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

1. GRANT/AGREEMENT NO.	2. MODIFICATION NO.	3. PERIOD OF PERFORMANCE	4. AUTHORITY
NRC-38-10-979		FROM: 7/1/2010 TO: 6/30/2012	Pursuant to Section 31b and 141b of the Atomic Energy Act of 1954, as amended

5. TYPE OF AWARD	6. ORGANIZATION TYPE	7. RECIPIENT NAME, ADDRESS, and EMAIL ADDRESS
[X] GRANT [ ] COOPERATIVE AGREEMENT	Public State-Controlled Institution of Higher ED	Cal Poly Corporation One Grand Avenue San Luis Obispo, CA 93407

8. PROJECT TITLE:
Thermal Sciences for Fire Protection Engineers

9. PROJECT WILL BE CONDUCTED	10. TECHNICAL REPORTS ARE REQUIRED	11. PRINCIPAL INVESTIGATOR(S) NAME, ADDRESS and EMAIL ADDRESS
PER GOVERNMENT'S/RECIPIENT'S PROPOSAL(S) DATED See Program Description AND APPENDIX A-PROJECT GRANT PROVISIONS	[X] PROGRESS AND FINAL [ ] FINAL ONLY [ ] OTHER (Conference Proceedings)	California Polytechnic State University Attn: Christopher Pascual Email: cpascual@calpoly.edu 805-756-1306

12. NRC PROGRAM OFFICE (NAME and ADDRESS)	13. ACCOUNTING and APPROPRIATION DATA	14. METHOD OF PAYMENT
NRC Attn: John Gutteridge MS: W5A6 (301) 492-2313 11545 Rockville Pike Rockville, MD 20852	APPN. NO: 31X0200 B&R NO: 0-8415-5C1116 JOB CODE: T8460 BOC NO: 4110 OFFICE ID NO: RFPA: HR-10-979	[ ] ADVANCE BY TREASURY CHECK [ ] REIMBURSEMENT BY TREASURY CHECK [ ] LETTER OF CREDIT [X] OTHER (SPECIFY) Electronic ASAP.gov (See Remarks in Item #20 "Payment Information")

15. NRC OBLIGATION FUNDS		16. TOTAL FUNDING AGREEMENT	
THIS ACTION	$101,766.00	NRC	$101,766.00
PREVIOUS OBLIGATION		RECIPIENT	
TOTAL	$101,766.00	TOTAL	$101,766.00

This action provides funds for Fiscal Year in the amount of See Page Two

17. NRC ISSUING OFFICE (NAME, ADDRESS and EMAIL ADDRESS)

U.S. Nuclear Regulatory Commission
Div. of Contracts
Attn: Sheila Bumpass
Mail Stop: TWB-01-B10M
Rockville MD 20852

18.	19. NRC CONTRACTING OFFICER
Signature Not Required	Sheila Bumpass (Signature) 7/1/2010 (Date) NAME (TYPED) Sheila Bumpass TITLE Contracting Officer TELEPHONE NO. 301-492-3484

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

NRC-38-10-979

ATTACHMENT A - SCHEDULE

A.1 PURPOSE OF GRANT

The purpose of this Grant is to provide support to the "Cal Poly State University's Thermal Sciences for Fire Protection Engineers" 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, 2012.

2. Funds obligated hereunder are available for program expenditures for the estimated period: July 1, 2010 – June 30, 2012

A. GENERAL

1. Total Estimated NRC Amount:	$101,766
2. Total Obligated Amount:	$101,766
3. Cost-Sharing Amount:	$0
4. Activity Title:	Thermal Sciences for Fire Protection Engineers
5. NRC Project Officer:	Randi Neff
6. DUNS No.:	029326246

B. SPECIFIC

RFPA No.:	HR-10-979
FFS:	N/A
Job Code:	T8453
BOC:	4110
B&R Number:	0-8415-5C1116
Appropriation #:	31X0200
Amount Obligated:	$101,766

A.3 BUDGET

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

Line Item	Year 1
Personnel	37,656
Fringe	3,494
Other Direct Costs	31,540
TOTAL DIRECT COSTS	$ 72,690
TOTAL INDIRECT COSTS @ 40.0%	$ 29,076
TOTAL COSTS	**$ 101,766**

All travel must be in accordance with the Cal Poly State 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 $101,766 for the two year period.

2. NRC hereby obligates the amount of $101,766 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

Many countries, including the United States, are moving from prescriptive fire safety regulation to performance-based fire safety regulation as a means to develop more effective, flexible and risk-informed fire safety solutions, particularly for large and complex structures. This shift is particularly evident in the nuclear industry. For example, under 10 CFR 50.48(c), the US Nuclear Regulatory Commission has recently adopted the NFPA 805 Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants as a regulatory basis for licensing and re-licensing commercial nuclear power plants. To date, approximately Ya of the 104 operating units in the US have committed to adopting NFPA 805 as their licensing basis.

The potential benefits of performance-based fire safety practices were recognized at the NSFsponsored workshop on *Making the Nation* Safe *from Fire* held at the National Research Council on April 15-16, 2002. One of the major findings of this workshop was that *"Performancebased building codes, which are now available in the United States for adoption by state and local governments, offer real promise for regulators and public officials to institute regulations that reflect* a *better understanding of risks and improved safety performance for buildings in their communities. However, performance based codes depend on the ability of engineers to predict how buildings will perform under fire conditions . ...* " This last statement underscores the need for more educational opportunities for performance-based fire safety analYSis and design.

Proper implementation of this shift from prescriptive to performance-based fire safety design and regulation demands a more scientifically educated workforce for both the design and regulatory sides of the process. Performance-based fire safety regulation requires a more fundamental understanding of fire dynamics, the response of materials and structures to fire, and human behavior in fire than the prescriptive regulations being replaced. It also requires the implementation of a robust methodology for the practice of performance-based fire safety analysis, design and regulation, such as the methodology presented in NFPA 805 as supported by NRC and nuclear industry guidance documents (e.g., Regulatory Guide (RG) 1.205 and NEI 04-02).

As noted in Section 4.1 of RG 1.205 regarding the use of analytical methods and tools to support NFPA 805 analyses, "Engineering analyses and associated methods that the licensee applies to demonstrate compliance with the nuclear safety and radioactive release performance criteria should have the requisite degree of technical and defensible justification, as dictated by the scope and complexity of the specific application. Persons qualified in the specific analytical methods should perform these analyses." (Emphasis added)

The demand for qualified fire protection engineers needed to support performance-based analyses in the nuclear industry is addressed in Report GAO-08-747 on Fire Safety and Nuclear Reactor Units issued by the United States Government Accountability Office (GAO) in June 2008. This GAO report also highlights the critical shortage of personnel qualified to perform and review such analyses within the nuclear industry. As noted in this GAO report:

"Numerous NRC, industry, and academic officials we spoke with expressed concern that the transition to the new risk-informed approach could be delayed by a limited number of personnel with the necessary skills and training to design, review, and inspect against probabilistic risk assessments. Several nuclear unit officials told us that the pool of fire protection engineers with expertise in these areas is already heavily burdened with developing probabilistic risk assessments for the pilot program units and other units, including the 38 units that had already begun transitioning as of October 2007.

There is a clear need for additional academic programs in FPE to support the shift to riskinformed performance-based fire safety analysis and design, particularly in the nuclear industry. This proposed project is intended to address this need.

Academic Focus

The California Polytechnic State University (Cal Poly) in San Luis Obispo, CA, is initiating a new graduate program leading to a Master of Science (MS) degree in FPE. The program will launch in the Fall of 2010. This program is being designed to support the shift from prescriptive to performance-based fire safety design. Cal Poly is an ideal institution for this program because of its strong commitment to excellence in engineering education at the Bachelor's and Master's degree levels and its location on the West Coast of the United States, where no other

Most of the formal education for the program at Cal Poly will focus on the graduate-level STEM courses needed to support performance-based fire safety analysis and design. The required courses in the program include:

FPE 501 Fundamental Thermal Sciences FPE 502 Fire DynamiCS FPE 503 Flammability Assessment Methods FPE 504 Fire Modeling

FPE 521 Egress Analysis and Design FPE 522 Fire Detection, Alarm and Communication Systems FPE 523 Water-based Fire Suppression Systems FPE 524 Structural Fire Protection

The FPE 50x series of classes is intended to provide students with the fundamental knowledge of 'fire physics and chemistry needed to identify and quantitatively assess 'fire scenarios. Accurate selection and assessment of 'fire scenarios are critical aspects of performance-based fire safety analysis and design.

The FPE 52x series of classes is intended to provide students with the theoretical understanding and practical knowledge of different fire safety subsystems that are used to mitigate fire hazards and risks in the built environment. In these classes, students will address both the prescriptive requirements for these systems as well as the performance objectives associated with these systems. Students will apply performance-based analysis techniques in order to evaluate the expected levels of performance associated with these fire safety systems.

To complete the requirements of the MS program, students also will take two approved elective courses and will complete a culminating project related to performance-based fire safety analysis and design under the supervision of a professional mentor. The culminating project experience will typically be for students to: 1) perform a comprehensive fire and life safety evaluation of a selected building under the supervision of a professional mentor; 2) prepare a comprehensive report documenting the results of this evaluation, including both prescriptive and performance-based aspects of the analysis; and 3) defend their analysis and findings in an oral presentation to a review committee. The student will need to complete a comprehensive report of their project and defend their analysis and findings in an oral presentation to a review committee.

This proposal requests funding to support development of the first required course, FPE 501 Fundamental Thermal Sciences, in this new graduate program. Neither of the eXisting FPE graduate programs on the East Coast offers a similar course. Instead, these existing programs generally require prospective students lacking a background in the thermal sciences to complete one or more thermal science courses before being admitted to the program. Through distance delivery, the FPE 501 course at Cal Poly can fulfill the needs of such students in these other programs as well as the needs of students in the Cal Poly program. It will particularly fulfill the needs of the nuclear industry, where many engineers currently working in fire protection lack a thermal science background.

Proposed Project

The funding from this grant will be used to develop the first course in the FPE program at Cal Poly. The course, FPE 501 -Fundamental Thermal Sciences, will cover the subjects of fluid mechanics, thermodynamics and heat and mass transfer with a focus on applications of these subjects in the field of fire protection engineering. This course will provide students with the fundamental knowledge, skills, and training in the thermal sciences that will prepare them for further education and professional experiences in fire dynamics and fire modeling. This course would be a suitable prerequisite for the fire modeling course currently being developed at WPI under the NRC curriculum development grant program (Fiscal Year 2009). Upon completing this proposed course, students will understand how these concepts are used in the development and application of fire dynamics calculations and fire modeling Simulations, including their applications under 10 CFR 50.48(c) and NFPA 805.

The subject material of this course will include:

- Thermodynamics
  - Control volume concepts -application to enclosure fires
  - Conservation equations for mass, species, energy and momentum (force)
  - Chemical thermodynamics -fire applications
- Fluid mechanics
  - Hydrostatics
  - Bernoulli's principle and orifice flows
  - Internal flows -flow in pipes and other conduits
  - External flows -boundary layers, plumes and ceiling jets

- Vent flows in enclosure fires
- Heat and mass transfer
  - Conduction -heating and ignition of solid materials
  - Convection -heat losses to solid boundaries and targets
  - Radiation -radiant energy exchange in enclosure fires
  - Burning rate theory

Potential for Supporting or Advancing the Nuclear Safety Educational Infrastructure

Fire protection engineering is critical to the NRC's regulatory mission, with "fire representing one of the most significant risks to the safe operation of commercial nuclear power plants. The NRC's fire protection regulations, inspections, and research focus on· nuclear power plant fire safety. To accomplish this goal of fire safety, the NRC requires a robust fire protection program at every commercial nuclear power plant in the United States and has a staff of fire protection engineers to inspect plants and enforce its regulations. The NRC's fire protection program imposes a high demand for qualified fire protection engineers both within the nuclear industry and within the NRC. As noted in the GAO 08-747 report, "NRC also faces an aging workforce and the likelihood that it will be competing with industry for engineers with skills in the fire protection area .... A number of experts in the engineering field, including academics and fire engineers, stated that it will be difficult for NRC to compete with industry over the projected numbers of graduates in this field over the next few years." Thus, the NRC is facing a critical shortage of engineers in this field that is critical to its regulatory mission.

To help fulfill the manpower needs of the NRC and the nuclear industry, the graduate program in FPE at Cal Poly will address one of the primary impediments to more widespread use of performance-based fire safety analysis, design and regulation in the United States --the lack of a more scientifically educated workforce on both the industry and regulatory sides of the process. As noted in the GAO-08-747 Report, this shortfall in the workforce is associated in part with the extremely limited number of educational offerings in this field. Currently, only two institutions in the United States, the University of Maryland and Worcester Polytechnic Institute, offer graduate degrees in FPE in the United States. This new program will train engineers in performance-based fire safety analysis and directly supports the NRC initiative on 10 CFR 50.48(c) and NFPA 805. The successful start of this program will increase by 50% the number of educational institutions offering graduate degrees in FPE within the United States and thus will have a large impact on advancing the educational infrastructure necessary to allow the Nation to safely move its nuclear energy initiatives forward.

Improvements to Teaching Competencies and Subject Matter Expertise

Fire Protection Engineering is a multi-disciplinary program drawing from expertise in engineering, architecture, construction management, and natural resources. This new graduate program will allow the faculty at Cal Poly to grow into a new area of study and to work collaboratively with colleagues from across the university campus. The new graduate program will improve the teaching competencies of the faculty by allowing them to apply their knowledge in a new direction. This new collaboration will not only involve faculty, but will also involve the fire protection engineering industry, with members of the profession co-teaching courses and serving as professional mentors for students. This collaboration with industry will validate the subject material presented to the students and help the faculty develop subject matter expertise.

Proposed Approach and Collaborative Linkages

Innovative Instructional Approach

The Master of Science program in FPE at Cal Poly is designed to be delivered in a primarily online, blended format. There will be two cohorts of students, one on-campus and one on-line. It is anticipated that on-campus students will be primarily full-time students, many of whom will be continuing directly from their undergraduate education, while on-line students will be primarily part-time students who are working professionals.

Lectures in the FPE program will be delivered in technology-enabled classrooms to permit distance delivery. On-campus students will attend lectures in the classrooms, while distance students will attend lectures via the internet. Distance students will be encouraged to participate in lectures in real-time for maximum benefit, but the lectures will also be recorded for asynchronous delivery to stUdents whose work schedules or other responsibilities may not permit real-time partiCipation.

In order to develop and offer a high quality online graduate program, it is recognized that faculty support above that which is usually required for a traditionally delivered program will be needed. Cal Poly recognizes this and will provide assistance to faculty in developing courses for online delivery. Cal Poly, through Continuing Education, currently offers other programs through distance learning. Therefore, the infrastructure is in place to support the faculty who teach in the program and to help them develop materials for a web-based course. Furthermore, The California State University system has committed resources to support cyber-learning including support for MERLOT (http://www.calstate.edu/ats/quality-contentlpdf/MERLOT.pdf). In order to develop and offer a high quality online graduate program, it is recognized that faculty support above that which is usually required for a traditionally delivered program will be needed. Continuing Education recognizes this and will take the following actions as the graduate program moves forward:

- Provide assistance to faculty in transitioning courses to an online format through individual and group instruction. Continuing Education currently offers to faculty a noncredit course on teaching online and how to use Blackboard and EliuminateLive. Faculty teaching in the fire protection engineering program will be able to participate in this course without charge. When requested, individual assistance will be provided.
- Continuing Education will provide individual tutoring and assistance to faculty as they transition course materials to an online format.
- Courses will be offered via EliuminateLive as the learning management system combined with Blackboard as the class management system. EliuminateLive has agreed to provide free support to faculty teaching in online programs offered by Continuing Education as they learn the system and migrate course content.
- Through the Academic Technology Services unit of the California State University, a great many resources are made available to faculty who want to teach online. A representative of ATS will be brought to Cal Poly to provide a workshop designed to help acquaint faculty with the multitude of available resources including the CSU digital library, MERLOT, and others.

The Master of Science in Fire Protection Engineering program at Cal Poly is also innovative in the way it combines traditional aspects of STEM academic education in the classroom with professional training and project experience in the field. To complete the MS degree requirements, students are required to complete a comprehensive performance-based fire safety analysis under the guidance of a professional mentor. Students working within the nuclear industry can select culminating projects related to their work environment and can work with professional mentors within the industry to complete their projects.

Institutional Capability and Capacity

Cal Poly and the California State University system are strongly committed to the success of the new MS degree program in Fire Protection Engineering. Institutional resources have been committed to the program in the form of administrative support and teaching facilities to implement the distance education element of the program. The letters of support that accompany this proposal show that the graduate program in Fire Protection Engineering has strong institutional support from the Chancellor of the California State University system as well as from the President, the Dean of Research and Graduate Programs and the Dean of the College of Engineering at Cal Poly. The letters of support from five prominent Fire Protection Engineering firms are representative of the strong support for this program within the broader fire protection engineering profession. These letters also demonstrate the commitment to maintain the program once federal support ends.

Program Sustainability

As noted in the California State University's strategic plan, Access to Excellence, "degree requirements for information-age jobs increasingly extend to master's and professional degrees and continuing education. Continuing adult education for refreshing of skills, applied masters programs, and professional degrees and certificates will also be in high demand" (CSU, 2009). The workforce development reflected in this new graduate program is a priority of the system and the campus and will help foster program institutionalization and sustainability.

Both the FPE graduate program itself and the online format advance the goals of Access to Excellence. Specifically, it addresses *Commitment Eight* which calls for the campuses of the CSU to "act on the CSU's responsibility to meet

post-baccalaureate needs, including those of working professionals." The graduate program will accomplish this by meeting the following Access to Excellence objectives:

- Advocate the strengths of the CSU and its institutions to outside agencies and industry groups.
  - This graduate program is being developed in response to the needs of California to develop and maintain professionals working in the area of fire protection engineering in order to decrease the loss of life and property in our state.
- Attract and secure grant funding for partner support of graduate education and research.
  - To date, approximately $90,000 has been received in grant support for the development of this graduate program. In addition, commitments have been received from fire protection engineering firms to help build an FPE lab, hire graduates, and support internships.
- Provide educational programs and re-training opportunities related to workforce needs.
  - This graduate program fulfills a gap in California's workforce development needs by educating middle and upper level professionals in the area of fire protection engineering.

Once the FPE 501 course on Fundamental Thermal Sciences has been successfully developed and implemented, it is anticipated that the course materials will be made available to the nuclear industry for use in its ongoing educational programs. For example, EPRI has been offering short courses on fire modeling to nuclear industry personnel with NRC support. The materials developed for this course could be incorporated in this or other short course offerings.

Key Personnel

Dr. Christopher Pascual, the primary investigator, has a strong thermal science background and industrial experience in the nuclear industry. Because of his background in thermal sciences related to the nuclear industry, Dr. Pascual is well-qualified to develop FPE 501. He will work closely with Dr. Frederick Mowrer in developing fire protection engineering material that is relevant for this class.

Dr. Frederick Mowrer, Acting Director for the Fire Protection Engineering Program, is a wellrespected fire protection engineer who is well-qualified to lead development of the graduate program in fire protection engineering. Dr. Mowrer has extensive experience with nuclear fire protection. He was the principal developer of the quantitative methods of fire hazard analysis incorporated in the FIVE Methodology developed by EPRI in the early 1990s and has recently developed and taught a short course on fundamentals of fire modeling as part of the EPRI fire modeling course offered to nuclear industry personnel. He will be used as an expert to help develop the courses for the program and to facilitate the networking between industry and Cal Poly.

NRC-38-10-979

Attachment C – Standard Terms and Conditions

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

Preface

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

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

To assist with finding additional guidance for selected items of cost as required in 2 CRF 220, 2 CFR 225, and 2 CFR 230 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 herby 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 form 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."