: right;">\$125,000</td> <td style="width:40%; vertical-align: top;">This action provides funds for Fiscal Year in the amount of See Page Two</td> </tr> <tr> <td>RECIPIENT</td> <td style="text-align: right;">_____</td> <td></td> </tr> <tr> <td><b>TOTAL</b></td> <td style="text-align: right;"><b>\$125,000</b></td> <td></td> </tr> </table>		NRC	\$125,000	This action provides funds for Fiscal Year in the amount of See Page Two	RECIPIENT	_____		<b>TOTAL</b>	<b>\$125,000</b>	
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RECIPIENT	_____																	
<b>TOTAL</b>	<b>\$125,000</b>																	
<b>17. NRC ISSUING OFFICE (NAME, ADDRESS and EMAIL ADDRESS)</b>  U.S. Nuclear Regulatory Commission Div. of Contracts Attn: Sheila Bumpass Mail Stop: TWB-01-B10M Rockville MD 20852																		
<b>18.</b>  Signature Not Required		<b>19. NRC CONTRACTING OFFICER</b>  <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:60%; text-align: center;">             _____            (Signature)         </td> <td style="width:40%; text-align: center;">             _____            (Date)         </td> </tr> <tr> <td colspan="2">NAME (TYPED) <u>Sheila Bumpass</u></td> </tr> <tr> <td colspan="2">TITLE <u>Contracting Officer</u></td> </tr> <tr> <td colspan="2">TELEPHONE NO. <u>301-492-3484</u></td> </tr> </table>		 _____ (Signature)	 _____ (Date)	NAME (TYPED) <u>Sheila Bumpass</u>		TITLE <u>Contracting Officer</u>		TELEPHONE NO. <u>301-492-3484</u>								
 _____ (Signature)	 _____ (Date)																	
NAME (TYPED) <u>Sheila Bumpass</u>																		
TITLE <u>Contracting Officer</u>																		
TELEPHONE NO. <u>301-492-3484</u>																		
<b>20. PAYMENT INFORMATION</b>  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).																		
<b>21.</b> 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.																		
<b>22. ORDER OF PRECEDENCE</b> In the event of a conflict between the recipient's proposal and this award, the terms of the Award shall prevail.																		
<b>23.</b> By this award, the Recipient certifies that payment of any audit-related debt will not reduce the level of performance of any Federal Program.																		

**SUNSI REVIEW COMPLETE**

**TEMPLATE - ADM001**

**ADM002**

# ATTACHMENT A - SCHEDULE

## A.1 PURPOSE OF GRANT

The purpose of this Grant is to provide support to the "Creation of a Radiochemistry Teaching Program in Nuclear Engineering 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 July 1, 2010. The estimated completion date of this Grant is June 30, 2011.
2. Funds obligated hereunder are available for program expenditures for the estimated period: July 1, 2010 – June 30, 2011.

## A. GENERAL

- |                                |  |
|--------------------------------|--|
| 1. Total Estimated NRC Amount: | \$125,000  |
| 2. Total Obligated Amount:     | \$125,000  |
| 3. Cost-Sharing Amount:        | \$0  |
| 4. Activity Title:             | Creation of a Radiochemistry Teaching Program in Nuclear Engineering at Missouri S&T |
| 5. NRC Project Officer:        | Randi Neff   |
| 6. DUNS No.:                   | 804883767  |

## B. SPECIFIC

- |                   |               |
|-------------------|---------------|
| RFPA No.:         | HR-10-966     |
| FFS:              | N/A           |
| Job Code:         | T8453         |
| BOC:              | 4110          |
| B&R Number:       | 0-8415-5C1116 |
| Appropriation #:  | 31X0200       |
| Amount Obligated: | \$125,000     |

## 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
Direct Participant Cost	\$86,806.00
Indirect Cost	<u>\$38,194.00</u>
Yearly Total	\$125,000.00

All travel must be in accordance with the Missouri University of Science and Technology Travel Regulations or the US Government Travel Policy absent Grantee's travel regulation.

## A.4 AMOUNT OF AWARD AND PAYMENT PROCEDURES

1. The total estimated amount of this Award is \$125,000 for one year period.
2. NRC hereby obligates the amount of \$125,000 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

### Creation of a Radiochemistry Teaching Program in Nuclear Engineering at Missouri S&T

#### 1. Introduction:

The demand for graduates educated and trained in academic disciplines that can support the broad field of radiochemistry, radiobiology, and nuclear forensics is increasing amid the need of readiness to prevent or deal with nuclear terrorism and enhance our capabilities to understand and handle nuclear material. Unfortunately, nuclear and radiochemistry subjects currently are not taught at a sufficient number of US universities including Missouri S& T despite having a 200 kW nuclear reactor where neutron activation analysis are routinely carried out; a nuclear radiation measurement and spectroscopy laboratory, liquid scintillation counting facilities, a lead-lined room, lab space available, and interdisciplinary faculty with the expertise needed. We propose the creation of a radiochemistry/radiobiology course at Missouri S& T. The program objective will be to provide students with an understanding of the potential applications of radiation and nuclear materials in the chemical and biological field, including fundamentals of nuclear forensics. The program will consist of a lecture course including some demonstration practices. The course will be offered to both undergraduates and graduates. The students will receive a broad survey of the field of radiochemistry and radiobiology along with some basic demonstration of typical applications of the field and related issues of chemistry of radioactive compounds and the interaction of biological systems with radiation. The program will also train one (1) graduate student on bio/radiochemistry to encourage a career on the subject.

#### 2. Objectives:

2.1. We will create a lecture undergraduate/graduate course to introduce the fundamentals of radiochemistry and radiobiology as well as a few demo laboratory practices to introduce experimental techniques used in radiochemistry and radiobiology.

2.2. The developed courses together with other local facilities (200 kW nuclear reactor, environmental, biological, chemical engineering laboratories, Material Research Laboratory) will help our program prepare students with the set of skills required to understand the principles of environmental radioactivity, nuclear forensics, isotope production, materials effects, the long term safety of stored waste, etc, which is critical for the future of our nation.

2.3. The courses contents will be made available on the internet in an open but moderated format (wiki &&&) such that other educational programs can benefit from it and can contribute to improve it over time. All educational material, including PPT presentations and laboratories including data processing, error analysis, and interpretation of results, will be fully available online to help other programs elsewhere.

2.4. The program will benefit society by producing BS students with a solid theoretical and experimental foundation on radiochemistry and radiobiology. The program is open to all interested students (graduate and undergraduate) in all engineering and scientific disciplines at Missouri S&T. In the end, producing students with the set of skills required to better understand the problems of dealing with radioactive compounds, as well as dealing with potential real-life future problems related to the chemical interaction of radioactive components with the environment and biological systems.

#### 3. Description of the Effort (Content of Courses to be Developed):

Two courses will be offered to both undergraduate and graduate students. The development of each course needs to be completed on time for the first offering. (See section 4, Milestones).

### 3.1. LECTURE Course in Radiochemistry and Radiobiology:

The course Fundamentals of Radiochemistry and Radiobiology will provide the fundamental tools required to understand the subject. The course will be offered by an interdisciplinary group of professors (the authors of this proposal). The tentative outline for the course will include:

1. Introduction to Nuclear Science (Lee, Castano, Usman)
  - a. Radiation types
  - b. Radioactivity decay and growth - Isotopes and decay diagrams
  - c. Nature of nuclear reactions and energies of nuclear reactions
  - d. Neutron cross sections and activation calculations
  - e. Radiation Interaction with matter and dose calculations (neutral and charged radiation)
  - f. Instruments for radiation measurements and statistical considerations
  - g. Dosimetry and biological effects of radiation
2. Chemical Isolation/Concentration of Radioactive Species (Al-Dahhan, Castano)
  - a. Effect of impurities
  - b. Carriers, scavengers
  - c. Solvent extractions
  - d. Ion-exchange separations
  - e. Electrorefining
  - f. Redox, Trigly, Butex, Purex, Thorex
3. Tracers (Al-Dahhan, Usman)
  - a. Mixing, flow, and other chemical process studies
  - b. Radioactive particle tracking
  - c. Tracking of materials, tagging of explosives
  - d. Radiocarbon tracer studies
4. Radiation Interaction with Biological Systems (Lee)
  - a. Historical Roots
  - b. Exposure, Dose, Kerma
  - c. Relative Biological Effectiveness, Effective Dose
  - d. Effect of Large Doses in Biological Systems
  - e. Hereditary Effects
  - f. Dose Response Models
  - g. Radiation Protection Standards
5. Environmental Radioactivity (Usman)
  - a. Radioactivity in water (tritium, radon, radium, etc)
  - b. Airborne radiation (particulate monitoring)
  - c. Radiation waste management
  - d. Nuclear fallout, Chernobyl
  - e. Biological half-life & Internal Dosimetry (ICRP overview)
6. Nuclear Forensics (Lee, Castano, Usman)
  - a. Trafficking on special nuclear material
  - b. Trace radionuclide contaminants
  - c. Isotopic Signatures (pre and post explosion)
  - d. Attribution

### 3.2. LABORATORY Course in Radiochemistry and Radiobiology:

The laboratory course of the program will meet weekly and the logistics of the experiments will be defined depending on the number of the students registered for the course (not all experiments will be done every semester). The proposed laboratory experiments for the course outlined below were selected based on available experimental facilities at Missouri S& T. A number of experiments have already been prepared or are routinely used in teaching and research, some others are partially developed and need further improvement, while others need to be developed. Some of the requested funds will be allocated for this development, including acquiring the supplies needed for analysis, materials for targetry, and chemical separations, etc. The tentative experiments proposed are:

1. Liquid Scintillation Counting (LSC) (**available**)
  - a. Radon in water determination (mine well water) (**available**)

- b. Tritium in water determination (reactor pool water) **(available)**
- c. Uranium in water determination (ALPHAEX) **(to be developed)**
- 2. Nuclear Measurements and  $\gamma$ -Spectroscopy **(available)**
  - d. High Purity Germanium Detector **(available)**
  - e. Identification of isotopes **(available)**
- 3. Working with Tracers **(available)**
  - f. Frequency response **(to be developed)**
  - g. Radio-dating **(available)**
- 4. Neutron Activation Analysis **(available)**
  - a. Detection limit and statistical uncertainty calibration with prepared tracer samples **(to be developed)**
  - b. Selenium in the human body **(to be developed)**
- 5. Isotope production and Separations **(partially available)**
  - a. Radioisotope generators **(available)**
  - b. Reactor production of radioisotopes
  - c. Candidates  $^{89}\text{Y}$ - $^{790}\text{Y}$ (64h) or  $^{165}\text{Ho}$ - $^{7166}\text{Ho}$ (26.8h) **(to be developed)**
- 6. Biological half-life **(to be developed)**
- 7. Irradiation of biological systems **(available)**
  - a. Planarias **(available)**
  - b. Flowers **(available)**
  - c. Seeds **(available)**
  - d. Bacteria **(available)**
- 8. Irradiation effect of materials **(available)**
  - a. PMMA or UHMW PE irradiation (plastics) **(partially available)**
  - b. Cellulose irradiation **(partially available)**
- 9. Coupled Thermal Desorption Spectrometry and Mass Spectrometry **(available)**
- 10. Neutron Radiography **(available)**
- 11. Attribution Example SEM/EDX, XRD **(available)**

#### 4. List of Milestones and Timeline:

The interdisciplinary group of professors participating in this project has the expertise required to teach the **theoretical** part of the course. The material will be collected and assembled in a coherent sequence during the fall semester of 2010. The first theoretical course will be offered on Spring 2011. The **experimental** course practices will be assembled gradually during the time of this grant, as shown in tables 1 and 2. The first offering of the experimental course will be on Spring 2012.

Table 1. Techniques to be incorporated in the Radio and Nuclear Chemistry Laboratory including the expected date the techniques will be available for broad use.

Incorporation of the Technique in the Lab	Date
1. Nuclear Measurements and $\gamma$ -Spectroscopy Neutron Irradiated Samples (available) <ul style="list-style-type: none"> <li>a. High Purity Germanium Detector (available)</li> <li>b. Identification of isotopes (available)</li> </ul>	07/2010
2. Liquid Scintillation Counting (LSC) (available) <ul style="list-style-type: none"> <li>a. Radon in water determination (mine well water) (available)</li> <li>b. Tritium in water determination (reactor pool water) (available)</li> <li>c. Uranium in water determination (ALPHAEX) (to be developed)</li> </ul>	10/2010
3. Working with Tracers (available) <ul style="list-style-type: none"> <li>a. Frequency response (to be developed)</li> <li>b. Radio-dating (available)</li> <li>c. Tracing particles in chemical engineering systems (to be developed)</li> </ul>	02/2011
4. Neutron Activation Analysis (available) <ul style="list-style-type: none"> <li>a. Detection limit and statistical uncertainty calibration with prepared tracer (to be developed)</li> <li>b. Selenium in the human body (to be developed)</li> <li>c. Nuclear Barcode for explosives (to be developed)</li> </ul>	OS/2011
5. Isotope production and Separations (partially available) <ul style="list-style-type: none"> <li>a. Radioisotope generators (available)</li> <li>b. Reactor production of radioisotopes</li> </ul>	08/2011

c.Candidates 89y~90Y(64h) or 165Ho~166Ho(26.8h) (to be developed)	
6.Biological half-life (to be developed)	12/2011
7.Coupled Thermal Desorption Spectrometry and Mass Spectrometry (available)	03/2012
8.Attribution and Nuclear Forensics SEM/EDX, XRD (available)	06/2012

#### 5. Benefits of the Project:

The use of radioactive substances for tracers, diagnostics, imaging, medical applications, irradiation for the modification of material properties, induction of desirable mutations in seeds, disinfection, and plague control is well attested in the literature. Unfortunately the number of schools that offer radiochemistry/radiobiology courses to their students have decreased over the years. Students of Missouri S&T, which is a premier technological school, that produces engineers and scientists that solve technological problems in the real world, will benefit from a class that provides a broad theoretical/practical survey of applications of radioactive substances to many disciplines. We plan to introduce students to many applications of radiation. From the use of tracers for petroleum engineering, chemical engineering, environmental engineering, mining, and chemistry, to neutron activation analysis for all disciplines, to the effect of radiation on biological systems (biological engineering, biology) including humans, also radio-dating techniques for geological engineering, geology, geophysics, and mining.

Given the variety of students and the breadth of the field, in the laboratory course we will permit students to undertake different laboratories. The main emphasis will be on allowing students to pursue their main interest. This program will benefit undergraduate students by introducing them to the fundamentals of scientific research, using bibliographical resources (e.g. Compendex), experimental design, analysis of results, estimation of errors, and preparation of publishable results.

Graduate students will benefit as both researchers and teachers. They will learn to be inspiring mentors and teachers by using active learning techniques.

Table 2. Facilities to be built and experiments to be performed in the radiobiology laboratory, including the expected date of completion.

Facility	Date
1.Plant growing facility (humidity, temperature, illumination controlled)	08/2010
a. Growing of Importation Flowers ( <i>Hydrangeas, roses, etc</i> (vase life studies)	
2. Set up water medium growth for invertebrates	
a. Planaria (available)	12/2010
b. Daphnia, nematodes, rotifers, hydras, etc to be developed	
3.Finish Lining the Lead Room (Fulton 217A)	
4.Move gamma shield in place (to Fulton 217A)	
5.Gamma Spectroscopy (available)	03/2011
6.A1 ha Spectroscopy - Vacuum to be developed	
7.Linear attenuation coefficient measurement equipment (available)	
a. Phosphate cement formulation (available)	
8.Reformulation runs and identification of samples for INL (mechanical tests)	
9. Growing of Common Importation Flowers ( <i>Hydrangeas, roses, etc</i> ) (vase life studies)	07/2011
10. Radionuclide uptake by plants	12/2011
a. Calibration with tracer labeled fertilizers (to be developed)	1
b.Modification by different fertilizers/soil amendments (to be developed)	03/2012
	2
	06/2012
	2

This program also benefits society by producing BS students that have an intimate understanding of how academic research is conducted, and how to publicly report their results. Students involved in research as undergraduates are more likely to enroll in post-graduate programs in both Missouri S&T and other institutions.

#### 6. Value of the Project within the Nuclear Disciplines:

The proposed project will improve nuclear education infrastructure in the area of radiochemistry and radiobiology by establishing a functional instructional laboratory at Missouri S& T. The institution has provided a dedicated lab space for this purpose and some basic equipment (and supplies). Requested funds will be used primarily to enhance the existing capabilities, centralize the radiochemistry and radiobiology capabilities, establish new laboratory practices and train one graduate student on radiochemistry and radiobiology, in the end developing two new courses and associated teaching material. The participating faculty members will coordinate their current specialized knowledge to develop new subject matter expertise, and skills to offer these new courses. The faculty's subject matter expertise areas are:

- Radiation dosimetry and biological effects
- Environmental sampling of nuclear material including; chemical isolation; concentration and extraction of radioactive species
- Application of radioactive tracers
- Biological effects of radiation and Environmental radioactivity and important isotopes from nuclear fuel cycle.

The project will emphasize the areas of public health & safety and environmental protection. The course material developed in this effort will provide historic perspective as well as contemporary methods for estimating radiation doses and various standards used for radiation protection. The laboratory practices will introduce various techniques for environmental sample collection, chemical isolation and extraction. Important concepts of minimum detection limit and statistical uncertainty associated with low level measurements will also be introduced to the students in various laboratory exercises. The research nuclear reactor available on campus will be used for several of these laboratory exercises for neutron activation and production of radioisotopes. In addition, techniques of gamma and neutron radiography will also be introduced in the laboratory course.

Finally, the two new courses developed in this effort will complement the existing nuclear engineering curriculum, strengthening in the area of environmental protecting and monitoring. Moreover, the hands-on laboratory exercises will prepare the graduating nuclear engineers to conduct similar work which is very relevant to NRC mission.

#### 7. Instructional Approach:

A number of innovative techniques will be used to teach both the lecture and laboratory courses. The PI is 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. The techniques currently being used by the PI that will be incorporated into this educational effort are, for the theoretical and laboratory part of the course, as follows:

##### 7.1. Lecture Course:

### 7.1.1. Personal Response System ("Clickers"):

A personal response system [1] will be used by the instructors of the class. This personal response system colloquially called by students as "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 not following (erroneous answers) the professor can stop, obtain feedback, and clarify concepts.

### 7.1.2. LEAD Sessions:

Another technique currently in use that will be incorporated is the use of Learning Enhanced Across Disciplines (LEAD) sessions [2]. These are learning forums where interested students come to learn from peers within an atmosphere of cooperative learning. The idea is that students learn better from a peer than from an authority. Also students learn better when they work as a cooperative group. 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 new coming students 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>).

### 7.2. Laboratory Course:

The PI is configuring the laboratory course as a fun and open-ended discovery instruction laboratory [3] giving every undergraduate student the opportunity to participate in a simulated research experience in the broad area of nuclear and radiological engineering. Students are attracted to the idea of discovering new information about the effect of radiation on untested systems. For example, in the past a small facility for growing irradiated seeds, and to observe flowers was constructed by students (see figure 1). These and other examples of past discovery instruction carried out by the PI are presented in the next section.

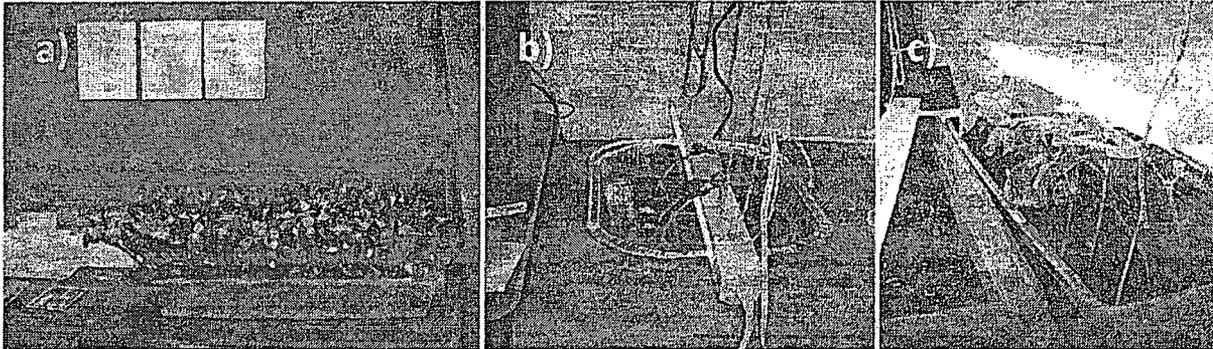


Figure 1. Fulton 217 - a) Flower observation facility (flowers are individually supported on nutrient liquid). b) Seed germination studies trays for sub-lethal dose germination. c) Plant growing beds (top crop beans shown).

### 7.2.1. Examples of Undergraduate Discovery Laboratories in the Past:

Two projects (flower irradiation, planaria irradiation) were presented to students and explained that discoveries could have a broad economic impact in the important economic market of imported flowers (see figure 2) as well as important learning on the effect of gamma irradiation on the regenerative properties of planarias (see figure 3).

The first example of data obtained is shown in figure 2. This research is important because currently Carbofuran (Furadan<sup>TM</sup>) is used internationally to treat flowers imported to the US [4]. The EPA announced that it plans to ban Carbofuran [5] because of its high toxicity and persistence in some foods. We found that for Irises (flowers produced in the US) the vase life improved with gamma radiation at the doses typical of pest control (e.g. 9 kRad for *Thrips Palmi*). The next stage of this research involves using flowers that are commonly imported into the US, but grown locally so that we can simulate irradiation without chemical interference and at the proper stage of harvesting. This research can have a broad impact in the economy of flower producers that export to the US and improve the quality of life of Americans by decrease the risk of pesticides entering US homes in the flowers bought at the store, and decrease the risk of growing flowers abroad. The flower importation business is currently worth about \$600 million dollars a year and growing [6].

The second interesting effect is the induction of enhanced planaria fissioning under sub-lethal (sub LD-50) gamma irradiation. Figure 3 illustrates the effect. One way that planaria reproduces is by "tail-splitting", this happens normally when planaria are well feed and have a comfortable environment. While studying the effect of gamma irradiation on the regeneration of cut planaria, the undergraduates noticed that tail splitting was greatly enhanced on planaria irradiated at sub LD-50 doses. Interestingly this effect is unreported in the literature and the students were very excited to have found it.

**Figure 3. Planaria "tail-splitting" (reproduction) increases under sub-lethal gamma irradiation.**

Even in cases where students are not successful at finding proper solutions, they learn better by engaging in experiences that are unlikely to leave them unchanged. Another example was a group interested on producing radiotracers for tracing "dirty" money. Students initially attempted activation (with neutrons) of normal money bills. When a suitable isotope was not found, they searched for a suitable gamma emitter that could be impregnated in the money (e.g. by spraying). This example shows how through discovery laboratories students can learn specific applications of nuclear technology, shielding, neutron activation analysis, and even legislation about the use of radioisotopes in daily life. All in all a valuable experience likely to be useful in their future work as engineers and to give them a more rounded education.

**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 these URLs to the Office of Management and Budget Cost Circulars are included for reference:

A-21 (now 2CFR 220): <http://www.whitehouse.gov/omb/circulars/a021/print/a021.html>  
A-87 (now 2CFR 225): <http://www.whitehouse.gov/omb/circulars/a087/print/a087-all.html>  
A-122 (now 2CFR 230): <http://www.whitehouse.gov/omb/circulars/a122/print/a122.html>  
A-102, SF 424: <http://www.whitehouse.gov/omb/circulars/a102/print/a102.html>  
Form 990: <http://www.irs.gov/pub/irs-pdf/i990-ez.pdf>

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.

By drawing funds from the Automated Standard Application for Payment system (ASAP), the recipient agrees to the terms and conditions of an award.

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 Part 180 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](http://www.whitehouse.gov/omb/circulars/a133_compliance/08/08toc.aspx) >

#### **2. Award Package**

##### **Grant Performance Metrics:**

The Office of Management and Budget requires all Federal Agencies providing funding for 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 curriculum development 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:

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.

#### **§ 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 215.180 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 VII 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 VII, 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 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 must 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, termination of the award, 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](http://www.fas.org/irp/offdocs/eo/eo-13224.htm).

#### **Procurement Standards. § 215.40**

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 is an appropriate charge to this award and prior authorization for specific trips are not required, as long as the trip is identified in the Grantee's original program description and original budget. All other travel, domestic or international, must not increase the total estimated award amount. Trips that have not been identified in the approved budget require the written prior approval of the Grants Officer.

Travel will be in accordance with the US Government Travel Regulations at: [www.gsa.gov/federaltravelregulation](http://www.gsa.gov/federaltravelregulation) and the per diem rates set forth at: [www.gsa.gov/perdiem](http://www.gsa.gov/perdiem).

Travel costs to the grant must be consistent with provisions as established in Appendix A to 2 CFR 220 (J.53)

### **Property Management Standards**

Property standards of this award shall follow provisions as established in 2 CFR 215.30.

**Equipment** procedures shall follow provision established in 2 CFR 215.34.

### **Procurement Standards**

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

### **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 title and retain ownership 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** of this award shall follow provisions as established in 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 a review committee consisting of a minimum of three persons.

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.

### **Monitoring and Reporting § 215.51**

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.
- Budget Revision – 2 CFR 215.25
  - In accordance with 2 CFR 215.25(e), the NRC waives the prior approval requirement for items identified in sub-part (e)(1-4).
  - The Grantee is not authorized to rebudget between direct costs and indirect costs without written approval of the Grants Officer.
  - Allowable Costs – 2 CFR 215.27

### **b. Federal Financial Reports**

Effective October 1, 2008, NRC transitioned from the SF-269, SF-269A, SF-272, and SF-272A to the Federal Financial Report (SF-425) as required by OMB:

[http://www.whitehouse.gov/omb/fedreg/2008/081308\\_ffr.pdf](http://www.whitehouse.gov/omb/fedreg/2008/081308_ffr.pdf)

[http://www.whitehouse.gov/omb/grants/standard\\_forms/ffr.pdf](http://www.whitehouse.gov/omb/grants/standard_forms/ffr.pdf)

[http://www.whitehouse.gov/omb/grants/standard\\_forms/ffr\\_instructions.pdf](http://www.whitehouse.gov/omb/grants/standard_forms/ffr_instructions.pdf)

The Grantee shall submit a "Federal Financial Report" (SF-425) on a quarterly basis, for the periods ending 3/31, 6/30, 9/30 and 12/31, 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 shall be submitted within 90 days after expiration of the award.

### **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 shall 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 shall 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 as specified in the special award conditions in the same frequency as the Federal Financial Report unless otherwise authorized by the Grants Officer.

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.

### **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 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."