

## STATEMENT OF WORK

Contract: N66001-XXXX

Task Order No.: 0085

Descriptive title: Environmental Research for Microbial Fuel Cell Improvement

Date: March 18, 2015

SOW Task No:

### 1.0 SCOPE

This Statement of Work covers the need for the services of one graduate/post graduate to provide technical and analytical support in the field of environmental and general microbiology for Environmental Research for Microbial Fuel Cell Improvement Research and Development work at the Space and Naval Warfare Systems Center, Pacific. This work is part of our new start project with the Department of Defense Coalition Warfare Program. This work shall require use of both standardized and innovative laboratory-based test and evaluation procedure to increase power in a microbial fuel cell. The work shall be conducted at SSC Pacific.

### 1.1 BACKGROUND

SSC Pacific is involved in a variety of research projects to support the DoD. Specific to this effort, is to better understand fate, transport, and bioavailability of organics for the improvement of microbial fuel cell systems. A better understanding of factors associated with fate, transport and bioavailability in sediments would enable operators to minimize operational environmental risks, constraints, and over-all costs. Current methodologies do not accurately predict system performance. SSCPAC has a goal to produce 500mW of continuous power. Several avenues of research need to be examined.

This tasking supports methodology development to improve ability of discerning the microbiome present in soil and sediments along with fate and transport of organic materials related to biologically meaningful endpoints. Part of this tasking is to examine a variety of microbial fuel cells. In those with increased power, the anodes will be transplanted into other areas. The testing shall include characterization and isolation of key microbial variables such as native nutrients as well as addition of nutrients and carbon sources; as well as basic bacteria detection analysis. The contractor should have experience with and interest in basic environmental engineering efforts, engineering and circuits connection (connection of anodes and cathodes). The contractor shall be involved in the preparation, performance, and data analysis of environmental and biological samples using standard methods, along with general laboratory maintenance and up-keep.

In addition, SSCPAC is also supporting a pilot scale MFC for installation at Remote Training Site (RTS) Warner Springs. Additional roles include assisting with proposal development, related water chemistry analysis, presentations, and publications. The contractor shall also participate in planning meetings and conference calls with project collaborators. No human or animal use is expected with this effort.

2.0 APPLICABLE DOCUMENTS: N/A

3.0 TECHNICAL REQUIREMENTS: The contractor shall assist the work sponsor in:

3.1 Conducting sample characterization using standardized methods and analytical assays (such as HPLC, PCR, and DGGE).

3.2 Maintaining laboratory microbial culture stocks.

3.3 Setting up new BMFC systems to determine differences under different circumstances (total organic carbon (TOC), grain size, and other sediment characteristics). Using MatLab to analyze data. Usage of MatLab to create sediment power maps.

3.4 Performing data analysis of characterization data using Microsoft Excel, image analysis and software processing (BioApplications, Adobe Photoshop, Adobe Illustrator, MatLab) and other statistical packages.

3.5 Maintaining laboratory facilities (e.g.. washing dishes and glassware, inventory control, ordering supplies).

3.6 Inventory control of hazardous materials and substances. Be the primary person responsible for maintenance of SOP's and MSDS documents.

3.7 Conducting relevant literature searches pertaining to the studies and participating in report preparation and writing of investigative papers.

3.8 Monthly Status Reports and Bi-Weekly Time Reports shall be in accordance with basic contract CDRL

#### 4.0 MATERIALS

4.1 Government Furnished Equipment: Computer

4.2 Contractor Procured Materials or equipment: None

#### 5.0 TRAVEL

TBD- conferences and deployments.

#### 6.0 OTHER

6.1 Security: Unclassified

6.2 Place of Performance: SPAWAR Systems Center Pacific

6.3 Inspection and Acceptance of Services: E.D. Lyles, SSC Pacific, Code 56001, (619) 553-2463, E-mail: erin.lyles@navy.mil

#### 6.4 Qualifications of Personnel:

##### 6.4.1 Minimum Qualifications:

Post Graduate student Level 1/ 2 majoring in environmental engineering or related field & general microbiology knowledge.

Required course work for graduate level person: experimental techniques, Microbiology, Environmental Microbiology, Environmental chemistry, molecular biology, and analysis of metagenomic data.

6.5.2 Additional Qualifications desired:

Experience with modern and classical approaches for cultivation of different groups of microorganisms such as most probable number technique; Experience with analytical tools including HPLC, GC/MS, raman spectroscopy; Cloning and transfection, and gene-expression experience. Experience with microbial physiology. Experience with circuits and electrical engineering. Experience working with pathogenic and semi pathogenic microbes. Must be available a minimum of 20 hours per week with some field work. Familiarity with computers and data processing. Ability to communicate effectively.

6.5 Principal Work Assignment: Dr. Y. Meriah Arias-Thode, Code 71760, BS Bldg 111, room 272, ph: 619-553-2671, Email: meriah.ariasthode@navy.mil

Dr. Y. Meriah Arias-Thode, Work Sponsor

E.D. Lyles, COR