

Grant and Cooperative Agreement

CHOOSE ONE:

- COOPERATIVE AGREEMENT
- GRANT

CHOOSE ONE:

 EDUCATION FACILITIES RESEARCH SDCR TRAINING

1. GRANT/COOPERATIVE AGREEMENT NUMBER NRC-HQ-60-17-G-0024		2. SUPPLEMENT NUMBER		3. EFFECTIVE DATE 06/30/2017		4. COMPLETION DATE			
5. ISSUED TO NAME/ADDRESS OF RECIPIENT (No., Street, City/County, State, Zip) UNIVERSITY OF TEXAS AT SAN ANTONIO ONE UTSA CIRCLE SAN ANTONIO TX 782491130				6. ISSUED BY U.S. NRC - HQ Mailing Address: Acquisition Management Division Mail Stop: TWFN-8E06M Washington DC 20555-0001					
7. TAXPAYER IDENTIFICATION NO. (TIN)				9. PRINCIPAL INVESTIGATOR/ORGANIZATION'S PROJECT OR PROGRAM MGR. (Name & Phone) [REDACTED]					
8. COMMERCIAL & GOVERNMENT ENTITY (CAGE) NO.				[REDACTED]					
10. RESEARCH, PROJECT OR PROGRAM TITLE Faculty Development Program at the University of Texas at San Antonio: Probabilistic Risk Assessment of Stress Corrosion Cracking in Nuclear Facilities									
11. PURPOSE See Schedule									
12. PERIOD OF PERFORMANCE (Approximately) 06/30/2017 through 06/29/2020									
13A.		AWARD HISTORY			13B.		FUNDING HISTORY		
PREVIOUS		\$0.00			PREVIOUS		\$0.00		
THIS ACTION		\$450,000.00			THIS ACTION		\$30,000.00		
CASH SHARE		\$0.00			TOTAL		\$30,000.00		
NON-CASH SHARE		\$0.00							
RECIPIENT SHARE		\$150,000.00							
TOTAL		\$450,000.00							
14. ACCOUNTING AND APPROPRIATION DATA 2017-X0200-IUPNSE-60-60D099-52-S-164-1148-4110									
PURCHASE REQUEST NO.		JOB ORDER NO.			AMOUNT		STATUS		
RES-17-0188									
15. POINTS OF CONTACT									
	NAME		MAIL STOP		TELEPHONE		E-MAIL ADDRESS		
TECHNICAL OFFICER	NANCY V. HEBRON-ISREAL		TWFN10B56		301-415-6996		Nancy.Hebron-Isreal@nrc.gov		
NEGOTIATOR									
ADMINISTRATOR	M'LITA R. CARR				301-415-6869		MLita.Carr@nrc.gov		
PAYMENTS									
16. THIS AWARD IS MADE UNDER THE AUTHORITY OF: Pursuant to Section 31b and 141b of the Atomic Energy Act of 1954, as amended									
17. APPLICABLE STATEMENT(S), IF CHECKED:					18. APPLICABLE ENCLOSURE(S), IF CHECKED:				
<input type="checkbox"/> NO CHANGE IS MADE TO EXISTING PROVISIONS					<input type="checkbox"/> PROVISIONS <input type="checkbox"/> SPECIAL CONDITIONS				
<input type="checkbox"/> FDP TERMS AND CONDITIONS AND THE AGENCY-SPECIFIC REQUIREMENTS APPLY TO THIS GRANT					<input type="checkbox"/> REQUIRED PUBLICATIONS AND REPORTS				
UNITED STATES OF AMERICA					COOPERATIVE AGREEMENT RECIPIENT				
CONTRACTING/GRANT OFFICER			DATE		AUTHORIZED REPRESENTATIVE			DATE	
M'LITA R. CARR			06/29/2017						

Grant and Cooperative Agreement

ITEM NO. (A)	ITEM OR SERVICE (Include Specifications and Special Instructions) (B)	QUANTITY (C)	UNIT (D)	ESTIMATED COST	
				UNIT PRICE (E)	AMOUNT (F)
	<p>CFDA Number: 77.006</p> <p>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 200.</p> <p>Payment:</p> <p style="padding-left: 40px;">ASAP GRANT FUNDS REIMBURSEMENT SYS US TREASURY</p> <p>Period of Performance: 06/30/2017 to 06/29/2020</p>				

Attachment A - Schedule

A.1 PURPOSE OF GRANT

The purpose of this Grant is to provide support to the "Faculty Development Program at the University of Texas at San Antonio: Probabilistic Risk Assessment of Stress Corrosion Cracking in Nuclear Facilities" as described in Attachment B entitled "Program Description."

A.2 PERIOD OF GRANT

1. The effective date of this Grant is June 30, 2017. The estimated completion date of this Grant is June 29, 2020.
2. Funds obligated hereunder are available for program expenditures for the estimated period: June 30, 2017 – June 29, 2020.

A.3 GENERAL

- | | |
|--------------------------------|---|
| 1. Total Estimated NRC Amount: | \$450,000.00 |
| 2. Total Obligated Amount: | \$30,000.00 |
| 3. Cost-Sharing Amount: | \$150,000.00 |
| 4. Activity Title: | Faculty Development Program at the University of Texas at San Antonio: Probabilistic Risk Assessment of Stress Corrosion Cracking in Nuclear Facilities |
| 5. NRC Project Officer: | Nancy Hebron-Isreal |
| 6. DUNS No.: | 800189185 |

A.4 AMOUNT OF AWARD AND PAYMENT PROCEDURES

1. The total estimated amount of this Award is \$600,000.00 for the three year period; inclusive of \$150,000.00 in cost share.
2. NRC hereby obligates the amount of \$30,000.00 for program expenditures during the period set forth above and in support of the Budget above. 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 Recipient in accordance with procedures set forth in the Automated Standard Application for Payments (ASAP) Procedures set forth below.

A.5 AVAILABILITY OF FUNDS

1. Funding for this award is available through the date specified in Section A.2.2.
2. Additional funding for subsequent periods is optional and contingent upon and subject to the availability of funds as well as satisfactory performance of the most recent performance period.

A.6 BUDGET

Revisions to the grant award budget shall be made in accordance with Revision of Grant Budget in accordance with [2 CFR § 200.308](#).

BUDGET INFORMATION - Non-Construction Programs

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. NRC-HQ-60-17-FOA-0001	77.008	\$0.00	\$0.00	\$179,796.00	\$50,000.00	\$229,796.00
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

SECTION B - BUDGET CATEGORIES

Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY						Total (5)
	(1) NRC-HQ-60-17-FOA-0001	(2) NRC-HQ-60-17-FOA-0001	(3) NRC-HQ-60-17-FOA-0001	(4) NRC-HQ-60-17-FOA-0001	(5) NRC-HQ-60-17-FOA-0001	(6) NRC-HQ-60-17-FOA-0001	
a. Personnel	\$24,606.00	\$25,344.00	\$26,104.00	\$133,347.00	\$136,857.00	\$179,796.00	\$450,000.00
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
k. TOTALS (sum of 6i and 6j)	\$179,796.00	\$133,347.00	\$136,857.00	\$450,000.00	\$450,000.00	\$450,000.00	\$450,000.00
7. Program Income	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Standard Form 424A (Rev. 7-97)
Prescribed by OMB Circular A-102

ATTACHMENT B - PROJECT DESCRIPTION

I. PROPOSED FACULTY DEVELOPMENT PROGRAM

Environmental assisted cracking (EAC) is a critical and complex phenomenon occurring at nuclear power plants. There are a number of nuclear related EAC topics that are still the focus of ongoing work including, but not limited to, irradiated assisted stress corrosion cracking (SCC) of primary components, SCC in dissimilar welds in pressurizer surge nozzles, corrosion fatigue, and chloride induced SCC of dry canister storage systems [1-6]. The unique environmental exposure conditions observed at a nuclear power plant contribute to these types of aging degradation mechanisms that have been observed over decades of operation. Comprehension of the various EAC phenomena is complex as it requires mechanical, materials, and electrochemical knowledge. However, very few researchers have a comprehensive understanding of these three scientific fields, which is essential to develop accurate probabilistic, fracture-mechanics and electrochemical based computational tools to evaluate the probability of failure of nuclear structures due to EAC.

Therefore, the proposed program will support three tenure-track professors to become leading scholars in evaluating the risk of SCC in nuclear facilities. The proposed program is structured to enrich the professors' tenure-track portfolio in the three areas that are used to evaluate faculty performance: **a) Research, b) Teaching and c) Service.** Resources will be provided to the young investigators to:

- A) Develop a pioneering research program** on SCC testing and modeling. This effort is aligned with NRC goal of developing a probabilistic-fracture mechanics based tool capable of determining the probability of failure of nuclear system components.
- B) Create an educational program** focused on the fundamentals of corrosion with applications to nuclear safety issues. This program will support NRC mission readiness and reduce future maintenance costs.
- C) Engage in external service activities** to ensure that research findings are incorporated into practices and policies.

In addition, the young professors will be under a **mentoring plan** established between [REDACTED], Mechanical Engineering (ME) Professor and Associate Dean for Research in the College of Engineering at the University of Texas at San Antonio (UTSA), [REDACTED], Chair of the Civil and Environmental Engineering Department (CEE), and the Environmental Performance of Materials Section of Southwest Research Institute (SwRI).

A. RESEARCH PROGRAM: The proposed research work will develop a finite element-based probabilistic fracture-mechanics tool fed with electrochemical information that evaluates the probability of rupture in nuclear components. The proposed approach is *potentially transformative* as the finite element capabilities will allow the modeling of any nuclear system component with different crack geometries and loading conditions, as opposed to current methods that are limited to a modest library of shapes and materials [7-9]. At the completion of the proposed research, the *expectation* is to have developed a unique analysis technique for addressing a large range of EAC issues observed at nuclear power plants. Also, we anticipate to contribute to the understanding of the interactions between plastic deformation and electrochemical reactions occurring at the crack tip.

A.1. Experimental work: A series of high resolution fracture mechanic and electrochemical

based experiments will be performed to obtain the steady state (stage II) subcritical crack growth rate (da/dt), the threshold stress intensity (K_{TH}) and the pitting potential (E_{pit}) as a function of environmental variables that simulate dry canister storage conditions. Load, displacement and crack length will be measured during the test. The crack length will be measured using the direct-current potential difference (dc-PD) method [10], which has been successfully and extensively used in SCC studies [11-12]. NRC Information Notice 2012-20 describes several incidents where austenitic stainless steel canisters exhibited SCC as result of atmospheric chloride exposure [13]. The chloride source was reported to be related to marine environments, but it could also be associated to the proximity to salted roads and cooling towers. In these environments, different salts can be deposited on the surface of the canister such as, NaCl and $MgCl_2$. At low relative humidity (RH) and above the deliquescence point of these salts, a saturated electrolyte layer can form on the canister surface, driving localized corrosion [14-18] and, in some cases, leading to SCC [19-22]. A solution of $MgCl_2$ can sustain higher maximum chloride concentrations than NaCl and therefore drive a higher decrease of the E_{pit} of austenitic stainless steels than NaCl, which could also lead to the observed higher resistance of these alloys to SCC in the presence of NaCl than in $MgCl_2$ [23]. This SCC resistance dependence on the type of chloride has also been reported by Grubb et al. [24]. In addition, temperature plays an important role in increasing the susceptibility to chloride-induced SCC [25]. Therefore, the key environmental parameters that will be tested in this proposed project include variations in: a) chloride type (NaCl and $MgCl_2$), b) chloride concentration (controlled through RH or solution preparation) and c) temperature. Initially, the effect of the environment will be studied by measuring E_{pit} utilizing cyclic potentiodynamic polarization. Then, fracture mechanics experiments will be performed in two exposure modes, that is, under total immersion and atmospheric simulations. The latter case involves salt deposition on the single edge notch tensile (SENT) specimen, which will be controlled at different levels to address its effect on da/dt and K_{TH} . During these experiments, the temperature and relative humidity will also be controlled. An inert environment, consisting of N_2 , will be tested for comparison. The fracture morphology and the un-exposed material microstructure will be characterized through a scanning electron microscope (SEM). In addition, the chemical composition of the alloy will be determined as well as its mechanical properties.

A.2. Computational work: The goal is to provide an efficient and robust method for progressive crack propagation that allows the analyst, in only a few steps, to predict the risk of SCC for nuclear components under realistic loadings. This work will be based on the extension of a *revolutionary* finite element method based on multicomplex mathematics. The Complex Finite Element Method, denoted as ZFEM, was developed at UTSA under the supervision of Dr. Millwater. ZFEM has the capability of computing arbitrary-order derivatives of the output fields of the model with respect to input parameters, including shape, material parameters and loading [26-28]. This capability was used to compute the energy release rate (or its equivalent partner-the stress intensity factor, K) in arbitrarily shaped cracked bodies. It was shown that ZFEM has the same accuracy as the J-integral when computing the energy release rate for 2D and 3D linear elastic models [29]. However, this method is simpler in concept and implementation. Recently, a ZFEM based progressive crack growth algorithm for 2D elastic materials was developed at UTSA. An appealing characteristic of this method is that large curvilinear crack progressions can be made before remeshing for a subsequent step.

For SCC, the presence of the corrosive environment generates spatial and time dependent conditions at the crack tip. Plastic strain at the crack tip causes the passive film to fracture, thereby exposing fresh metal to the environment. This zone corrodes to produce an increment of crack growth. However, after a brief period, a passive film is formed again and crack growth is arrested. After accumulated plastic strain, the film fractures again and the process

repeats itself [30, 31]. Hence, an accurate estimate of the plastic strain zone surrounding the crack tip is essential for accurate lifetime predictions. ZFEM can provide an accurate evaluation of the stress intensity factors for arbitrary material models, e.g. bilinear isotropic hardening, kinematic hardening, Johnson Cook plasticity model, etc. Moreover, the cyclic film rupture phenomenon can be captured in ZFEM progressive crack growth algorithm by defining a user subroutine that controls film rupture.

Probability Risk Assessment (PRA) based on the Monte Carlo approach allows analysts to quantify the risk of an unwanted event, such as the rupture of a cylinder carrying reactor liquid [32]. A coupled finite element-Monte-Carlo simulation involves a large number of computational runs to estimate the variance of an output with respect to random inputs. This approach can be prohibitively time consuming for large models. However, by performing a few ZFEM runs, a first order approximation can be obtained in an efficient manner. The variability in the response of a structure can be obtained as [33]: $V_{\theta} \approx \sum V_{X_i} (\partial\theta / \partial X_i)^2$, where V_{θ} represents the variance of the output quantity θ (e.g. stress, displacement), X_i represents any random variable affecting the output (e.g., loading, material property, or geometry parameter), and V_{X_i} is the known variability of the input random variable. The key element to this method is to estimate the partial derivatives ($\partial\theta / \partial X_i$) efficiently. ZFEM provides a robust, stable, computationally efficient, and highly accurate method for calculating these partial derivatives. The tasks needed to accomplish the research objectives include: a) extending the ZFEM material library to incorporate electrochemical effects, b) integrating the film rupture model to the crack growth algorithm and c) validating crack propagation results with the experimental measurements.

Sustainability: Energy and Sustainability are 2 of the 5 key strategic initiative areas of UTSA's 2016 Strategic Plan. The proposed research in SCC and PRA tools for nuclear applications is well-aligned with UTSA's plan. Moreover, the investigators have a track record of conducting research in these areas. The potential outcomes of the program (research exposure, publications, student advising and collaborations) will foster an ideal environment for achieving tenure, and consequently assure the professors' long term research work in these areas.

B) EDUCATIONAL PROGRAM: UTSA College of Engineering (COE) offers materials and computational fracture mechanics related courses, such as Mechanical Behavior of Materials, Linear and Nonlinear Finite Element Methods and Fracture Mechanics. In addition, COE offers an undergraduate course in Corrosion Engineering that covers the fundamental theories of Corrosion and Electrochemistry. To complement and improve the current capabilities at UTSA, the proposed program seeks to sharpen the theoretical and practical knowledge of students in electrochemistry in order to equip them with skills that will make them work-ready for the nuclear sector. The following activities are proposed:

B.1. New Course Development: This proposal offers to launch a graduate level course titled *Advanced Corrosion Engineering*. This class will cover topics such as: Electrochemical Impedance Spectroscopy, Passivation and EAC, and a laboratory component that will include a simulation of EAC on nuclear applications. Also, [REDACTED] from SwRI will offer each one in-class seminar per semester to show students industry related corrosion cases.

B.2. Student Projects: Each year the investigators will support at least one ME Senior Design project, required for graduation, related to corrosion and/or fracture mechanics. The involved faculty will provide resources and advice to the students. The students will be required to present their work at UTSA's Undergraduate Research and Creative Inquiry Showcase.

B.3 Certificate Programs: The proposed research and educational activities will strengthen UTSA Certificate in Oil and Gas offered by the ME department and contribute to the efforts of the CEE department in establishing a certificate in risk and safety analysis of structural components. These efforts initiated under NRC Grant No. NRC-HQ-12-G-38-0076, which included the development of two design courses for nuclear structures. The proposed corrosion course will become a core course of the certificate programs.

Sustainability: ME commits to continue offering corrosion courses after NRC funding ends (see attached letter of support). The courses will be self-sufficient by using student tuition to support future classes. The certificate program will be sustained as it is based on the existing and the proposed new courses. Upon project completion, funds for student projects will be requested to COE and professional organizations, such as NACE International and the local San Antonio NACE Section.

C) SERVICE: The supported faculty will contribute to the improvement of nuclear engineering practices by participating in conferences and agency committees. Potential conferences and committees include the International Conference on Environmental Degradation of Materials in Nuclear Power Systems, [NACE Corrosion Risk Management Conference](#), NACE CORROSION Conference and Expo, TMS Annual Meeting & Exhibition, NACE Research Committee, and ACI Committee 349 for Nuclear Safety-Related Concrete Structures.

II. IDENTIFIED CANDIDATES

██████████ have been identified as qualified professors to launch the proposed program on SCC testing and modeling. ██████████ is a fifth year Assistant Professor with a dual appointment in UTSA's CEE and ME departments. ██████████ joined UTSA this fall as an Assistant Professor in the ME department. ██████████ is a 3rd year Assistant Professor in Mechanical Engineering. They possess the following qualifications relevant to the success of the project:

1) Experience aligned with the project: ██████████ have a strong computational fracture mechanics background and ██████████ has a solid experimental background in corrosion, including SCC. ██████████ developed the first methodology that incorporates the finite element method to predict the probability of failure of corroded suspension bridge cables [34]. He has been a key contributor to the development of ZFEM for fracture mechanics applications [29]. ██████████ has computational and experimental experience on multi-scale failure of materials under extreme environments. ██████████ has worked on projects related to EAC, specifically SCC of duplex and austenitic stainless steels [23]; and hydrogen embrittlement of Monel K500 alloys [12]. In addition, she is the Vice-Chair for the Research in Progress Symposium related to EAC for the NACE CORROSION 2017 Conference and Expo and is a member of the NACE Research Committee.

2) Existing relationship with UTSA research mentor: ██████████ has successfully collaborated with ██████████ in extending the ZFEM methodology for several applications [35-36]. ██████████ is collaborating with ██████████ regarding modeling of materials under thermal environments. ██████████ have collaborated with ██████████ writing a proposal on a materials-by-design approach for functionally graded magnesium alloys with enhanced performance in extreme environments.

3) Existing collaboration with SwRI: ██████████ have collaborated with the Environmental Performance of Materials Section at SwRI. ██████████ collaboration has

included the testing of ZnNi coated 4340 steel specimens to determine their susceptibility to hydrogen embrittlement. [REDACTED] was recently awarded the 2016 NACE Seed Grant to study chloride induced SCC. This project includes a strong collaboration with SwRI to study the effect of passive film composition on the electrochemical behavior and cracking of corrosion resistant alloys utilizing surface enhanced Raman spectroscopy.

4) Teaching abilities: [REDACTED] is one of the top faculty to receive high course evaluation from CEE and ME students (rating average 4.54/5.00). In addition, he has won the 2015 Zarem Educator Award, given by the American Institute of Aeronautics and Astronautics, for the technical excellence shown in the research work of his graduate student (which was related to ZFEM). [REDACTED]. [REDACTED] teaches machine element design at the undergraduate level and continuum mechanics at the graduate level. [REDACTED] has served in the past as undergraduate teaching assistant in Analytical Chemistry and as graduate teaching assistant in the Introduction to Materials Science and Engineering and Phase Transformations course. She has also volunteered to lecture undergraduate and graduate courses related to Corrosion at the Ohio State University and the University of Virginia.

III. MANAGEMENT STRUCTURE AND CAPABILITIES

UTSA is the eighth largest public four-year higher education institution in the state of Texas. [REDACTED] will serve as the Principal Investigator of the project and provide research mentoring to the young faculty. He has over twenty-five years of experience in the application of probabilistic mechanics methods to aerospace and aircraft components and gas turbine engine disks. During the period that he served as chair of ME, he acquired vast expertise in mentoring young professors towards achieving tenure. [REDACTED] will mentor the young faculty in the teaching and service areas. She is a member of UTSA's Academy of Distinguished Teaching. She was included in the Top 25 Women Professors in Texas in 2013 and awarded the University of Texas Regents' Outstanding Teaching Award in 2012. UTSA faculty will also interact with SwRI personnel on a regular basis. SwRI, also located in San Antonio, TX, has performed hundreds of programs related to the area of nuclear power generation. These programs have supported work for both nuclear power plant operators along with nuclear power regulatory groups, including USNRC.

PhD Student Selection Process and Marketing Strategy: Two doctoral students showing a genuine interest in nuclear structures will be recruited for this project to assist with the research tasks. A PhD funding opportunity will be posted in the homepage websites of the CEE and ME Departments at UTSA. An effort will be made to recruit a graduate student from a Hispanic background in order to align this effort to UTSA's mission as a minority serving institution. Thus, an announcement will be sent to neighboring schools with a high percentage of minority students such as Univ. of Texas at Pan Am, Univ. of New Mexico, etc. The students will be selected following an interview process seeking for the top candidates.

Work Distribution: The breakdown of efforts is as follows:

- 1) Experimental Testing: The experimental tests will be performed by one PhD student under the supervision of [REDACTED] at her laboratory at UTSA. A dc-PD and compliance crack monitoring system is needed to perform this research, which is stipulated in the budget section of this proposal. Pragmatic feedback will be obtained from SwRI.
- 2) Computational Models: The probabilistic-fracture mechanics based models will be conducted by a PhD student under [REDACTED] direction. [REDACTED], as the originator of ZFEM, will meet on a bi-weekly basis with the computational team.
- 3) Educational Component: [REDACTED] will work with [REDACTED] to develop the laboratory components of the corrosion courses and the educational program for the new graduate level

corrosion course that will be taught at UTSA. The laboratory sessions will take place in UTSA's first laboratory dedicated to the study of corrosion, which will be set up by [REDACTED] with the start-up package provided by UTSA. These courses will be taught by [REDACTED] as result from her vast experience in this area. [REDACTED] will introduce modules on modeling SCC to the course. [REDACTED] will help the young faculty develop the course syllabi and class objectives, observe their teaching style and provide feedback.

4) Program Certificates: [REDACTED] will coordinate with the Dean of COE to finalize the efforts towards offering a Certificate in Risk and Safety Analysis of Structural Components in Nuclear Facilities.

IV. EVALUATION PLAN

A timeline of the program's activities and a formal mentoring plan will be developed at early stages of the project. [REDACTED] will request the mentee to a) develop a written plan, b) review the plan and c) request the mentees to submit the plan to their Department Chairs. The plan will be reviewed as necessary throughout the year and formally reviewed at the end of each year by the mentee and mentors. The criteria used to evaluate the project's *minimum expectations (MEX)* are based on the established Annual Department Evaluation Metrics as they provide a clear indication if the program has led the young faculty towards achieving tenure. The plan will consist on:

- 1) Publications: Provide a list of planned publications, with potential titles, journal, co-authors, and expected date of submittal (contributes to research). *MEX*: 1 journal publication per year.
- 2) Travel: Make a list of conference presentations and committee sessions that the mentee plans to attend during the duration of the project (contributes to research and service). *MEX*: 1 local conference per year, 1 international conference over the 3 year period, 1 committee.
- 3) Students: Describe the research activities for each student and potential thesis defense date (contributes to research and teaching). *MEX*: 1 PhD student per faculty.
- 4) Teaching: Describe how the research findings of the project can be incorporated to courses taught by the instructor and establish a plan for the development of the proposed laboratory components (contributes to teaching). *MEX*: Student Course Evaluation: 4/5.

The tenure-track faculty should complement their tenure-track package with their other existing research projects and collaborations. A summative evaluation will be conducted in the last year of the program funding to assess successful completion of the project.

ATTACHMENT C – STANDARD TERMS AND CONDITIONS

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

Preface

This award is based on the application submitted to, and as approved by, the Nuclear Regulatory Commission (NRC) under the authorization [42 U.S.C. § 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 grant or cooperative agreement. The following also apply:

- 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 Part 200 Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards](#).

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 (E.O.), Office of Management and Budget (OMB) Circulars, the NRC's Mandatory Standard Provisions, special award conditions, and standard award conditions.

Certifications and Representations: These terms incorporate the certifications and representations required by statute, executive order, or regulation that were submitted with the SF424B application through [GRANTS.GOV](#).

I. Mandatory General Requirements

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

1. Applicability of 2 CFR Part 200

All provisions of 2 CFR Part 200 and all Standard Provisions attached to this grant/cooperative agreement are applicable to the Recipient and to sub-recipients which meet the definition of "Recipient" in 2 Part [§200.86](#), unless a section specifically excludes a sub-recipient from coverage. The Recipient 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 D](#) of [2 CFR Part 200](#) and include this term in lower-tier (sub-award) covered transactions.

Recipients must comply with monitoring procedures and audit requirements in accordance with [2 CFR Part 200, Subpart F—AUDIT REQUIREMENTS](#).

2. Award Package

The Recipient is obligated to conduct project oversight as may be appropriate, to manage the funds with prudence, and to comply with the provisions outlined in [2 CFR Part 200](#). Within this framework, the Principal Investigator (PI) named on the award face page, 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, and is subject to a refund of unexpended grant funds to the NRC.

The non-Federal entity alone must be responsible, in accordance with good administrative practice and sound business judgment, for the settlement of all contractual and administrative issues arising out of procurements related to its grant award. These issues include, but are not limited to, source evaluation, protests, disputes, and claims. These standards do not relieve the non-Federal entity of any financial or fiduciary responsibilities or obligations arising under its grant, including sub-contracts and sub-awards, or any other contractual or financial obligation. The Federal awarding agency will not substitute its judgment for that of the non-Federal entity unless the matter is primarily a Federal concern. Violations of law will be referred to the local,

State, or Federal authority having proper jurisdiction. See [2 CFR § 200.318\(k\)](#), General Procurement Standards.

Subawards

[Appendix II to Part 200](#) Contract Provisions for Non-Federal Entity Contracts Under Federal Awards

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 Recipient to NRC. See [2 CFR § 200.318](#).

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.

The Recipient agrees to comply with the non-discrimination requirements below:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. §§ 2000d et seq.), which prohibits discrimination on the grounds of race, color, or national origin in any program or activity receiving federal financial assistance.
- Title IX of the Education Amendments of 1972 (20 U.S.C. §§ 1681 et seq.), which prohibits discrimination on the basis of sex in any education program or activity receiving federal financial assistance.
- Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794), which prohibits discrimination on the basis of disability in any program or activity receiving federal financial assistance.
- The Age Discrimination Act of 1975, as amended (42 U.S.C. §§ 6101 et seq.), which prohibits discrimination on the basis of age in any program receiving federal financial assistance.
- The Americans with Disabilities Act of 1990 (42 U.S.C. §§ 12101 et seq.), which prohibits recipients from discriminating on the basis of disability in employment (Title I); State and local government services (Title II); and places of public accommodation and commercial facilities (Title III).
- Parts II and III of E.O. 11246, as amended by E.O. 11375, 11478, 12086, 12107, 13279, 13665, and 13672, which prohibits federal contractors and federally assisted construction contractors and subcontractors, who do over \$10,000 in Government business in one year, from discriminating in employment decisions on the basis of race, color, religion, sex, or national origin and requires that government contractors take affirmative action to ensure that equal opportunity is provided in all aspects of their employment.
- E.O. 13166, "Improving Access to Services for Persons with Limited English Proficiency," which clarifies that national origin discrimination under Title VI includes discrimination on the basis of limited English proficiency (LEP) and requires that the recipient take reasonable steps to ensure that LEP persons have meaningful access to programs and activities.
- Any other applicable non-discrimination law(s).

Generally, Title VII of the Civil Rights Act of 1964, 42 U.S.C. § 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 U.S.C. § 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.

Applicants must ensure that individuals selected as beneficiaries of support under this grant meet the legal requirements consistent with Supreme Court Decisions including *Fisher*, *Gratz*, and *Grutter*.

Modifications/Prior Approval

NRC's prior written approval may be required before a Recipient 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 and obtained from the NRC Grants Officer in advance of the change or obligation of funds. All requests for NRC prior approval, including requests for extensions to the period of performance, must be made, in writing (which includes submission by e-mail), to the designated Grants Officer at least 30 days before the proposed change. The request must be signed by the authorized organizational official. Failure to obtain prior approval, when required, from the NRC Grants Officer, may result in the disallowance of costs, or other enforcement action within NRC's authority.

Lobbying Restrictions

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

The Recipient will comply with provisions of 31 U.S.C § 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 Recipient shall submit, at the time of application, a completed "Certification Regarding Lobbying" form, regardless of dollar value.

If applicable, the Recipient receiving in excess of \$100,000.00 in Federal funding shall submit a completed Standard Form (SF-LLL), "Disclosure of Lobbying Activities" for any persons engaged in lobbying activities, as discussed at 31 U.S. Code § 1352 – Limitation on use of appropriated funds to influence certain Federal contracting and financial transactions. The form concerns 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. If the Recipient must submit the SF-LLL, including those received from sub-recipients, contractors, and subcontractors, to the Grants Officer.

Debarment And Suspension – (See [2 CFR Part 180](#); [2 CFR § 200.205](#); [2 CFR § 200.113](#); and [2 CFR Part 200, Appendix II.](#))

The Recipient 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, 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 the recipient's 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); or
- (4) Have had one or more public transactions (Federal, State, or local) terminated for cause or default within the preceding three years.
- (5) The Recipient agrees that, unless authorized by the Grants Officer, it will not knowingly enter into any subaward or contracts under this grant/cooperative agreement with a person or entity that is not included on the System for Award Management (SAM) (<https://www.sam.gov>).

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

Debarment, Suspension, Ineligibility, and Voluntary Exclusion

The Recipient 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 [2 CFR Part 180](#) and [2 CFR Part 200](#).

Drug-Free Workplace

The Recipient 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 U.S.C. §§ 8101-8106](#).

Implementation of E.O.13224 – Executive Order on Terrorist Financing

The Recipient 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 Recipient 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.

The Recipient must comply with E.O. 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:

[Implementation of Executive Order 13224 Blocking Property and Prohibiting Transactions With Persons Who Commit, Threaten To Commit, or Support Terrorism amended by E.O. 13268, 13284, and 13372.](#)

Procurement Standards - [2 CFR §§ 200.318-200.326](#)

Sections 200.318 - 200.326 set forth standards for use by Recipients 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 will be imposed by the Federal awarding agencies upon Recipients, unless specifically required by Federal statute, executive order, or approved by OMB.

Travel and Transportation

Travel must be in accordance with the Recipient's Travel Regulations or the U.S. Government Travel Policy and Regulations at: <http://www.gsa.gov/portal/category/21222> and the per diem rates set forth at: <http://www.gsa.gov/portal/content/104877>, absent Recipient's travel regulations. Travel and transportation costs for the grant must be consistent with provisions as established in [2 CFR § 200.473-474](#).

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

The Recipient will comply with the provisions of the Fly America Act (49 U.S.C 40118), as implemented at 41 CFR §§ 301-10.131 through 301-10.143.

Federal funds may not be used to travel to countries identified as "Foreign Policy Restricted Countries", as identified by the U.S. Department of State or the U.S. Agency for International Development.

Property Standards

Property standards of this award shall follow provisions as established [2 CFR §§ 200.310-200.316](#).

Intangible Property

Intangible and intellectual property of this award shall generally follow provisions established in [2 CFR § 200.315](#).

Inventions Report - The Bayh-Dole Act (P.L. 96-517) affords Recipients the right to elect and retain title to inventions they develop with funding under an NRC grant award ("subject inventions"). In accepting an award, the Recipient 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 Recipient report all subject inventions to the awarding agency (NRC) as well as include an acknowledgement of federal support in any patents.

Patent Notification Procedures - If the NRC or its Recipients, 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, E.O.12889 requires NRC to notify the owner. If the Recipient uses or has used patented technology under this award without license or permission from the owner, the Recipient must notify the Grants Officer. This notice does not imply 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, such as data, databases or software are determined by [Subpart D](#) of [2 CFR Part 200](#). The Recipient 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 Recipient 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 Recipient employees may be copyrighted, but only the part authored by the Recipient is protected because, under [17 U.S.C. § 105](#), works produced by Government employees are not copyrightable in the United States. On occasion, NRC may ask the Recipient 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 U.S.C. § 105](#).

Record Retention and Access

Recipient shall follow established provisions in [2 CFR §§ 200.333-337](#).

Conflict Of Interest

Conflict of Interest standards for this award will follow the Organizational Conflict of Interest (OCOI) requirements set forth in Section 170A of the Atomic Energy Act of 1954, as amended, and provisions set forth at [2 CFR § 200.112](#), Conflict of Interest.

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 Recipient'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 Acquisition Management Division, unless otherwise delegated, who shall appoint an intra-agency Appeal Board to review a recipient appeal of an agency action, if required, which will consist of the program office director, the Deputy Director of Office of Administration, and the Office of General Counsel, or their designees.
- 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 Recipient 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.

Remedies for Noncompliance

Termination of this award will follow provisions as established and described above in "Dispute Review Process" in [2 CFR §§ 200.338-342](#).

Performance and Financial Monitoring and Reporting - 2 CFR §§ 200.327-329

Recipient Financial Management systems must comply with the provisions in [2 CFR § 200.302](#).

- Payment – [2 CFR § 200.305](#)
- Cost Share or Matching – [2 CFR § 200.306](#)
 - Recipients are to be careful with providing excessive cost share or match since at the end of the grant, if the identified match has not been provided, then a portion of the federal share may be required to be returned to the Government.
- Program Income – [2 CFR § 200.307](#)
 - Earned program income, if any, will be added to funds committed to the project by the NRC and Recipient and used to further eligible project or program objectives or be deducted from the total project cost for the grant, as directed by the Grants Officer or indicated in the terms and conditions of the award.
- Revision of Budget and Program Plans – [2 CFR § 200.308](#)
 - The Recipient is required to report deviations from the approved budget and program descriptions in accordance with – [2 CFR § 200.308\(b\)](#) and request prior written approval from the Project Officer and the Grants Officer.
 - The Recipient is not authorized to re-budget between direct costs and indirect costs without written prior approval of the Grants Officer.
 - The Recipient is authorized to transfer funds among direct cost categories up to a cumulative 10 percent of the total approved budget. The Recipient is not allowed to transfer funds if the transfer would cause any Federal appropriation to be used for purposes other than those consistent with the original intent of the appropriation.
 - Allowable Costs – [2 CFR §§ 200.403](#)
- See section [2 CFR §§ 200.330-332](#) for Subrecipient Monitoring and Management.

FEDERAL FINANCIAL REPORTS

Federal Financial Reports (SF-425) are semi-annually, for the periods ending March 31 and September 30. Reports are due within 30 calendar days following the end of the reporting period and must be emailed to the Project Officer at the email addressed indicated in the Notice of Award, and to the Grants Officer at:

Grants_FFR.Resource@nrc.gov. (NOTE: There is an underscore between Grants and

FFR in the email address.) The SF-425 form and instructions are available at the following URL: http://www.whitehouse.gov/omb/grants_forms/.

PERFORMANCE PROGRESS REPORTS

The performance (technical) reports indicated below are subject to [2 CFR §200.328](#).

Faculty Development

Performance reports must be submitted semi-annually, for the periods ending March 31 and September 30, or any portion thereof, regardless of the award date. Reports are due within 30 days following the end of each reporting period and must be emailed to the Project Officer at the email addressed indicated in the Notice of Award, and to the Grants Officer at: Grants_PPR.Resource@nrc.gov. (*NOTE: There is an underscore between Grants and PPR in the email address.*)

Final Reports - The Recipient is required to submit final reports, both Financial (SF-425) and Performance (SF-PPR, SF-PPR-B, SF-PPR-E) within 90 days of the grant expiration. In addition to these reports, a final SF-428, Tangible property report, is also required, if applicable. The final PPR (for Scholarship, Fellowship, and Trade School and Community College Scholarship awards) must include the names of all students with up to date contact information (mailing address, telephone/cell phone, email address). The reports must be emailed to the Project Officer at the email addressed indicated in the Notice of Award, and to the Grants Officer at: Grants_FFR.Resource@nrc.gov and Grants_PPR.Resource@nrc.gov. (*NOTE: There is an underscore between Grants and FFR and Grants and PPR in the email addresses.*)

For grant awards that are modified to add additional Program Descriptions, the recipient is required to address the applicable grant performance metrics associated with all programs. Further, these metrics should be broken out by individual program (e.g. Program A and Program B). This can be done utilizing Block 10, Performance Narrative, of the SF-PPR form. If this block does not have sufficient space, additional pages will be accepted. Sf-PPR-B and SF-PPR-E should be used to address both programs as well.

Period of Performance – [2 CFR § 200.309](#)

The recipient may charge to the Federal award only allowable costs incurred during the period of performance and any costs incurred before the NRC or pass-through entity made the Federal award that was authorized by the NRC or pass through entity.

Unless otherwise authorized in [2 CFR Part 200](#) or by special award condition, any extension of the award period can only be authorized by the Grants Officer in writing. Assurances of funding from other than the Grants Officer shall not constitute authority to obligate funds for programmatic activities beyond the expiration date.

The NRC Grant Officer may authorize a no cost extension of the period of performance. The recipient must submit a no cost extension request no less than 30 days prior to the award end date. Any request for a no cost extension after the grant has expired will not be approved. However, the NRC has no obligation to provide any additional prospective or incremental funding. Any modification of the award to increase funding and/or to extend the period of performance is at the sole discretion of the NRC.

Automated Standard Application For Payments (ASAP) Procedures

Unless otherwise stated, Recipient payments are made using the Department of Treasury's Automated Standard Application for Payment (ASAP) system, ASAP.gov, through preauthorized electronic funds transfers. To receive payments, Recipients 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 is required to make ASAP withdrawals: (1) ASAP account number – the award number found on the cover sheet of the award; (2) Agency Location Code (ALC) – 31000001; and Region Code. Recipients enrolled in the ASAP system do not need to submit a "Request for Advance or Reimbursement" (SF-270).

II. Audit Requirements

Audits

Organization-wide or program-specific audits are performed in accordance with the Single Audit Act of 1996, as amended, and as implemented by [2 CFR Part 200, Subpart F—AUDIT REQUIREMENTS](#). Recipients are subject to the provisions of this subpart if they expend \$750,000 or more in a year in Federal awards. See [2 CFR 200.501](#).

The Form SF-SAC and the Single Audit Reporting packages for fiscal periods ending on or after January 1, 2008 are submitted online, as follows:

1. Create the recipient's 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; and
5. Click "Submit."

Organizations expending less than \$750,000 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

The recipient is responsible for providing documentation to the NRC that tracks each student's progress in achievement of the academic program for which federal funds were provided. This includes: (1) ensuring the service agreement is signed by the student prior to providing support; (2) providing the NRC with student contact information upon student entry into the program, upon completion or withdrawal from the program, and upon request by the NRC; and (3) monitoring the student's fulfillment of the service agreement for the duration of the award. The NRC shall be notified immediately if a student is not fulfilling the academic program or the service agreement.

Grant Performance Metrics

The Office of Management and Budget requires all Federal Agencies providing funding for educational scholarships and fellowships as well as other educational related funding to report on specific metrics. These metrics are part of the Academic Competitiveness Council's (ACC)

2007 report and specifically relates to Science, Technology, Engineering, and Mathematics (STEM) curricula.

As part of the OMB requirements indicated above (for metric reporting), the recipient shall address the following questions and submit responses with the required progress reports:

Faculty Development Metrics:

1. How many Faculty have been sponsored by NRC funding?
 - a. Response is the number of faculty sponsored, for this reporting period and cumulative to the grant.

2. How many items have the sponsored faculty produced, for example, Professional Journal articles, publications, patents, or conference reports?
 - a. Response is the type and number of items (not a bibliography), for this reporting period and cumulative to the grant.

Unsatisfactory Performance

Failure to perform the work in accordance with the terms of the award and maintain at least a satisfactory performance rating may result in designation of the Recipient as high risk and the assignment of special award conditions. Further action may be required as specified in the standard term and condition entitled "Remedies for Noncompliance."

Failure to comply with the award provisions may result in a negative impact on future NRC funding. In addition, the Grants Officer may withhold payments; change the method of payment from advance to reimbursement; impose special award conditions; suspend or terminate the grant.

Other Federal Awards With Similar Programmatic Activities

The Recipient will immediately notify the Project Officer and the Grants Officer in writing if after award, other financial assistance is received to support or fund any portion of the program description stated in the NRC award. NRC will not pay for costs that are funded by other sources.

Prohibition Against Assignment By The Recipient

The Recipient will not transfer, pledge, mortgage, or otherwise assign the award, or any interest to the award, or any claim arising under the award, to any party, banks, trust companies, or other financing or financial institutions without the written approval of the Grants Officer.

Site Visits

The NRC, through authorized representatives, has the right to make site visits to review project accomplishments and management control systems and to provide technical assistance as required. If any site visit is made by the NRC on the premises of the Recipient or contractor under an award, the Recipient shall provide and shall require his/her contractors to provide reasonable access to all facilities and provide necessary assistance for the safety and convenience of the Government representative in the performance of his/her official duties.

IV. Additional Requirements

Criminal and Prohibited Activities

The Program Fraud Civil Remedies Act ([31 U.S.C. §§ 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).

False statements ([18 U.S.C. § 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.

False Claims Act ([31 U.S.C. § 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.

Copeland “Anti-Kickback” Act ([18 U.S.C. § 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

Recipients are encouraged to purchase American-made equipment and products with funding provided under this award.

Increasing Seat Belt Use in the United States

E.O. 13043, amended by E.O. 13652, requires Recipients to encourage employees and contractors to enforce on-the-job seat belt policies and programs when operating company-owned, rented or personally-owned vehicle.

Federal Leadership of Reducing Text Messaging While Driving

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

Federal Employee Expenses

Federal agencies are barred from accepting funds from a Recipient 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 Recipient’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 Recipients or applicants regardless of the source.

Minority Serving Institutions (MSIs) Initiative

Pursuant to E.O.s 13230 and 13270, [amended by E.O. 13316](#) and [13385](#), 13532, 13592, 13555, 13515, and 13621, 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 Recipients 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 Recipient 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 Recipient organization shall investigate the allegation and submit its findings to the Grants Officer. The NRC may accept the Recipient's findings or proceed with its own investigation. The Grants Officer shall inform the Recipient 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 Recipient 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 Recipient 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 **[Recipient name]** under award **[number]** from **[name of operating unit]**, Nuclear Regulatory Commission. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the view of the **[name of operating unit]** or the US Nuclear Regulatory Commission.”

Trafficking In Victims Protection Act Of 2000 (as amended by the Trafficking Victims Protection Reauthorization Act of 2003)

Section 106(g) of the Trafficking In Victims Protection Act Of 2000 (as amended as amended, directs on a government-wide basis that:

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

EXECUTIVE COMPENSATION REPORTING

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

Reporting Subawards and Executive Compensation.

a. Reporting of first-tier subawards.

1. *Applicability.* Unless you are exempt as provided in paragraph d. of this award term, you must report each action that obligates \$25,000.00 or more in Federal funds that does not include Recovery funds (as defined in section 1512(a)(2) of the American Recovery and Reinvestment Act of 2009, Pub. L. 111–5) for a subaward to an entity (see definitions in paragraph e. of this award term).

2. *Where and when to report.*

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

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

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

b. Reporting Total Compensation of Recipient Executives.

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

i. the total Federal funding authorized to date under this award is \$25,000.00 or more;

ii. in the preceding fiscal year, you received—

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

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

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

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

- i. As part of your registration profile at <http://www.sam.gov> .
- ii. By the end of the month following the month in which this award is made, and annually thereafter.

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

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

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

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

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

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

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

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

d. *Exemptions*

If, in the previous tax year, you had gross income, from all sources, under \$300,000.00, you are exempt from the requirements to report:

i. Subawards,

and

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

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

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

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

ii. A foreign public entity;

iii. A domestic or foreign nonprofit organization;

iv. A domestic or foreign for-profit organization;

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

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

3. *Subaward*:

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

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

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

4. *Subrecipient* means an entity that:

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

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

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

i. *Salary and bonus.*

ii. *Awards of stock, stock options, and stock appreciation rights.* Use the dollar amount recognized for financial statement reporting purposes with respect to the fiscal year in

accordance with the Statement of Financial Accounting Standards No. 123 (Revised 2004) (FAS 123R), Shared Based Payments.

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

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

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

vi. Other compensation, if the aggregate value of all such other compensation (e.g., severance, termination payments, value of life insurance paid on behalf of the employee, perquisites or property) for the executive exceeds \$10,000.00.