

Basic IDIQ

STATEMENT OF OBJECTIVE

Directed Energy Bioeffects Research

23 January 2013

I. Statement of Work (Basic IDIQ):**TITLE: Directed Energy Bioeffects Research (DEBR)****Period of Performance:** The Period of Performance for the Basic IDIQ is 78 months.**SECURITY CLASSIFICATION LEVEL IS: Top Secret/SCI/SAP/SAR****1. Background, Scope, Goals, Objectives, and Needs.****a. Background.**

The Directed Energy Bioeffects Research (DEBR) contract supports the US Air Force, one of the largest developers and users of radio frequency (RF) and high power microwave (HPM) emitting devices in the world, which has been at the forefront of research on the biological effects of RF/HPM radiation for more than 30 years. The use of Directed Energy (DE) extends to military and commercial applications. While the targeted customers for this effort are primarily concerned with the use and application of RF/HPM radiation technologies, the joint services and others like the Department of Homeland Security along with commercial customers will likely benefit from the research conducted and discoveries made under this program.

Specifically, the DEBR contract aids in the mission accomplishment of the Radio Frequency Bioeffects Branch (711 HPW/RHDR) part of the Bioeffects Division (711 HPW/RHD) to protect Air Force personnel from RF/HPM radiation hazards, while minimizing negative operational impact. This will be conducted as part of an extensive research program in the dosimetry and bioeffects of RF/HPM radiation. Research results will be transitioned and transferred to national and international health and safety standards, which will be used by the Air Force Surgeon General for Occupational Health and Environmental Safety, as well as for data to support the rapid development and deployment of DE technologies. The advent of HPM and ultra-wide band for directed energy weapons (DEW) make this effort supporting 711 HPW/RHDR's products and services ever more essential to national security.

b. Goals.

The goal of the Air Force Research Laboratory (AFRL) and this contract is to provide the USAF with the world's best RF/HPM radiation bioeffects research and science-based exposure standards, allowing maximum safe exploitation of DE for the national defense. Using joint-service cooperation, this contract will help bring broad expertise, advocacy, and involvement in RF/HPM technologies.

c. Scope.

The scope of this effort will cover conducting bioeffects research on DE and kinetic energy systems to assist in transitioning DoD technologies. Research efforts will include the following technical areas: directed energy weapon effectiveness and safety, directed energy bio-mechanisms, radiofrequency bioeffects modeling and simulation, and human effectiveness analysis and integration.

d. Objectives.

This effort includes conducting research to identify the benefits, risks, and capabilities for a wide range of military RF/HPM radiation systems. This includes prediction and mitigation of the bio-effects of DE on personnel and mission performance and exploitation of the bio-effects of DE for DEW applications. Specifically, these Technology Areas (TAs) and objectives can be broken into the following:

- i. **Directed Energy Bio-Mechanisms:** Conduct proteomic, genomic, and metabolomic studies that identify critical biochemical or molecular changes following exposure to DE prior to or during mission operations that assists in the prediction of health degradation. The goal is to investigate basic mechanism(s) of interactions between biology and RF radiation (DC-THz); and to uncover previously unknown bioeffects of RF exposure that may provide a defensive or offensive capability to the Air Force. Conduct and design laboratory and field research and testing of the bioeffects of RF and DEW systems hardware and software.
- ii. **Directed Energy Weapon Effectiveness and Safety:** Conduct biological effects research in support of the development and deployment of future DE weapons and other emerging technologies that could be beneficial to the Air Force and the warfighter. The research will also provide data to aid in the development of tactics, training, and procedures for the safe and optimal use of DE weapons. Research will provide data that evaluates and supports the DE system effectiveness, its policy acceptability, and optimal use. The research leads to a better understanding of the bioeffects of DE weapons, as well as methods to counter the bioeffects produced by these technologies. This research is intended to characterize behavioral and physiological responses of individuals in response to high average power and high peak power directed energy systems.
- iii. **Modeling and Simulation of Radio Frequency Bioeffects:** Conduct mathematical, statistical, and theoretical analyses necessary for the development of modeling and simulation products. These models will lead to capabilities that include predictive and decision-making software that

allow futuristic views of the bioeffects from exposure to RF/HPM radiation. The development and execution of modeling and simulation of electrical current, DE weapons, and radar and communication effects aids in the understanding of effects on and within biological systems.

- iv. **Human Effectiveness Analysis and Integration:** To develop an understanding of the bioeffects associated with exposing humans to counter-personnel, non-lethal weapons is essential for legal, treat, policy, and material development purposes. Without it, escalation of force options cannot be provided to war fighters. The objective of this effort is to provide Human Effects data and information that is necessary to characterize devices and technologies intended for this purpose. In order to accomplish these objectives it is essential to conduct laboratory and field experiments necessary to understand a variety of human effects responses across a wide taxonomy of technologies. These include directed energy, riot control agents, broadband light, acoustic sounds, and blunt impact materials. Another objective is to apply that scientific information by engineering optimal effects-based design parameters for non-lethal weapons. Additionally, this effort will provide Integrated Product Teams with engineering data necessary to not only design devices, but to evaluate and test prototypes during material development phases of the DoD acquisition process.
- v. **Health and Safety:** Provide substantial value to the Air Force and scientific community by evaluating bioeffects of DE exposure. It is important to address the physical and cognitive health and safety concerns of DE systems. Data obtained from RF/HPM radiation bioeffects research is designed in this technical area to support national and international health and safety standards.

e. Needs.

This effort will provide the means to protect personnel from RF radiation exposure hazards, and assess weapons application of RF/HPM radiation, by meeting the military needs to push the state-of-the art in science. The contract effort will do so by evaluating the bioeffects of DE systems. All this will be accomplished while addressing the health and safety concerns of the Air Force. These outcomes will help to enable the maximum safe exploitation of the RF/HPM electromagnetic spectrum for national defense.

2. Deliverable Items.

Data, Hardware, Software

3. Specific Technical Requirements (as determined by specific task orders)

a. Data Collections.

Conduct data collection activities, as necessary and determined by Air Force and user requirements. This will include as necessary developing research plans, experimental plans, human use protocols, and animal use protocols for all data collections. Preparation for data collection will require as necessary pilot studies and setup of a panel of readily available subjects. The contractor shall collect pre-experimental data to assure that the facilities for specific data collections are available and functioning.

b. Data Analysis

The contractor shall conduct appropriate descriptive and inferential statistical analyses using experimental data. The contractor shall represent statistical analyses using graphical, pictorial, and tabular summaries.

c. Modeling and Simulation.

Perform modeling and simulation to support understanding of subsystem and system technologies and guide technical efforts.

d. Developmental Research

The contractor shall develop hardware and software (in the form of prototypes, conceptual demonstrations, models, and simulations) as necessary to accomplish specific research.

e. Research Laboratories and Research, Development, Test, and Evaluation (RDT&E) Network

As required by the research programs, the contractor shall provide all engineering and related efforts necessary to effect and document changes to laboratory facilities or to integrate new and unique components which will enhance research goals, improve equipment reliability, increase productivity, enhance flexibility, or improve fidelity. The contractor shall provide the capability for machining and fabricating research articles, to include, but not be limited to, prototypes, fixtures, mounting brackets, and the like. The contractor shall ensure operation of RDT&E networks, including hardware fault determination and repair, software development and updates, training in system usage, engineering development, installation of enhancements and upgrades, and system software configuration.

f. Systems Integration

The contractor shall perform systems integration of software and hardware components as necessary to validate requirements for advanced technology demonstrations.

g. Management of Effort

The contractor shall manage technical, schedule and cost satisfaction of the task order; plan, prepare, conduct, and document reviews; track CDRL satisfaction; and interface with the customer to assess performance satisfaction and re-plan the project as needed. Contractor shall comply with all applicable human use and animal use regulations.

4. Security Requirements

a. Position of Trust

All contractor personnel require a minimum of a National Agency Check with written Inquires (NACI)/SF85 for any position that requires access to the internet, use of automated systems or unescorted entry into restricted or controlled areas prior to reporting for duty in performance of any task order. The investigation is not for a security clearance; it is for a position of trust. This is a mandatory requirement set forth in DoD5200.1-R and AFI 31-50 I Information Security. All documentation required for security certification shall be the responsibility of the contractor. No foreign nationals shall be employed for any task order issued under this contract without prior approval of the Government.

b. Operations Security (OPSEC)

The contractor shall provide OPSEC protection for all sensitive/critical information as defined by AFI 10-701 (Operations Security), the 711 HPW OPSEC Plan, and critical information list. The contractor shall participate in the 711 HPW sustained OPSEC awareness training or include OPSEC training as part of their on-going security program. The 711 HPW OPSEC coordinator will evaluate the OPSEC posture of AF contract activities and operations.

c. Information Security and Force Protection

The contractor shall provide Information Security and Force Protection training as defined by AFI31-401 (Information Security Program Management) and AFII0-245 (Air Force Antiterrorism Standards). The contractor shall participate in the 711 HPW sustained information Security and Force Protection/Antiterrorism training or include this training as part of their on-going security program. The 711HPW Security Managers will evaluate the training posture of AF contract activities and operations. This requirement is set forth in AFI 31-401, AFI 10-245 and applicable AFMC and local supplements.

d. Individual Security Clearances

IAW DD254. The Contractor shall maintain a U.S. security clearance up to a maximum of Top Secret SCI as required by individual task orders for all contractor personnel required to have access to classified information. Onsite

contractor personnel must have an active clearance prior to reporting for duty in performance of any task order issued. Interim clearances for newly hired personnel shall be processed as expeditiously as possible since some contractor personnel will be required to utilize the SIPRNET and process classified materials; however this will be on a case-by-case basis. Such clearance must be obtained through the Defense Investigative Services. Contractor personnel who already have approved security clearances are highly preferred. The contractor shall be required to wear contractor identification badges and maintain currency in all Privacy Act Laws.

5. Other Information

a. Hazardous Waste.

The contractor will use hazardous materials in research studies under this effort. Contractors will be required to complete Fort Sam Houston, TX hazardous materials training.

The government will be responsible for disposing all Laboratory HazWaste.

b. Human Use.

The contractor will use human subjects in research studies under this effort. The final contract will include the clause entitled "Protection of Human Subjects." For the performance of the contract, the contractor will be complying with the provisions of the following directives/regulations:

- i. Department of Defense, Title 32, Code of Federal Regulations, Part 219 (32 CFR 219), "Protection of Human Subjects" July 2006;
- ii. DHHS Regulations, Title 45, Code of Federal Regulations, Part 46 (45 CFR 46) "Protection of Human Subjects," July 2009;
- iii. DoD Instruction 3216.02, "Protection of Human Subjects and Adherence to Ethical Standards in DoD Supported Research," November 2011;
- iv. Air Force Instruction 40-402, "Protection of Human Subjects in Biomedical and Behavioral Research, (May 2005);" and (v) AFRL Instruction 40-402, "Using Human Subjects in Research, Development, Test, and Evaluation" (October 2008).
- v. Contractor personnel performing human use research will be required to take government sponsored initial and annual refreshers "Basic Human Subjects - Biomedical & Social & Behavioral Focus"

Human testing shall not commence until approval from the Air Force IRB has been obtained for any applicable task order effort.

Note: The selected Offeror will be required to establish a Federal Wide Assurance (FWA), for the Protection of Human Subjects, after award if they do not already have a FWA. There is no requirement for offerors to provide evidence of having the FWA with their proposal.

c. Animal Use:

- i. The contractor will use animals in research studies under this effort. The contractor shall comply, as appropriate, with the provisions of the following directives/regulations:
 - (1) Air Force Manual 40-401(I), "The Care and Use of Laboratory Animals in DoD Programs", July 2006;
 - (2) "DoD Instruction 3216.01, "Use of Animals in DoD Programs," September 2010.
- ii. Moreover, the contractor shall maintain records associated with animal subjects research as required by the approved protocol.
- iii. Contractor personnel performing animal use research will be required to take government sponsored initial and annual refreshers training as prescribed by the on-site Veterinarian
- iv. Contractor personnel working with animals are required to have an annual "negative" Tuberculosis (TB) test at the expense of the contractor.

Animal testing shall not commence until approval from the Air Force Institutional Animal Care and Use Committee has been obtained for any applicable task order effort.

6. Base Support/Network Access will be provided at JBSA Ft Sam Houston TX for the performance of this effort.