

# ORDER FOR SUPPLIES OR SERVICES

1. CONTRACT/PURCH ORDER/AGREEMENT NO. <b>FA8650-13-D-6368</b>	2. DELIVERY ORDER/ CALL NO. <b>0006</b>	3. DATE OF ORDER/CALL (YYYYMMDD) <b>24 NOV 2014</b>	4. REQUISITION/PURCH REQUEST NO. <b>SEE SCHEDULE</b>	5. PRIORITY <b>DO-C9</b>
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6. ISSUED BY <b>AFRL/RQKHB</b> CODE <b>FA8650</b> USAF/AFMC AFRL WRIGHT RESEARCH SITE 2130 EIGHTH STREET, BUILDING 45 WRIGHT-PATTERSON AFB OH 45433-7541 (b) (6) 937-713-9859 (b) (6) us.af.mil	7. ADMINISTERED BY (If Other than 6) CODE <b>S2404A</b> DCMA MANASSAS 10500 BATTLEVIEW PARKWAY SUITE 200 MANASSAS VA 20109-2342 DCMA.VIRGINIA@DCMA.MIL SCD: C PAS: (NONE)	8. DELIVERY FOB <input checked="" type="checkbox"/> DESTINATION <input type="checkbox"/> OTHER <small>(See Schedule if other)</small>
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9. CONTRACTOR CODE <b>07MU1</b> FACILITY <b>GENERAL DYNAMICS INFORMATION TECHNOLOGY, INC.</b> NAME AND ADDRESS 3211 JERMANTOWN RD FAIRFAX VA 22030-2844 (703) 995-8666	10. DELIVER TO FOB POINT BY (Date) (YYYYMMDD) SEE SCHEDULE	11. X IF BUSINESS IS <input type="checkbox"/> SMALL <input type="checkbox"/> SMALL DISADVANTAGED WOMEN-OWNED
12. DISCOUNT ITEMS <b>N</b>		
13. MAIL INVOICES TO ADDRESS IN BLOCK <b>SEE BLOCK 15 (PAYMENT OFFICE)</b>		

14. SHIP TO CODE <b>SEE SCHEDULE</b>	15. PAYMENT WILL BE MADE BY CODE <b>HQ0338</b> DFAS COLUMBUS CENTER DFAS-CO/SOUTH ENTITLEMENT OPS P.O. BOX 182317 COLUMBUS OH 43218-2317 EFT:T	MARK ALL PACKAGES AND PAPERS WITH IDENTIFICATION NUMBERS IN BLOCKS 1 AND 2.
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16. TYPE OF ORDER	DELIVERY/ CALL	<input checked="" type="checkbox"/>	This delivery order/call is issued on another Government agency or in accordance with and subject to terms and conditions of above numbered contract.
	PURCHASE		
Reference your _____ furnish the following on items specified herein.			
ACCEPTANCE. THE CONTRACTOR HEREBY ACCEPTS THE OFFER REPRESENTED BY THE NUMBERED PURCHASE ORDER AS IT MAY PREVIOUSLY HAVE BEEN OR IS NOW MODIFIED, SUBJECT TO ALL OF THE TERMS AND CONDITIONS SET FORTH, AND AGREES TO PERFORM THE SAME.			

NAME OF CONTRACTOR	SIGNATURE	TYPED NAME AND TITLE	DATE SIGNED (YYYYMMDD)
X If this box is marked, supplier must sign Acceptance and return the following number of copies: <b>1</b>			

17. ACCOUNTING AND APPROPRIATION DATA/LOCAL USE  
**SEE SCHEDULE**

18. ITEM NO.	19. SCHEDULE OF SUPPLIES/SERVICES	20. QUANTITY ORDERED/ACCEPTED*	21. UNIT	22. UNIT PRICE	23. AMOUNT

*If quantity accepted by the Government is same as quantity ordered, indicate by X. If different, enter actual quantity accepted below quantity ordered and encircle.	24. UNITED STATES OF AMERICA  //signed// BY: (b) (6)	25. TOTAL <b>\$10,327,099.00</b>  29. DIFFERENCES
26. QUANTITY IN COLUMN 20 HAS BEEN <input type="checkbox"/> INSPECTED <input type="checkbox"/> RECEIVED <input type="checkbox"/> ACCEPTED, AND CONFORMS TO THE CONTRACT EXCEPT AS NOTED		27. SHIP NO. 28. D.O. VOUCHER NO.

DATE SIGNATURE AND TITLE OF AUTHORIZED GOVERNMENT REPRESENTATIVE	30. INITIALS	32. PAID BY <input type="checkbox"/> PARTIAL <input type="checkbox"/> FINAL
36. I CERTIFY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT. DATE SIGNATURE AND TITLE OF CERTIFYING OFFICER	32. PAYMENT <input type="checkbox"/> COMPLETE <input type="checkbox"/> PARTIAL <input type="checkbox"/> FINAL	33. AMOUNT VERIFIED CORRECT FOR 34. CHECK NUMBER 35. BILL OF LADING

37. RECEIVED AT	38. RECEIVED BY (Print)	39. DATE RECEIVED (YYYYMMDD)	40. TOTAL CONTAINERS	41. S/R ACCOUNT NO.	42. S/R VOUCHER NO.
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1. In accordance with basic contract Clause B040 "Ordering Procedures", the Contractor shall accomplish the effort as described in the attached Statement of Work (SOW) at Section J.

The following clauses are incorporated in accordance with the Basic IDIQ contract.

**2. SECTION B - SUPPLIES OR SERVICES AND PRICES/COSTS:**

**B054 IMPLEMENTATION OF LIMITATION OF FUNDS (DEC 2005)**

Pursuant to the clause FAR 52.232-22 in Section I entitled, "Limitation of Funds", the total amount available for payment and allotted to this contract for all CLINs is **\$319,750**. It is estimated that this amount is sufficient to cover task order performance through **30 December 2014**. (*Government estimate*).

**B058 CONTRACT TYPE: COST-PLUS-FIXED-FEE (DEC 2005) (TAILORED)**

The estimated cost and fee for this task order are shown below. The applicable fixed fee set forth below may be increased or decreased only by negotiation and modification of the order for added or deleted work. Fee shall be paid as it accrues, in regular installments based upon the percentage of completion of work.

Estimated Cost: (b) (4)  
 Fixed Fee: (b) (4)  
**Total CPFF: \$10,327,099**

ITEM	SUPPLIES OR SERVICES	Qty Purch Unit	Unit Price Total Item Amount
<b>0001</b>		1	\$10,327,099.00
		Lot	\$10,327,099.00
	<i>Noun:</i>	RESEARCH AND DATA	
	<i>NSN:</i>	N - Not Applicable	
	<i>DD1423 is Exhibit:</i>	A	
	<i>Contract type:</i>	U - COST PLUS FIXED FEE	
	<i>Inspection:</i>	DESTINATION	
	<i>Acceptance:</i>	DESTINATION	
	<i>FOB:</i>	DESTINATION	
	<i>Descriptive Data:</i>		
	Conduct research in accordance with the Statement of Work entitled, "NOVEL DIRECT ENERGY WEAPON EFFECTS", dated <b>05 SEPT 2014</b> in accordance with Section C, Descriptions/Specifications, Attachment 1, Section J hereto. Deliver data in accordance with Exhibit A, Contract Data Requirements List, DD Form 1423-1, dated 26 NOV 12, attached to the basic contract.		
<b>000101</b>	<i>Noun:</i>	Funding Info Only	
	<i>ACRN:</i>	AA (b) (4)	
	<i>PR/MIPR:</i>	F4FBRD4176B001	(b) (4)
<b>000102</b>	<i>Noun:</i>	Funding Info Only	
	<i>ACRN:</i>	AB (b) (4)	
	<i>PR/MIPR:</i>	F4FBRD4253B003-001	(b) (4)

ITEM	SUPPLIES OR SERVICES	Qty Purch Unit	Unit Price Total Item Amount
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**000103**

*Noun:* Funding Info Only  
*ACRN:* AC (b) (4)  
*PR/MIPR:* F4FBRD4253B002 (b) (4)

**0002**

1  
Lot NSP  
NSP

*Noun:* HARDWARE  
*ACRN:* U  
*NSN:* N - Not Applicable  
*Contract type:* U - COST PLUS FIXED FEE  
*Inspection:* DESTINATION  
*Acceptance:* DESTINATION  
*FOB:* DESTINATION

*Descriptive Data:*  
 Deliver Hardware in accordance with Section C, Description/Specifications: Statement of Work entitled, "NOVEL DIRECT ENERGY WEAPON EFFECTS", dated **05 SEP 2014**, at attachment 1 to Section J.

**SECTION I CLAUSE, 252.211-7003 ITEM IDENTIFICATION AND VALUATION (JUN 2011), APPLIES TO THIS EFFORT AS FOLLOWS:**

The contractor shall deliver hardware as required by Statement of Work and in accordance with Clause 252.211-7003, "Item Identification Valuation", the contractor shall provide DoD unique item identification, or a DoD recognized unique identification equivalent for all delivered items for which the government's unit acquisition cost is \$5,000 or more.

**0003**

1  
Lot NSP  
NSP

*Noun:* SOFTWARE  
*ACRN:* U  
*NSN:* N - Not Applicable  
*DD1423 is Exhibit:* A  
*Contract type:* U - COST PLUS FIXED FEE  
*Inspection:* DESTINATION  
*Acceptance:* DESTINATION  
*FOB:* DESTINATION

*Descriptive Data:*  
 Deliver Software in accordance with Section C, Description/Specifications: Statement of Work entitled, "NOVEL DIRECT ENERGY WEAPON EFFECTS", dated **05 SEPT 2014**, at attachment 1 to Section J.

The following clauses are incorporated in accordance with the Basic IDIQ contract.

**3. SECTION C - DESCRIPTION/SPECS/WORK STATEMENT:**

**C003 INCORPORATED DOCUMENTS/REQUIREMENTS (AUG 2006) (TAILORED)**

- (a) The following documents are a part of this task order, SECTION J:

- Attachment 1, Statement of Work, Novel Direct Energy Weapon Effects, dated 05 Sept 2014.
- Exhibit A, DD Form 254 Security Requirements.

**4. SECTION D - PACKAGING AND MARKING**

-- D002 Packaging and Marking (AUG 2005)

**5. SECTION E - INSPECTION AND ACCEPTANCE**

-- E006, "Receiving Report Mailing Address"

The Project Engineer for this Task Order is identified at clause F007 herein.

-- E007 - "Inspection and Acceptance Authority (APR 1998) (TAILORED)" is amended to read as set forth below:

The Project Engineer for this Task Order is identified at clause F007 herein.

Inspection and acceptance for all Contract and Exhibit Lines or Subline Items shall be accomplished by the **Program Manager/Project Engineer, Air Force Research Laboratory, found in Clause F007 herein.**

**6. SECTION F - DELIVERIES OR PERFORMANCE:**

ITEM	SUPPLIES SCHEDULE DATA	QTY	SHIP TO	MARK FOR	TRANS PRI	DATE
<b>0001</b>		1	F4FBRD			17 Feb 2020

*Noun:* RESEARCH AND DATA

*ACRN:* 9

*Descriptive Data:*

The technical effort must be completed no later than **17 Nov 2019**. Draft final report due 30 days after end of technical effort. The scheduled delivery date for the approved final technical report is **17 Feb 2020**. All data shall be in accordance with Exhibit A, Contract Data Requirements List, DD Form 1423-1, dated 26 NOV 12, attached to the basic contract. See DD Form 1423-1 and Clause F007 for mailing addresses.

ITEM	SUPPLIES SCHEDULE DATA	QTY	SHIP TO	MARK FOR	TRANS PRI	DATE
<b>0002</b>		1	F4FBRD	F4FBRD		17 Feb 2020

*Noun:* HARDWARE

*ACRN:* U

*Descriptive Data:*

The scheduled delivery date for the hardware is as reflected herein. See Clause F007 for mailing address(es).

Delivery address for Hardware is:

**711 HPW/RHDR**

**4141 Petroleum Rd, Bldg 3260**

**JBSA Ft Sam Houston, TX 78234**

**MARK FOR: PROGRAM MGR/CONTRACT NO.**

<b>0003</b>		1	F4FBRD	F4FBRD		17 Feb 2020
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*Noun:* SOFTWARE

*ACRN:* U

*Descriptive Data:*

The scheduled delivery date for the Software is as reflected hererin. See Clause F007 for mailing addresses.

Delivery address for Software is:

**711 HPW/RHDR**

**4141 Petroleum Rd, Bldg 3260**

**JBSA Ft Sam Houston, TX 78234**

**MARK FOR: PROGRAM MGR/CONTRACT NO.**

**7. The following clause is incorporated in accordance with the Basic IDIQ contract.**

Clause F007

PROGRAM ENGINEER:

HPW/RHDR

Attn: (b) (6)

4141 Petroleum Drive

Ft. Sam Houston, TX 78234

(b) (6) @us.af.mil

STINFO:

711 HPW/OMCA

2947 Fifth St, Bldg 840, Suite 302

Wright-Patterson AFB, OH 45433

711hpwstinfo@mailbox@us.af.mil

FINANCE:

711 HPW/RHD

Attn: (b) (6)

2610 7th Street, B441

Wright-Patterson AFB OH 45433-7901

(b) (6) @us.af.mil

DCMA/ACO:

See Task Order cover page - Block 7 for address DCMA (ACO) address

CONTRACTS POC

See Task Order cover page- Block 6 for Contracts POC info.

WIDE AREA WORK FLOW (WAWF) ACCEPTOR:

Wide Area Work Flow (WAWF) Acceptor

711 HPW/OMP

2510 Fifth Street

WPAFB, OH 45433-7913

711hpw.rh.wawf@wpafb.af.mil

**8. SECTION G - CONTRACT ADMINISTRATION DATA AND CLAUSES APPLY IN ACCORDANCE WITH THE BASIC IDIQ CONTRACT AS FOLLOWS:**

**-G005 PAYMENT INSTRUCTIONS FOR MULTIPLE ACCOUNTING CLASSIFICATION CITATIONS (MAR 2001)**

Payment for all effort under this contract should be made in the order and amounts shown in the informational subline item(s) in Section B, CLIN 0001 of the contract and recapped below. Exhaust the funds in each ACRN before using funds from the next listed ACRN.

ACRN	SUBCLIN NO.	TOTAL OBLIGATED
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SEE SECTION G FOR THIS INFORMATION: ACRN, SUBCLIN NO., TOTAL OBLIGATED AMOUNT

a. This contract will be funded by multiple accounting classification citations. Payment shall be made from ACRNs in alphabetical order (AA,AB,etc). DO NOT USE A PRORATED METHOD to pay, disburse and liquidate funds. Do not liquidate any funds from an ACRN unless the preceding ACRNs have been fully liquidated, or if revised payment instructions are provided per paragraph b. below.

b. Additional ACRNs will be assigned when new accounting classifications are available. When adding new ACRNs or changing existing ACRNs, the above payment instructions shall apply, unless specific revised payments instructions are provided as part of a contract modification.

- Section G DFARS clause is hereby incorporated: **DFARS 252.204-0007, Contract-Wide: Sequential ACRN Order.**

- See Section G clause of the Basic IDIQ contract, clause **252.232-7006, WIDE AREA WORKFLOW PAYMENT INSTRUCTIONS (JUN 2012)**, for payment instructions that are incorporated by reference from the basic IDIQ contract. See Clause F007 herein for Program Mgr/Project Engr address information.

ACRN	Appropriation/Lmt Subhead/Supplemental Accounting Data	Obligation Amount
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**AA**

97 40130 1833 AC447HP6330703HU08W8210063115F503000F03000 (b) (4)

*Funding breakdown:* On CLIN 000101: (b) (4)

*PR/MIPR:* F4FBRD4176B001 (b) (4)

*ESP:* GM

*Descriptive data:*

PR Info:

PR #: F4FBRD4176B001

Basic, dated 30 Jun 2014

FSR: 023401

PSR: 252840

DSR: 117850

ESP: GM

CSN: \_44300

PR is Complete.

**AB**

57 43600 294 47DN 613003 6TRHDR 82100 61102F 503000 F03000 J4D346 (b) (4)

*Funding breakdown:* On CLIN 000102: (b) (4)

*PR/MIPR:* F4FBRD4253B003-001 (b) (4)

*JON:* 2313HD91

*Descriptive data:*

PR Info:

PR #: F4FBRD4253B003

Basic, dated 11 SEP 2014

FSR: 016130

PSR: 507079

DSR: 105354

PR is Complete.

PR Info:

PR #: F4FBRD4253B003

Amend 001, dated 14 Oct 2014

FSR: 016130

PSR: 507079

DSR: 105354

PR is Complete.

ACRN Appropriation/Lmt Subhead/Supplemental Accounting Data Obligation  
Amount

**AC** (b) (4)  
 57 43600 294 47A8 627757 6TRHDR 82100 62202F 503000 F03000 J4D345  
*Funding breakdown:* On CLIN 000103: (b) (4)  
*PR/MIPR:* F4FBRD4253B002 (b) (4)  
*JON:* 7757B360  
*Descriptive data:*  
 PR Info:  
  
 PR #: F4FBRD4253B002  
 Basic, dated 10 SEP 2014  
  
 FSR: 014590  
 PSR: 507071  
 DSR: 162795  
  
 PR is Complete.

**SECTION G CONTINUED:**

Recap of funding from Reports is inserted herein

**List of CLINS for FA8650-13-D-6368 0006**

CLIN NO	TOT AMT NET CHG	NOUN	ACRN	OBL NET CHANGE
(b) (4)		(b) (4)		
	\$10,327,099.00			(b) (4)

-- Clause G002 is incorporated as set forth:

G002 PROGRAM MANAGER FOR THIS EFFORT IS:

HPW/RHDR

(b) (6)

4141 Petroleum Drive

Ft. Sam Houston, TX 78234

(b) (6)@us.af.mil

See Section F for DoDAAC Code; F4FBRD

**9. SECTION H - SPECIAL CONTRACT REQUIREMENTS APPLY IN ACCORDANCE WITH THE CLAUSES/PROVISIONS IN THE BASIC IDIQ CONTRACT. SECTION H APPLIES SPECIFICALLY TO THIS TASK ORDER AS SET FORTH BELOW:**

-- H063 CONTRACTOR IDENTIFICATION (FEB 2003)

-- H098 BASE SUPPORT (SEP 2011)

-- H099 EXPORT CONTROLLED DATA RESTRICTIONS (APR 2012)

-- H101 INCORPORATION OF SUBCONTRACTING PLAN (APR 2012)

**10. SECTION I - BASIC IDIQ CONTRACT CLAUSES APPLY AS FOLLOWS IN ACCORDANCE WITH THE CLAUSES/PROVISIONS IN THE BASIC IDIQ CONTRACT. SECTION I APPLIES SPECIFICALLY TO THIS TASK ORDER AS SET FORTH BELOW:**

-- 52.223-03 HAZARDOUS MATERIAL IDENTIFICATION AND MATERIAL SAFETY DATA (JAN 1997)

-- 52.251-01 GOVERNMENT SUPPLY SOURCES (APR 2012)

-- 252.222-7006 RESTRICTIONS ON THE USE OF MANDATORY ARBITRATION AGREEMENTS (DEC 2010)

-- 252.223-7001 HAZARD WARNING LABELS (DEC 1991)

-- 252.223-7006 PROHIBITION ON STORAGE AND DISPOSAL OF TOXIC AND HAZARDOUS MATERIALS (APR 2012) - ALTERNATE I, (NOV 1995)

--252.225-7008 RESTRICTION ON ACQUISITION OF SPECIALTY METALS (MAR 2013)

--252.225-7009 RESTRICTION ON ACQUISITION OF CERTAIN ARTICLES CONTAINING SPECIALTY METALS (MAR 2013)

-- 252.225-7048 EXPORT-CONTROLLED ITEMS (JUN 2013)

-- 252.235-7002 ANIMAL WELFARE (DEC 2011)

-- 252.235-7004 PROTECTION OF HUMAN SUBJECTS (JUL 2009)

-- 5352.223-9001 HEALTH AND SAFETY ON GOVERNMENT INSTALLATIONS (NOV 2012)

-- 5352.242-9000 CONTRACTOR ACCESS TO AIR FORCE INSTALLATIONS (NOV 2012)

-- 5352.242-9001 COMMON ACCESS CARDS (CAC) FOR CONTRACTOR PERSONNEL -AFRL (NOV 2012)

-- 252.251-7000 ORDERING FROM GOVERNMENT SUPPLY SOURCES (AUG 2012)

**11. SECTION J - LIST OF ATTACHMENTS/EXHIBITS**

- Attachment 1, Statement of Work, Novel Direct Energy Weapon Effects, dated 05 Sept 2014.
- Exhibit A, DD Form 254 Security Requirements.

--Contract Holidays are in the Basic SOW and are incorporated herein by reference.  
-Exhibit A, Contract Data Items, of the Basic IDIQ apply to this order as follows:

**CDRLS:** A001, A002, A003, A004, A005, A006, A007, A008 & A009

LIST OF ATTACHMENTS

DOCUMENT	PGS	DATE	TITLE
EXHIBIT A	25	12 NOV 2014	DD254 DOD CONTRACT SECURITY CLASSIFICATION SPECIFICATION
ATTACHMENT 1	8	05 SEP 2014	STATEMENT OF WORK ENTITLED: MODELING AND SIMULATION OF RADIO FREQUENCY BIOEFFECTS



















































# **STATEMENT OF WORK**

Novel Direct Energy Weapon Effects

Task Order 0006

5 September 2014

**FA8650-13-D-6368**

**Task Order 0006  
Novel Direct Energy Weapon Effects**

**STATEMENT OF WORK**

**1. SCOPE:**

GDIT shall (b) (4) [REDACTED]

**2. OBJECTIVES:**

**a. Research Administration.**

GDIT shall (b) (4) [REDACTED]

**b. Research Descriptions. The contractor shall:**

- i. **Genomics.** Analysis of cellular deoxyribonucleic acid (DNA), gene expression, and epigenetic regulation.
  - (1) Extraction and purification of cellular ribonucleic acid (RNA).
  - (2) Quantitation of total RNA by spectrophotometry.
  - (3) Quality control of total RNA by denaturing agarose gel electrophoresis.
  - (4) Analysis of data from gene expression arrays (Affymetrix).
  - (5) Evaluation of protein functions in signal transduction pathways.
  - (6) Quantitative real-time reverse-transcription polymerase chain reaction (Roche, ABI), data analysis, and statistics.
- ii. **Proteomics.** Analysis of protein profiles, levels, and modifications.

- (1) Protein/peptide purification by high performance liquid chromatography (Waters).
  - (2) Extraction and purification of proteins from cell lysates.
  - (3) Quantitation of proteins by colorimetric assay and spectrophotometry.
  - (4) One-dimensional (10) analysis of proteins by denaturing polyacrylamide gel electrophoresis (PAGE).
    - (a) Two-dimensional (20) analysis of proteins by PAGE.
    - (b) Immunoblot following 10- or 20-PAGE.
    - (c) Staining of PAGE gels (fluorescent dye, silver stain) and scanning.
    - (d) Computer-assisted quantitative comparison of 20 gels using POQuest software.
    - (e) Peptide preparation of protein extracts for mass spectrometry.
    - (f) Mass spectrometry (Finnigan) using protein separation by capillary column, nanospray (NSI)- or matrix assisted laser desorption (MALDI) ionization methods, and time-of-flight (TOF) mass analysis.
    - (g) Computer-assisted mass spectrometric data analysis using Xcalibur and BioWorks (Finnigan) and BLAST software for peptide identification.
- iii. **Metabolomics.** Analysis of small molecule metabolites.
- (1) Analysis of data from real-time gas detectors.
  - (2) Analysis of hydrocarbon-specific data from gas chromatographs.
  - (3) Analysis of metabolomic byproducts as indication of activity in cells
- iv. **Immunology.** Analysis of immune cell functions, cytokine expression, innate and adaptive responses, cellular and humeral immunity.
- (1) Immune cell culture and activation.
  - (2) Immune cell proteomics.
  - (3) Enzyme-linked immunosorbent assays.
  - (4) Fluorescent immunoassays.
- v. **Cell culture.** In *vitro* culturing of mammalian cells.
- (1) Culturing of immune cells, fibroblasts, and keratinocytes.
  - (2) Crye-preservation of cells.

- (3) *In situ* assays for apoptosis, cell proliferation, and vital staining.
  - (4) Cellular transfection/genomic modification of cell cultures
- vi. **Animal subjects research.** Laboratory rats and pigs are the primary animal model used for molecular bioeffects research. Virtually all tissue types, body fluids, and breath are analyzed. All animal research is performed under approved protocols in accordance with federal and institutional requirements.
- (1) Short-term husbandry, dietary planning and care.
  - (2) Experimental handling, including anesthesia and microwave exposure.
  - (3) Biopsy/necropsy, sample collection and preservation from all tissue types.
  - (4) Human subjects research. Molecular bioeffects are also determined with human research subjects. This type of research is performed under approved protocols in strict accordance with federal, military, and institutional requirements.
  - (5) Saliva collection by anonymous donation (designated "Exempt From Review" by the Institutional Review Board).
  - (6) Saliva proteomics and small molecule analysis.
- vii. **Pathology.** In collaboration with the veterinary branch 711 ·HPW/RHDV, the biological effects of microwave exposure are studied microscopically at the cellular and tissue levels.
- (1) Histology with tissue sectioning and staining.
  - (2) Immunohistochemistry and immunofluorescence with tissue sections.
  - (3) Quantitative scoring of histological phenotypes.
  - (4) Laser-assisted micro-dissection of tissue sections for molecular analysis.
- viii. **Bioinformatics.** Overlapping with efforts in genomics, proteomics, and metabolomics, molecular bioeffects researchers also use bioinformatic methods.
- (1) Computer-based data management.
  - (2) Sample statistics and probability testing.
  - (3) Analysis of Affymetrix gene chip data.
  - (4) Predictive modeling of cellular signal transduction, assessment of impact of bioeffects on body systems, and associating molecular function with physiological response and disease.
  - (5) Microwave exposure, biological modeling and simulations. At present, the

prediction of biological effects of directed energy applications is limited by the relatively macroscopic nature of models. Recent advances in microdosimetry and the capacity to apply genomic and proteomic methods to single cell entities, now permit the development of more sophisticated model systems.

- (6) Analysis of infrared and conventional thermometry data.
- (7) Efforts to model microwave exposure at the tissue, cellular, and sub-cellular levels.

ix. **Microscopy**

- (1) Use of fluorescent microscopy system
- (2) Use of confocal fluorescent microscopy system
- (3) Use of conventional microscopy system with cells and tissues

x. **Electrophysiology**

- (1) Application of fundamental cellular electrophysiology during RF exposures
- (2) Analysis of ion channel activity during RF exposure
- (3) Analysis of electrophysiological data obtained via patch clamp

**Research Planning.** The contractor shall pursue relevant research objectives within mission requirements. GDIT shall (b) (4)

The contractor shall:

- i. Prior to the initiation of research, the subtask leader shall develop and deliver a subtask outline.
- ii. The subtask outline shall exhibit the following structure, which essentially follows that of a scientific publication:
  - (1) Introduction - Literature review, rationale, and hypothesis.
  - (2) Materials and methods - A description of the major procedures and requirements.
  - (3) Results - The number and scope of experiments and anticipated outcomes.
  - (4) Discussion - Meaning and context of expected results.
  - (5) Bibliography - References for publications relevant for subtask research.
  - (6) Estimated manpower involvement and costs.
  - (7) Estimated material costs.

(8) Estimated schedule of performance.

**d. Experimentation.** The contractor shall obtain the highest quality of data from research, each scientist shall be expected to do the following:

- i. Develop/adapt protocols from published sources, manufacturer brochures, and laboratory manuals.
- ii. Approach pilot studies and large experiments with the same attention to detail, to assure that the experimental outcome, while not being predictable, will nevertheless be fully traceable to specific starting materials and a reproducible method of investigation.
- iii. Perform experiments in a consistent manner, including appropriate controls and independent repetitions of assays. to obtain statistically significant insights.
- iv. Follow science documentation procedures as specified by government managers.

**e. Research Communications.** GDIT Scientists shall:

- i. (b) (4) [Redacted]
- ii. (b) (4) [Redacted]
- iii. (b) (4) [Redacted]

**f. Integrated Research Team.** The contractor shall sustain the productivity of the research effort, the following activities shall be coordinated within the IRT and specific members designated for responsibility:

- i. Accounting for and storing of supplies in approved locations.

- ii. Facilitating disposal of hazardous laboratory waste.
- iii. Storing and inventorying of research samples in freezers and refrigerators.
- iv. Maintaining gas supplies for cryo-storage units, back-up refrigerant, and cell culture incubators.
- v. Preparing common stock solutions and reagents.
- vi. Facilitating supplies requisition and the receiving of shipments.
- vii. Interfacing between the veterinary unit 711 HPW/RHDV and the Branch.

**g. Research Compliance Management.** The contractor shall ensure research performance is subject to federal, civil, and military regulation with respect to human and animal research subjects and occupational safety, as well as national security. GDIT shall comply with the following regulations:

- i. Security. GDIT shall comply with all applicable Air Force regulations pertaining to Operational Security (OPSEC) and Computer Security (COMPSEC).
- ii. Protection of Human Subjects. GDIT shall comply, as appropriate, with the provisions of the following regulations, directives, and instructions:
  - (1) Department of Defense, Title 32, Code of Federal Regulations, Part 219 (32 CFR 219), "Protection of Human Subjects" (Jul 2004).
  - (2) DHHS Regulations, Title 45, Code of Federal Regulations, Part 46 (45 CFR 46), "Protection of Human Subjects" (Oct 2004).
  - (3) DoD Directive 3216.2, "Protection of Human Subjects and Adherence to Ethical Standards in DoD-Supported Research," (25 Mar 2002).
  - (4) Air Force Instruction 40-402, "Protection of Human Subjects in Biomedical and Behavioral Research" (Sep 2000).
  - (5) AFRL Instruction 40-402, "Using Human Subjects in Research, Development, Test and Evaluation" (Feb 1999).

iii. In addition, GDIT shall (b) (4)

Human testing shall not commence until approval from the Air Force IRB has been obtained.

- iv. Protection of Animal Subjects. GDIT shall comply, as appropriate, with the provisions of the following guide: "Guide for the Care and Use of Laboratory Animals," prepared by the Committee on Care and Use of Laboratory Animals of the Institute of Laboratory Animal Resources, National Research Council (NIH Publication No. 86-23, Revised 1996). Moreover, GDIT will maintain records

associated with animal subjects research as required by the approved protocol.

Animal testing shall not commence until approval from the Air Force Institutional Animal Care and Use Committee has been obtained.

v. Comply with Air Force (AF) regulations in operations security (OPSEC) and communications security (COMSEC) as necessary.

h. Material management. Cutting edge research in molecular bioeffects requires sophisticated instrumentation, associated maintenance, and quality supplies from a variety of specialty vendors. GDIT shall:

(b) (4) [Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

### 3. Deliverables

#### List of all Deliverables:

- Reports: Status, Technical, Financial, Presentation, and Final
- Hardware: Lab prototype hardware (STE)
- Software: Lab data collection and analysis software.

**CDRLS:** A001, A002, A003, A004, A005, A006, A007, A008 & A009.