

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

1. GRANT/AGREEMENT NO. NRC-38-09-740	2. MODIFICATION NO. 1	3. PERIOD OF PERFORMANCE FROM: 7/1/2010 TO: 6/30/2011	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: 077273951	7. RECIPIENT NAME, ADDRESS, and EMAIL ADDRESS Florida Memorial University 15800 NW 42 nd Avenue Opa Locka, FL 33054																
8. PROJECT TITLE: The Improvement of the Nuclear Laboratory Curriculum Program at Florida Memorial University																		
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 Florida Memorial University Attn: Dimitri Tamalis Email: dtamalis@fmuniv.edu 305-626-0267																
12. NRC PROGRAM OFFICE (NAME and ADDRESS) NRC Attn: Randi Neff Office of Human Resources MS: GW5A6 (301) 492-2301 11545 Rockville Pike Rockville, Maryland 20852	13. ACCOUNTING and APPROPRIATION DATA APPN. NO: 31X0200 B&R NO: 0-8415-5C1116 JOB CODE: T8453 BOC NO: 4110 OFFICE ID NO: RFPA: HR-09-740-001	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;">\$111,117</td> </tr> <tr> <td>PREVIOUS OBLIGATION</td> <td style="text-align: right;">_____</td> </tr> <tr> <td>TOTAL</td> <td style="text-align: right;">\$111,117</td> </tr> </table>		THIS ACTION	\$111,117	PREVIOUS OBLIGATION	_____	TOTAL	\$111,117	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;">\$111,117</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>TOTAL</td> <td style="text-align: right;">\$111,117</td> <td></td> </tr> </table>		NRC	\$111,117	This action provides funds for Fiscal Year in the amount of See Page Two	RECIPIENT	_____		TOTAL	\$111,117	
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17. NRC ISSUING OFFICE (NAME, ADDRESS and EMAIL ADDRESS) U.S. Nuclear Regulatory Commission Div. of Contracts Attn: Sheila Bumpass 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;">  _____ (Signature) </td> <td style="width:40%; text-align: center;"> 7/1/2010 _____ (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)	7/1/2010 _____ (Date)	NAME (TYPED) <u>Sheila Bumpass</u>		TITLE <u>Contracting Officer</u>		TELEPHONE NO. <u>301-492-3484</u>								
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TELEPHONE NO. <u>301-492-3484</u>																		
20. PAYMENT INFORMATION Payment will be made through the Automated Standard Application for Payment (ASAP.gov) unless the recipient has failed to comply with the program objectives, award conditions, Federal reporting requirements or other conditions specified in 2 CFR 215 (OMB Circular A110).																		
21. Attached is a copy of the "NRC General Provisions for Grants and Cooperative Agreements Awarded to Non-Government Recipients. Acceptance of these terms and conditions is acknowledged when Federal funds are used on this project.																		
22. ORDER OF PRECEDENCE In the event of a conflict between the recipient's proposal and this award, the terms of the Award shall prevail.																		
23. By this award, the Recipient certifies that payment of any audit-related debt will not reduce the level of performance of any Federal Program.																		

TEMPLATE - ADM001

SUNSI REVIEW COMPLETE

ADM002

ATTACHMENT A - SCHEDULE

A.1 PURPOSE OF GRANT

The purpose of this Grant is to provide support to the "The Improvement of the Nuclear Laboratory Curriculum Program at Florida Memorial University" 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:	\$111,117
2. Total Obligated Amount:	\$111,117
3. Cost-Sharing Amount:	\$0
4. Activity Title:	The Improvement of the Nuclear Laboratory Curriculum Program at Florida Memorial University
5. NRC Project Officer:	Randi Neff
6. DUNS No.:	077273951

B. SPECIFIC

RFPA No.:	HR-09-740-001
FFS:	N/A
Job Code:	T8453
BOC:	4110
B&R Number:	0-8415-5C1116
Appropriation #:	31X0200
Amount Obligated:	\$111,117

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	\$74,326.00
Indirect Cost	\$36,791.00
Yearly Total	\$111,117.00

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

A.4 AMOUNT OF AWARD AND PAYMENT PROCEDURES

1. The total estimated amount of this Award is \$111,117 for one year period.
2. NRC hereby obligates the amount of \$111,117 for program expenditures during the period set forth above and in support of the Budget above. The Grantee will be given written notice by the Contracting Officer when additional funds will be added. NRC is not obligated to reimburse the Grantee for the expenditure of amounts in excess of the total obligated amount.
3. Payment shall be made to the Grantee in accordance with procedures set forth in the Automated Standard Application For Payments (ASAP) Procedures set forth below.

Attachment B – Program Description

PROGRAM DESCRIPTION

The overarching goal of this proposal is to improve the degree offerings in Biology by developing and implementing a new Bachelor of Science Program in Biology with a Concentration in Radiobiology. This new and innovative program, which would be the only one offered at the undergraduate level in South Florida, will further the diversity in the nuclear science industry and serve as a recruiting tool to train and subsequently graduate minority (underrepresented) students from Florida Memorial University, a historically black university (HBCU).

Moreover, because of continued funding from federal agencies for grants in radiochemistry and nuclear medicine, there is a clear need to train radiochemists in the biomedical arena. This program will address this pressing national issue.

Objectives

The objectives for the goal of this proposal have a three-pronged approach:

1. To establish a Radiobiology Program at Florida Memorial University and recruit fifteen freshmen students from the long-established biology program into the nascent Bachelor of Science degree in Biology with Concentration in Radiobiology program (henceforth called the radiobiology program).
2. To recruit/hire One new biology faculty member with graduate hours in radiobiology and/or practical experience in this sub-discipline.
3. To develop ongoing research activities in environmental, cellular, and molecular biology that reflect the current trends in medicinal and nuclear science.

The radiobiology program will complement the successful radiochemistry program, which was recently established by a grant from the National Nuclear Security Administration (NNSA) and sustained by a recent grant from the Nuclear Regulatory Commission (NRC). The radiobiology program will consist of new courses, such as Concepts in Radiochemistry, Introduction to Radiobiology, and Radiopharmacology/Radiopharmacy, as well as an overarching laboratory for both lecture courses. The proposed curriculum is shown in Table 1 below.

Course Name	Course Prefix	Credit Hours
Intro to Radiochemistry	CHE 230	3

Intro to Radiochemistry Lab I	CHE 231	1
Intro to Radiochemistry Lab II	CHE 232	1
Radiation Biology	BIO210	3
Radiopharmacology	BIO 306	3
Radioactive Waste Management	CHE 250	3
Principles of Radiological Health	CHE 350	3
Principles of Radiological Health Lab	CHE 351	1
Research Techniques in Radiation Biology & Radiopharmacology	BIO 326	1
<i>Advanced Radiochemistry</i>	<i>CHE 370</i>	3
<i>Advanced Radiochemistry Lab</i>	<i>CHE 371</i>	3
<i>Nuclear Chemistry</i>	<i>CHE 480</i>	3

Table 1. Current Radiochemistry curriculum at Florida Memorial University. Courses in bold font indicate the new radiobiology courses to be added. Courses in regular font indicate recently instituted nuclear education courses already taught on campus during the past two years. Courses in italics are recently instituted upper level nuclear education courses that have not yet been taught.

The School catalog will have the following statement as part of its Radiation Biology course description: "This course will explore the genetic and somatic effects radiation has on organisms. It will also examine the use of radiation in the sciences and how these advancements are used in research and in the medical field. The class will also review how radiation is used in agriculture and industry. The principles and methods of the proper use and handling of radiation will also be examined".

The catalog statement for Research techniques in Radiation Biology and Radiopharmacology Laboratory will similarly be: "Students will learn to use equipment to measure radioactive material in soil, water, and food sources. students will learn how to use radio-labeling in scientific studies. Students will go on field trips to institutions that use equipment dependent on radiation, such as hospitals, research facilities, and forensic laboratories. Students will also learn proper safety measures when working with radiation".

The School catalog will have the following statement as part of its Radiopharmacology course Description: "This course will examine the historical and scientific development of Radiopharmacology. It will also explore what radiation is and how it is used in Radiopharmaceutical development and the practical applications of radiation in medicine and drug development. The class will also review how legislation affects the field of radiopharmacy and its practices".

Additionally, this program should flourish through the liaison developed between the University and the consultant from the University of Texas at Austin, Dr. Sheldon Landsberger. Through this collaborative effort, there is an opportunity for the radiobiology students to train at the University of Texas at Austin, as well as obtain paid internships at *various* national laboratories or research institutes. Such training at the

undergraduate level will aid in creating a continuous supply of well-qualified students into either graduate school or into the nuclear/radiobiology workforce, such as the NRC and other agencies. In the summer of 2008, two students from the radiochemistry program, accompanied by Dr. Dimitri Tamalis, visited the UT at Austin Nuclear Engineering Teaching Laboratory for a month-long internship. Their work focused on prompt gamma activation analysis (PGAA) with a neutron beam. Both students and faculty gained invaluable expertise as a result of that collaboration. It is expected that this successful collaboration will continue, attracting a larger number of students to the field of nuclear education. Finally, an additional measure of success of the radiochemistry program has been the application of one Florida Memorial University student, Vanessa Sanders, to Florida State University in Radiochemistry.

Career Perspective

Radiobiology is the interdisciplinary field of science that studies the biological effects of ionizing and non-ionizing radiation of the entire electromagnetic spectrum, including ultraviolet (near and far UV) radiation, visible light, microwaves, and radio waves. The interactions between organisms and radiation can be studied at several levels, including but not limited to molecular and cellular biology; apoptosis; and radiation oncology.

A successful radiobiology program will prepare students for careers and research in analytical chemistry, biochemistry, biotechnology, genetic engineering, medicine, pharmacy, and pharmacology, to name a few. The radiobiology program is designed to provide students with competencies in the theoretical and applied concepts of radiation dangers, uses, and protection, and will prepare them to obtain professional careers in several areas.

The sustainability of the nuclear/radiochemical and radiobiological workforce is in jeopardy because the identified careers are not generally known to most college-minded youth, and therefore may be perceived as unattractive.

If, however, the undergraduate students in the radiobiology curriculum were educated about and trained in the plethora of careers in the nuclear industry, any identified shortage in the nuclear industry could be ameliorated.

Facilities

Undergraduate students seeking a degree in the radiobiology program will use the equipment in the Radiochemistry Facility at Florida Memorial University for their undergraduate classes and research projects. At the present time, this facility is equipped with a sodium iodide (NaI) detector system and a High-Purity Germanium (HPGe system), while an alpha spectrophotometer has already been purchased and will soon be installed in it. Other, smaller instrument and supplies include a hand-held Geiger-Mueller counter, dosimeters, radioactive sources for educational purposes, oscilloscopes, computer and printer, etc.

Room 11A, on the main floor of the Division of Health and Natural Sciences building, (the Athalie Range Science Hall) houses the Radiochemistry Laboratory facility. This

room, measuring approximately 12 X 24 ft, has been devoted exclusively to the use of the NaI and HPGe instruments. The alpha spectrophotometer will also be placed in the same room. An expansion of the science building is under way currently and the extra space will be used for the placement of a fume hood to be used for experiments involving radioactive elements and storage of the radioactive waste that will be generated. The room is adequately cooled year-round to protect the electronics of both the computer and the instrument. Storage cabinets are built into one of the long walls, which will house log books, detector manual, and software to run the detectors.

Use of the instrument is limited to trained faculty and students in radiochemistry laboratory classes at the present time, but later trained students shall have access also. Teaching laboratories and research projects will be its beneficiaries. Student use will be entirely operational, whereas faculty will both operate and maintain the instrument. All of the faculty members listed in this proposal and Dr. Ayivi Huisso, the Physics professor on campus, have prior experience in the use of the available instrumentation.

Current Status

A proposal for the Bachelor of Science degree in Biology with Concentration in Radiobiology has been developed and will be presented to the Curriculum and Instruction Committee at Florida Memorial University. The genesis of this new program was based on the success of the Radiochemistry program and the need to offer more choices to science majors. The fifteen students' who shall be recruited into the radiobiology program will be carefully screened, with this selection process based on their citizenship status, cumulative GPA, and their commitment to continue their studies in graduate or professional school. A selection committee, comprised of the four faculty members in this proposal and an extramural member, will be involved in the selection process. After receiving information about the Radiobiology Program, interested students will submit a written application to join. It is expected that the information and application processes will be an interactive process. The ultimate goal will be to admit both competent and interested students into the program who eventually will follow rewarding career paths.

The Radiochemistry program has proven to be successful, though small in student number. However, the program has been sustained by recruiting more students, obtaining an NRC grant (see Current and Pending Support section), and purchasing equipment to train both faculty and students. In the short time since its inception, this program has been able to generate great interest on campus as a high quality and promising field. Its only drawback thus far has been its limitation to chemistry majors.

Students have done internships (summer 2008) and faculty members have been trained in nuclear engineering/science at *the* University of Texas at Austin (summers of 2007 and 2008). Because more students have been exposed to the careers in nuclear science and the opportunities presented to them, the need to expand the educational infrastructure at Florida Memorial University became obvious.

Recruitment Activities

Most colleges and universities have become less accessible to many minority/underrepresented students because of decreased financial assistance. This shortfall in funding results in greater than 80% of these students having to work to subsidize any financial aid available to them from their post-secondary

institution of higher learning. This financial burden is seen at many small, liberal arts colleges/universities, such as Florida Memorial University. Financial difficulties are oftentimes juxtaposed to retention problems. Again, this corollary is evident at Florida Memorial University. Thus, the implementation and success of this new program would

aid in the financial pressures some students face while at the same time giving the school the opportunity to create a widely known, quality program in undergraduate nuclear education.

Recruiting students into the radiobiology program will primarily involve informing freshman and sophomore science majors about the new program. Students interested in changing their major to or declaring their major in radiobiology must meet the following criteria: a cumulative GPA of 3.00 and above, 21 or more on the ACT, and 1050 or more on the SAT, and no remedial classes in English, reading, and mathematics. Further, having met these criteria, a second tier of selection will be based on a written essay expressing their career goals in science and two letters of recommendation from math and/or science teachers.

Educational Team

The oversight of the management of the NRC proposal will be done by Dr. Dimitri Tamalis. His tasks will include convening the evaluation committee, coordinating all of its members, keeping records, doing laboratory work, and sending quarterly reports to the NRC. Dr. Marilyn Sherman and Dr. Rose Stiffin will work closely with the PI in terms of teaching courses. Specifically, Dr. Marilyn Sherman will have a role in conducting laboratory experiments. Finally, Dr. Sheldon Landsberger will consult with the Florida Memorial University team about collaborations with other institutions, progress of the proposal activities, summer internships, funding sources, and graduate school opportunities for students.

Additionally, the Principal Investigator and the co-Pis in the grant proposal will participate in the dissemination of information about the Radiobiology program to the student body, the recruitment process and the retention of the selected students, course development, design of experiments, and the availability of internships for interested students. A long term goal will also be the placement of the top students in graduate studies related to nuclear education, where the shortage of new students in general and underrepresented minorities in particular is dire.

Radiation Biology

The textbook chosen for this course is "Radiobiology for the Radiologist" by Eric J. Hall, fifth edition. Topics to be covered include the following:

stranded PCR fragments from these experiments will be labeled with ^{32}P nucleotide(s) in order to produce more accurate amplification data. Given the half-life, cost of purchase, and disposal cost of this nuclide, this experiment will be conducted no more than once a year.

Dr. Dimitri Tamalis has performed PCR on bacterial 16S rDNA genes utilizing two sets of

new primers that amplify a 280bp and a 1200bp fragments respectively. For more accurate data, limited cycle PCR will be used.

Project 2: Effects of low-level UV radiation of mice and the effects of vitamin D protection.

Extensive evidence exists on the damaging effect of UV radiation on skin. Such exposure can lead to skin cancer, cataracts, and melanoma. It is noteworthy that limited exposure to UVB radiation is one source of vitamin D production (the other source is diet). Therefore, a public health issue is created where the risks associated with potential overexposure must be weighed against potential malnourishment due to inadequate vitamin D production. Factors such as age, skin pigmentation, geographic location, even cultural and religious background which might dictate extensive clothes coverage of the skin must be taken into consideration in determining each person's need and risk. For example, infants on a strict diet of mother's milk and the elderly are both susceptible to developing vitamin D deficiency.

Interestingly, supplementation of the cancer patients' diets with a specific form of vitamin D (analog EB 1089) after radiation treatment has killed malignant tumor cells that survived radiation treatment.

Calcitriol, the active form of vitamin D, has been shown to protect against background radiation and shows great promise in investigations of its use as a protective agent against low-level nuclear radiation exposure. This vitamin is of great interest to pharmacologists with a specialization in radiation in their quest for a protective agent that can be administered orally and that has no side effects. This agent would be effective against radiation from a terrorist radiological (dirty bomb) attack or an accident from a nuclear plant (escape of radiation to the environment).

Cell cycle regulation and control of proliferation, apoptosis (programmed cell death), and antiangiogenesis are some of the cellular processes calcitriol is known to be involved, which is the reason for its protective anti-radiation properties. Specifically, calcitriol activates the Vitamin D Receptor (VDR), which allows gene transcription to take place and the activation of the innate immune response. Mice will be used in our experiments to measure the effect of increasing vitamin D uptake on radiation damage. Initially, different levels of UV radiation will establish a minimum exposure (in seconds or minutes) required to produce visible skin damage to the mice, whereas different amounts of vitamin D at a specified UV exposure will be subsequently investigated. A control group (no UV radiation, no vitamin D supplementation) will be included on both types of experiments.

Project 3: Alverine Citrate and Smooth Muscle Contraction

The drug alverine citrate can induce smooth muscle contraction. When smooth muscles contract after administration of alverine citrate, calcium influx from extracellular stores occurs concomitantly. Given that strontium can act as a calcium agonist, radioactive Strontium (Sr - 90) will be administered to the test animals along with alverine citrate to measure both muscle contraction and calcium mobility. Because Sr-90 is a beta emitter, this work will be done in collaboration with a nearby facility that regularly tests for beta emitters in food stuffs.

Project 4: Uptake of I-125 or I-131 by mice thyroid

To produce thyroid hormones, the thyroid gland needs iodine, an element contained in food and water. The thyroid gland traps iodine and processes it into thyroid hormones. As thyroid hormones are used, some of the iodine contained in the hormones is released, returns to the thyroid gland, and is recycled to produce more thyroid hormones. Mice can be purchased that are normal, hypothyroidic, or hyperthyroidic. Mice that are hypothyroidic produce lower levels of the thyroid hormone, which can adversely affect their metabolism. One aspect of an inactive thyroid is weight gain and slow metabolism. For hyperthyroidic mice, metabolism is increased and there is an increase in thyroid hormone production. Mice will be administered sodium iodothalamate as an aqueous solution in their feed or as a sterile injection. The compound, commercially sold as Glofil®, can be purchased as sodium iodothalamate I - 125. The solution contains 1 mg/ml of the iodinated salt and 0.9 % of benzyl alcohol as a preservative. The radioactive concentration of this ionizing radionuclide can be 250 300 $\mu\text{Ci}/\text{ml}$, as of the calibration date (not purchase date). Sodium bicarbonate and hydrochloric acid are present to adjust the pH. Given that I-125 decays by electron capture with a physical half-life ($t_{1/2}$) of 60.14 days, the mice will be given sodium iodothalamate and after two months (60 days), they will be sacrificed, their thyroid glands removed and the amount of I - 125 determined using a gamma detection system. Alternatively, the mice will be checked weekly for I - 125 in the thyroid, their urine (as waste), and their blood, to determine if the thyroid is utilizing the administered drug. All experiments with I - 125 will be conducted in a fume hood dedicated to radioactive use and disposal.

Project 5: K-40 content in Bananas and Plantains

In South Florida, there are three main types of bananas sold in the markets: plantains, Cavendish bananas, and Manzano bananas. Plantains are larger than a regular banana, up to seven inches in length. They are starchier and have lower sugar content. They can be boiled or fried. They can be purchased and eaten as a green plantain or fully ripe, when the skin is yellow. A Cavendish banana is the most popular or common banana known and is often called a Chiquita® banana because Chiquita® company markets them. The third type is called the Manzano banana, so called because its refreshing flavor, when the fruit is fully ripe, is reminiscent of a strawberry-apple blend, or a plum flavor. It is the smallest of all, measuring a few inches, and rather chubby in appearance. When fully ripe, the skin is dark brown to black. All bananas contain potassium and in fact are good natural sources of this nutrient. Potassium-40 (K-40) is radioactive and a gamma emitter (ionizing radionuclide). The K-40 content of an equal mass of the three types of bananas will be determined by counting for the K-40 levels for 72 hours to get an accurate reading. This experiment may serve as one of the introductory laboratories because it does not involve the use of radioactive materials. Additionally, it will serve to introduce the concept that isotopes are naturally occurring species, found in many sources, including food stuffs that are regularly consumed.

Project 6: Strontium-90 Content in Milk

Radioactive debris from atomic explosions deposited on vegetation and soil presents a potential health hazard to man. The element of particular concern is the radioactive isotope of strontium (Sr- 90). It has a long half-life (28 years) and has similar chemical reactivity as calcium (Ca), properties that make Sr of biological significance. Dairy cows

may consume grasses or feed contaminated with Sr-90. If the milk is consumed by man, the Sr - 90 may eventually deposit into the calcified bone tissue. Although Sr-90 does not pose as great a health risk as some ecological contaminants, its presence in milk and grains is a concern to geneticists and other biologists. Therefore, commercial milk will be freeze-dried and its Sr - 90 level measured. Alternatively, commercial powdered milk will be tested for Sr- 90 content.

Project 7: Regeneration of Segments of *Planaria maculata* after Exposure to Ionizing Radiation Source

Planaria, also called flatworms, belong to the phylum Platyhelminthes. They are non-parasitic organisms that live in both salt water and fresh water ponds and rivers. Planaria eat decaying meats and may be considered to be good for the environment. Flatworms are hermaphrodites, possessing both testes and ovaries and reproduce asexually with their own gametes or sexually with another flatworm. Planaria possess the extraordinary ability to regenerate lost or severed body parts. Ionizing radiation has been shown to induce molecular and cellular damage that affect in the long term many genes. Thus, planaria will be segmented into a tail, mid, and head region, and each part exposed to ionizing radiation. The segments will then be allowed to grow a new, complete flatworm. The effect of ionizing radiation at known doses on the ability of the planaria to regenerate itself will be determined.

Project 8: The Localization of P - 32 in Maize Plants

Macronutrients can be broken into two more groups: primary and secondary nutrients. The primary nutrients are nitrogen (N), phosphorus (P), and potassium (K). These major nutrients usually are lacking from the soil because plants use large amounts for their growth and survival. The secondary nutrients are calcium (Ca), magnesium (Mg), and sulfur (S). There are usually enough of these nutrients in the soil so fertilization is not always needed. Also, large amounts of Calcium and Magnesium are added when lime is applied to acidic soils. Sulfur is usually found in sufficient amounts from the slow decomposition of soil organic matter, an important reason for not throwing out grass clippings and leaves.

Corn seeds will be planted and the soil enhanced with P-32 labeled P_2O_5 , one of the major ways in which phosphorus is taken up by plants. After the plants have grown several inches above soil, certain parts of the plants will be excised and tested for localization of P-32 in different parts of the plant. Such specific localization might indicate the physiological demands of phosphorous based biomolecules.

Project 9: The Genetic Effect of Ionizing Radiation on *Escherichia coli's pepck* Gene

Escherichia coli can synthesize glucose from non-carbohydrate precursors during gluconeogenesis. The enzyme that catalyzes the committed step in gluconeogenesis is phosphoenolpyruvate carboxykinase (PEPCK). When *Escherichia coli* cells growing in an overnight culture are exposed to ionizing radiation such as $^{60}CoCl_2$, genetic damage may occur resulting in ionized or excited atoms or molecules. This damage may be in the form of free radicals, breaking of (DNA) bonds, or the creation of new (DNA) bonds. Since the sequence for *pepck* is known, the damage caused by prolonged exposure to Co-50 may be assessed by examining the sequence of the gene and measuring the

activity of the gene product, PEPCK, given that it has been shown that Co^{2+} can mimic Ca^{2+} in the allosteric activation of PEPCK in vitro. Thus, the damage to the gene and the activation of the enzyme may be assessed using one isotope that produces gamma rays.

The collection of laboratory experiments above represents a unique and powerful instructional approach leading to a robust overall Undergraduate Radiobiology Program we expect to become widely known. Strengthening this design will be the University's past commitment to the program and its future assistance as expressed in the attached letter of support. This commitment and our success thus far guarantee a sustained program on the long run.

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 >

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.

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 and the per diem rates set forth at: 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/grants/standard_forms/ffr.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."