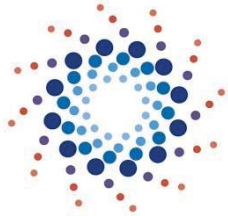




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# SBIR

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# Small Business Innovation Research

## FY2017

Program Solicitation: **NOAA2017-1**

Opening Date: October 20, 2016  
Closing Date: January 25, 2017

U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
<http://www.techpartnerships.noaa.gov>

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**DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION**

**PROGRAM SOLICITATION FOR SMALL BUSINESS INNOVATION RESEARCH (SBIR)**

**1.0 PROGRAM DESCRIPTION**

**1.1 Introduction**

The Department of Commerce (DOC) National Oceanic and Atmospheric Administration (NOAA) invites small businesses to submit research proposals under this solicitation. Firms with the capability to conduct research and development (R&D) in any of the topic areas listed in Section 8 of this solicitation and to commercialize the results of that R&D are encouraged to participate. The Small Business Innovation Research (SBIR) Program is not a substitute for existing unsolicited proposal mechanisms. **Unsolicited proposals are not accepted under the SBIR program.**

The SBIR program was originally established in 1982 by the Small Business Innovation Development Act (P.L. 97-219). It was then expanded by the Small Business Research and Development Enhancement Act of 1992, extending the program to the year 2000 and then to 2008. The program was reauthorized under Public Law 112-81, Section E and extended through September 30, 2017.

Eleven federal agencies set aside a portion of their extramural R&D budget each year to fund research proposals from small science and technology-based firms. The objectives of the SBIR program are to: stimulate technological innovation in the private sector; strengthen the role of small business in meeting Federal R&D needs; foster and encourage participation by socially and economically disadvantaged persons and women-owned small business concerns in technological innovation; and increase private sector commercialization of innovations derived from federal research and development. The NOAA SBIR Program identifies and solicits proposals in subtopics that fall within NOAA's mission.

NOAA is not obligated to make any awards under this solicitation and all awards are subject to the availability of funds.

NOAA is not responsible for any costs expended by the proposer in the development of the proposal and prior to award of any contract.

**1.2 Three-Phase Program**

Legislation requires the Department of Commerce to establish a three-phase SBIR program by reserving a percentage of its extramural R&D budget to be awarded to small business concerns for innovation research. SBIR policy is provided by the Small Business Administration (SBA) through the SBA Policy Directive.

The funding vehicles for NOAA's SBIR program in both Phase I and Phase II are contracts. While the Phase II proposal process is covered in this announcement, this solicitation is for **Phase I proposals only**. A separate solicitation will not be issued requesting Phase II proposal submissions. Unsolicited proposals will not be accepted through the SBIR Program. A Phase II proposal can be submitted **only** by a Phase I awardee. NOAA has the unilateral right to select SBIR research topics and awardees in both Phase I and Phase II and award several or no contracts under a given subtopic.

### **1.2.1 Phase I – Feasibility Research**

The purpose of Phase I is to determine the scientific, technical, and commercial merit and feasibility of the proposed research and the quality of performance of the small business concern receiving an award. Therefore, the proposal should concentrate on research that will significantly contribute to proving the feasibility of the proposed research, a prerequisite to further support in Phase II. NOAA Phase I awards are up to \$120,000 with up to a six (6) month period of performance. Proposers are encouraged to consider, and discuss in their proposal, whether the research or research and development being proposed to NOAA also has private sector potential, either for the proposed application or as a base for other applications. Only DOC NOAA SBIR Phase I awardees will be eligible to submit a Phase II proposal.

### **1.2.2 Phase II – Research and Development (R&D)**

All firms that are awarded Phase I contracts under this solicitation will be given the opportunity to submit a Phase II proposal immediately following completion of Phase I. Phase II is the R&D or prototype development phase. It will require a comprehensive proposal outlining the research in detail, a detailed plan to commercialize the final product, and may require a company presentation to the NOAA SBIR Selection Committee.

Instructions for Phase II proposal preparation and submission requirements will be provided to Phase I awardees toward the end of the Phase I period of performance. Phase II applicants will be required to provide information for the Small Business Administration (SBA) Database System (<http://sbir.gov>) when advised this system can accept their input.

Further information regarding Phase II proposals and SBA Database requirements will be provided to all firms receiving Phase I contracts. The following provides information for submitting a Phase II proposal to the Department of Commerce (DOC) National Oceanic and Atmospheric Administration (NOAA) SBIR program.

Phase II awards shall be for no more than **\$400,000**. The period of performance for completion of the Phase II will depend upon the scope of the research, but it should not exceed **24 months**. There is also a one year commercialization activity period, as discussed

elsewhere in this document. For planning purposes, NOAA's goal is to make Phase II awards in the month of July.

Each Phase II proposal will be evaluated against the criteria set forth in Solicitation NOAA 2017-1 (see Section 4.4). Phase II award decisions will be made based upon scientific and technical quality, commercial potential and available funds. Final recommended award decisions will be made by the NOAA Technology Partnerships Committee (TPC) to the Contracting Officer (CO) based upon rankings assigned by reviewers and consideration of other factors which includes possible duplication of ongoing research and the importance of the proposed research as it relates to NOAA mission needs.

Phase II proposals should be more comprehensive than Phase I proposals and are **NOT** limited to 26 pages. One year after completing Phase II R&D activity the awardee shall be required to report on their commercialization activities.

### **1.2.3 Phase III – Commercialization**

Under Phase III, the proposer is required to obtain funding from either, the private sector, a non-SBIR Government source, or both, to develop the prototype into a viable product or non-R&D service for sale in the Federal government and/or domestic and international private sector markets. SBIR Phase III refers to work that derives from, extends, or completes an effort made under prior SBIR funding agreements, but is funded by sources other than the SBIR Program. Phase III work is typically oriented towards commercialization of SBIR research or technology and may be for products, production, services, Research / Research and Development (R/R&D) or a combination thereof.

### **1.3 Manufacturing-related Priority**

Executive Order (EO) 13329 "Encouraging Innovation in Manufacturing" requires SBIR agencies, to the extent permitted by law and in a manner consistent with the mission of that department or agency, to give high priority within the SBIR programs to manufacturing-related R&D. "Manufacturing-related" is defined as "relating to manufacturing processes, equipment and systems; or manufacturing workforce skills and protection."

The NOAA SBIR Program solicits manufacturing-related projects through many of the subtopics described in this Solicitation. Further, NOAA encourages innovation in manufacturing by giving high priority, where feasible, to projects that can help the manufacturing sector through technological innovation in a manner consistent with NOAA's mission. This prioritization will not interfere with the core project selection criteria described in Section 4.3.



## 1.4 Energy Efficiency and Renewable Energy Priority

The Energy Independence and Security Act of 2007 (P.L. 110-140) directs SBIR Programs to give high priority to small business concerns that participate in or conduct energy efficiency or renewable energy system R&D projects.

The NOAA SBIR Program solicits energy efficiency or renewable energy system R&D projects through many of the subtopics described in this Solicitation. Further, NOAA encourages innovation in energy efficiency or renewable energy system R&D by giving high priority, where feasible, to projects that conduct energy efficiency or renewable energy system R&D through technological innovation in a manner consistent with NOAA's mission. This prioritization will not interfere with the core project selection criteria: scientific and technical merit and the potential for commercial success.

## 1.5 Eligibility and Limitations

Proposers for both Phase I and Phase II **must** qualify as a small business concern for research or research and development (R/R&D) purposes (Section 1.7.11) at the time of the award and at any other time set forth in the SBA's regulations at 13 CFR 121.701-121.705. Each awardee must submit a certification (See Section 2.4.1 and 9.5) stating that it meets the size, ownership and other requirements of the SBIR Program at the time of award, and at any other time set forth in SBA's regulations at 13 CFR 121.701-705.

For Phase I, a minimum of two-thirds of the research and/or analytical effort must be performed by the awardee<sup>1</sup>. For Phase II, a minimum of one-half of the research and/or analytical effort must be performed by the awardee.

For both Phase I and Phase II, the primary employment<sup>2</sup> of the principal investigator (PI) must be with the small business concern (SBC) at the time of the award and during the conduct of the proposed project. Primary employment means that more than one-half of the principal investigator's time is spent in the employ of the SBC. **Primary employment with a SBC precludes full-time employment with another organization.**

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<sup>1</sup> In order to help clarify these requirements, the government is looking at the overall dollars expended by the SBIR awardee for their operational costs for the research (including overhead and profit) versus the expenditures of an outside contracted party such as, but not limited to, a subcontractor, consultant fees, University partnerships, other non-profit, facility leases, or usage fees.

<sup>2</sup> If an individual has completed an Internal Revenue Service (IRS) Form W-4 form for a company to determine the correct amount of federal income tax to be withhold from their pay, that would indicate that the company considers the individual to be an employee. In contrast, if the individual has completed an IRS Form W-9 and/or the company provides the individual with an IRS Form 1099 for purposes of filing of income tax, it indicates that the company does not consider the individual to be an employee of the company. Instead, the individual would be considered by the company to be an independent contractor, consultant, or subcontractor.



For both Phase I and Phase II, all work must be performed by the SBC and its subcontractors in the United States. “United States” means the fifty states, the territories and possessions of the United States, the Commonwealth of Puerto Rico, the District of Columbia, the Republic of the Marshall Islands, the Federated States of Micronesia, and the Republic of Palau.

However, based on a rare and unique circumstance, for example, a supply or material or other item or project requirement that is not available in the United States, NOAA may allow that particular portion of the R/R&D work to be performed or obtained in a country outside of the United States.

**If a waiver is requested, it must be submitted, in writing, to the NOAA CO and SBIR Program Manager where work or supplies outside the United States are being considered and a detailed rational explaining steps taken to locate potential United States sources; if any United States sources were located and any potential concerns for use of those sources; and any potential cost differences between United States sources and foreign sources (if applicable). This waiver request shall be submitted via email to the points of contact in paragraph 1.6 at least fourteen calendar days prior to the solicitation closing date. It is in the firm’s best interest to submit these waiver requests as soon as they are known. Waivers are only approved in rare and unique circumstances.**

In accordance with the SBIR/STTR Reauthorization Act of 2011, each SBIR agency must determine whether an applicant for a Phase I award that has won multiple prior SBIR awards meets the benchmark requirements for progress towards commercialization before making a new Phase I award to the applicant. Small business concerns are assessed on June 1 of each year using their prior Phase I and Phase II SBIR and STTR awards across all SBIR agencies.

The Phase II Transition Rate Benchmark sets the minimum required number of Phase II awards the applicant must have received for a given number of Phase I awards received during the specified period. NOAA’s minimum Phase I to Phase II transition rate to be eligible to receive a new Phase I award, is 0.25 over the past 5 fiscal years, excluding the most recently completed fiscal year. This transition rate benchmark applies only to Phase I applicants that have received more than 20 Phase I awards over the past 5 fiscal years, excluding the most recently completed fiscal year. This requirement does not apply to companies that have received 20 or fewer Phase I awards over the 5 year period. For those companies that have received more than 20 Phase I awards over the past 5 years, SBA posts the company transition rates on the Company Registry at SBIR.gov. Information on the Phase I to Phase II Transition Rate requirement is available at <https://www.sbir.gov/performance-benchmarks>.

Applicants to this solicitation that may have received more than 20 Phase I awards across all federal SBIR/STTR agencies over the past five (5) years should, prior to proposal preparation, verify that their company’s Transition Rate on the Company Registry at SBIR.gov meets or exceeds the minimum benchmark rate of 0.25. The transition rate is calculated as the total number of SBIR and STTR Phase II awards a company received during the past 5 fiscal years divided by the total number of SBIR and STTR Phase I awards it received during the past 5 fiscal years excluding the most recently completed year.

SBA calculates individual company transition rates using SBIR and STTR award information across all federal agencies. SBA will identify, on June 1 of each year, the companies that fail to meet the benchmark. These companies will not be eligible to receive a Phase I award for a period of one year from that date. SBA will notify the companies and the relevant officials at the participating agencies.

If a company believes that the information used was incomplete or inaccurate, it may provide feedback through the Company Registry at [www.sbir.gov](http://www.sbir.gov). SBA accepts requests for reconsideration of the eligibility determination from April 1st through April 30th of each year. Additional information on the Transition benchmark is available at [SBIR.gov](http://SBIR.gov).

**Venture Capital Participation:** NOAA elects to not use the authority that would allow venture capital operating companies (VCOCs), hedge funds or private equity firms to participate in the SBIR Program.

Unsolicited proposals or proposals not responding to subtopics listed herein are not eligible for SBIR awards. Only proposals that are directly responsive to the subtopics as described in Section 8 will be considered.

Potential awardees (along with their consultants or subcontractors) may not participate in the selection of any topic or subtopic. Additionally, they may not or participate in the review of proposals. All offerors (including Guest Researchers, contractors, Cooperative Research and Development Agreement (CRADA) partners and others working with NOAA) may only submit a proposal if they:

- Had no role in developing or reviewing the subtopic
- Have not been the recipient of any information on the subtopic not available in the solicitation or other public means
- Have not received any assistance from DOC in preparing the proposal for this specific solicitation (including any 'informal' reviews) prior to submission.

NOAA may not enter into, or continue an existing CRADA with an awardee on the subtopic of the award.

## **1.6 Contact with NOAA**

In the interest of competitive fairness, oral or written communication with NOAA or any of its components, other than the contacts provided immediately below, concerning additional information on the technical topics described in Section 8 of this solicitation **is strictly prohibited**.

For general information on the NOAA SBIR program contact:

Vince Garcia, NOAA SBIR Program Manager  
1305 East West Highway, Room 7605  
Silver Spring, MD 20910

Telephone: (301) 628-1011  
Email: [vincent.garcia@noaa.gov](mailto:vincent.garcia@noaa.gov)

For information on the solicitation and other related contractual issues contact:

Joan Clarkston, Contracting Officer  
DOC/NOAA-EAD-KC  
601 East 12<sup>th</sup> Street, Room 1734  
Kansas City, MO 64106

Telephone: (816) 426-7469  
E-mail: [Joan.E.Clarkston@noaa.gov](mailto:Joan.E.Clarkston@noaa.gov)

In order to permit timely posted responses, all questions pertaining to the solicitation and its subtopics are due no later than ***Thursday, December 1, 2016 at 2:00 PM Eastern to the Joan Clarkston at [joan.e.clarkston@noaa.gov](mailto:joan.e.clarkston@noaa.gov). When sending questions, include the solicitation number in the header "NOAA2017-1."*** Questions sent to any other email address may not be answered. **After that date and time, NO ADDITIONAL QUESTIONS SHALL BE ACCEPTED.**

Additional scientific and technical information sources are listed in Section 7.

#### **NOAA ACQUISITION AND GRANTS OFFICE OMBUDSMAN (OCT 2016)**

- a. The NOAA Acquisition and Grants Office (AGO) Ombudsman is available to organizations to promote responsible and meaningful exchanges of information. Generally, the purpose of these exchanges will be to:
  1. Allow contractors to better prepare for and propose on business opportunities.
  2. Advise as to technologies and solutions within the marketplace that the government may not be aware of, or is not fully benefiting from.
  3. Identify constraints in transparency and process.
- b. The AGO Ombudsman will objectively, reasonably, and responsibly collaborate with parties and recommend fair, impartial, and constructive solutions to the matters presented to him/her. Further, the AGO Ombudsman will maintain the reasonable and responsible confidentiality of the source of a concern, when such a request has been formally made by an authorized officer of an organization seeking to do business with, or already doing business with NOAA.
- c. Before consulting with the AGO Ombudsman, interested parties must first address their concerns, issues, disagreements, and/or recommendations with the respective contracting officer for resolution. However, direct access to the AGO Ombudsman may be sought when an interested party questions the objectivity or equity of a contracting officer's decision, or when there is a bona fide reason to believe that reasonable,

responsible, and objective consideration will not be received from an assigned contracting officer.

- d. There are several constraints to the scope of the AGO Ombudsman's authority, of instance:
  - 1. Consulting with the AGO Ombudsman does not alter or postpone the timeliness of any formal process (e.g., protest, claims, debriefings, employee employer action, activities involving A-76 competition performance decisions, judicial or congressional hearings, or proposal, amendment, modification, or deliverable due dates, etc.).
  - 2. The AGO Ombudsman cannot participate in the evaluation of the proposals, source selection process, or the adjudication of protests or formal contract disputes.
  - 3. The AGO Ombudsman is not authorized to generate or alter laws, judicial decisions, rules, policies, or formal guidance.
  - 4. The AGO Ombudsman is not authorized to develop or alter opportunity announcements, solicitations, contracts, or their terms or conditions.
  - 5. The AGO Ombudsman cannot overrule the authorized decisions or determinations of the contracting officer.
  - 6. The AGO Ombudsman has no authority to render a decision that binds AGO, NOAA, the Department of Commerce, or the U.S. Government.
  - 7. The AGO Ombudsman is not NOAA's agent relative to the service of magistrate or judicial process and cannot be used to extend service of process to another party (whether federal, public, or a private entity).
- e. After review and analysis of a filed concern or recommendation, the AGO Ombudsman may refer the interested party to another more suitable federal official for consideration. Moreover, concerns, disagreements, and/or recommendations that cannot be resolved by the AGO Ombudsman will need to be pursued through more formal venues.
- f. The AGO Ombudsman is not to be contracted to requested copies of forms and/or documents under the purview of a contracting officer. Such documents include Requests for Information, solicitations, amendments, contracts, modifications, or conference materials.
- g. To speak to the NOAA Ombudsman, contact Rafael Roman at [Rafael.roman@noaa.gov](mailto:Rafael.roman@noaa.gov) and include the solicitation number.

## 1.7 Definitions

### 1.7.1 – Commercialization

The process of developing products, processes, technologies, or services and the production and delivering (whether by the originating party or others) of the products, processes, technologies, or services for sale to or use by the Federal government or commercial markets.

***As used here, commercialization includes both Government and private sector markets.***

### **1.7.2 – Essentially Equivalent Work**

Work that is substantially the same research, which is proposed for funding in more than one contract proposal or grant application submitted to the same Federal agency or submitted to two or more different Federal agencies for review and funding consideration; or work where a specific research objective and the research design for accomplishing an objective are the same or closely related to another proposal or award, regardless of the funding source.

### **1.7.3 – Feasibility**

The practical extent to which a project can be performed successfully.

### **1.7.4 - Funding Agreement**

Any contract, grant, or cooperative agreement entered into between any Federal agency and any small business concern (SBC) for the performance of experimental, developmental, or research work, including products or services, funded in whole or in part by the Federal Government.

***For purposes of this Solicitation, NOAA intends to award contracts in accordance with the Federal Acquisition Regulation.***

### **1.7.5 – Historically Underutilized Business Zone (HUBZone) Small Business Concern** (See 13 CFR Part 126 for additional details)

Status as a qualified HUBZone Small Business Concern is determined by the Small Business Administration.

### **1.7.6 – Innovation**

Something new or improved, having marketable potential, including: (1) development of new technologies; (2) refinement of existing technologies; or (3) development of new applications for existing technologies.

### **1.7.7 – Joint Venture**

See 13 CFR 121.103(h).

***NOAA HAS CHOSEN NOT TO PERMIT MAJORITY-OWNED BY MULTIPLE VENTURE CAPITAL OPERATING COMPANIES, HEDGE FUND, OR PRIVATE EQUITY FIRMS.***

#### **1.7.8 – Principal Investigator (PI)/Project Manager (PM)**

The one individual designated by the applicant to provide the scientific and technical direction to a project supported by a funding agreement.

#### **1.7.9 – Primary Employment**

The primary employment of the principal investigator/project manager must be with the SBC at the time of award and during the conduct of the proposed project. Primary employment means that more than one half of the PI/PM's time is spent in the employ of the small business concern. This precludes full-time employment with another organization (also see Section 1.5).

#### **1.7.10 – Prototype**

A model of something to be further developed, which includes designs, protocols, questionnaires, software, and devices.

#### **1.7.11 – Research or Research and Development (R/R&D)**

Any activity that is (a) a systematic, intensive study directed toward greater knowledge or understanding of the subject studied; (b) a systematic study directed specifically toward applying new knowledge to meet a recognized need; or (c) a systematic application of knowledge toward the production of useful materials, devices, systems, or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

***In general, the NOAA SBIR program will fund Phase I and Phase II proposals with objectives that can be defined by (b) and (c) in the above paragraph.***

#### **1.7.12 – SBIR Technical Data**

All data generated during the performance of a SBIR award.

#### **1.7.13 – SBIR Technical Data Rights**

The rights an SBIR awardee obtains in data generated during the performance of any SBIR Phase I, Phase II, or Phase III award that an awardee delivers to the Government during or upon completion of a Federally-funded project, and to which the Government receives a license.

#### **1.7.14 – Small Business Concern (SBC)**

A concern that meets the requirements set forth in 13 CFR 121.702.

#### **1.7.15 – Socially and Economically Disadvantaged Small Business Concern**

See 13 CFR 124, Subpart B.

#### **1.7.16 – Subcontract**

Any agreement, other than one involving an employer-employee relationship, entered into by an awardee of a funding agreement calling for supplies or services for the performance of the original funding agreement.

#### **1.7.17 – Women-Owned Small Business**

An SBC that is at least 51% owned by one or more women, or in the case of any publically owned business, at least 51% of the stock is owned by women, and women control the management and daily business operations.

### **1.8 Fraud, Waste and Abuse**

Fraud includes any false representation about a material fact or any intentional deception designed to deprive the United States unlawfully of something of value or to secure from the United States a benefit, privilege, allowance, or consideration to which an individual or business is not entitled. Waste includes extravagant, careless, or needless expenditure of Government funds, or the consumption of Government property, that results from deficient practices, systems, controls, or decisions. Abuse includes any intentional or improper use of Government resources, such as misuse of rank, position, or authority or resources. Examples of fraud, waste, and abuse relating to the SBIR Program include, but are not limited to:

(i) misrepresentations or material, factual omissions to obtain, or otherwise receive funding under, an SBIR award;

(ii) misrepresentations of the use of funds expended, work done, results achieved, or compliance with program requirements under an SBIR award;

(iii) misuse or conversion of SBIR award funds, including any use of award funds while not in full compliance with SBIR Program requirements, or failure to pay taxes due on misused or converted SBIR award funds;



(iv) fabrication, falsification, or plagiarism in applying for, carrying out, or reporting results from an SBIR award;

(v) failure to comply with applicable federal costs principles governing an award;

(vi) extravagant, careless, or needless spending;

(vii) self-dealing, such as making a sub-award to an entity in which the PI has a financial interest;

(viii) acceptance by agency personnel of bribes or gifts in exchange for grant or contract awards or other conflicts of interest that prevents the Government from getting the best value; and

(ix) lack of monitoring, or follow-up if questions arise, by agency personnel to ensure that awardee meets all required eligibility requirements, provides all required certifications, performs in accordance with the terms and conditions of the award, and performs all work proposed in the application.

Report any allegations of fraud, waste and abuse to:

Department of Commerce  
Office of Inspector General  
Complaint Intake Unit, Mail Stop 7886  
1401 Constitution Avenue, N.W.  
Washington, DC 20230

Telephone:

Local	202-482-2495
Toll free	1-800-424-5197
TTD	1-855-860-6950

Email: [hotline@oig.doc.gov](mailto:hotline@oig.doc.gov)

Fax: 855-569-9235

Website: <http://www.oig.doc.gov/Pages/online-hotline-complaint-form.aspx>

## 2.0 CERTIFICATIONS

### 2.1 Certification of Size, Ownership, and SBIR Program Requirements

Awardees will be required to certify size, ownership and other SBIR Program requirements with the submission of SBIR proposal, at the time of award, and during the funding agreement life cycle. A copy of these certifications is provided in Section 2.4.1, 2.4.2, 9.5 and 9.6.

### 2.2 Research Projects with Human Subjects, Human Tissue, Data or Recordings Involving Human Subjects

#### 2.2.1 Protection of Human Subjects

Any proposal that includes contractor participation in research involving human subjects, human tissue/cells, data or recordings involving human subjects must meet the requirements of the Common Rule for the Protection of Human Subjects ("Common Rule"), codified for the Department of Commerce (DOC) at 15 C.F.R. Part 27. In addition, any such proposal that includes research on these topics must be in compliance with any statutory requirements imposed upon the Department of Health and Human Services (DHHS) and other Federal agencies regarding these topics, all regulatory policies and guidance adopted by DHHS, the Food and Drug Administration, and other Federal agencies on these topics, and all Executive Orders and Presidential statements of policy on these topics.

NOAA reserves the right to make an independent determination of whether a proposer's research involves human subjects. If NOAA determines that your research project involves human subjects, you will be required to provide additional information for review and approval. If an award is issued, no research activities involving human subjects shall be initiated or costs incurred under the award until the NOAA CO issues written approval. Retroactive approvals are not permitted.

NOAA will accept proposals that include research activities involving human subjects that have been or will be approved by an Institutional Review Board (IRB) currently registered with the Office for Human Research Protections (OHRP) within the DHHS and that will be performed by entities possessing a currently valid Federal wide Assurance (FWA) on file from OHRP that is appropriately linked to the cognizant IRB for the protocol. NOAA will not issue a single project assurance (SPA) for any IRB reviewing any human subjects protocol proposed to NOAA. Information regarding how to apply for an FWA and register an IRB with OHRP can be found at <http://www.hhs.gov/ohrp/assurances/index.html>.

Generally, NOAA does not fund research involving human subjects in foreign countries. NOAA will consider, however, the use of **preexisting** tissue, cells, or data from a foreign source on a limited basis if all of the following criteria are satisfied:

- (1) the scientific source is considered unique,

- (2) an equivalent source is unavailable within the United States,
- (3) an alternative approach is not scientifically of equivalent merit, and
- (4) the specific use qualifies for an exemption under the Common Rule.

Any award issued by NOAA is required to adhere to all Presidential policies, statutes, guidelines and regulations regarding the use of human embryonic stem cells. The DOC follows the NIH Guidelines by supporting and conducting research using only human embryonic stem cell lines that have been approved by NIH in accordance with the NIH Guidelines. Detailed information regarding NIH Guidelines for stem cells is located on the NIH Stem Cell Information website: <http://stemcells.nih.gov>. The DOC will not support or conduct any type of research that the NIH Guidelines prohibit NIH from funding. The DOC will review research using human embryonic stem cell lines that it supports and conducts in accordance with the Common Rule and NOAA implementing procedures, as appropriate.

Any request to support or conduct research using human embryonic stem cell lines not currently approved by the NIH, will require that the owner, deriver or licensee of the human embryonic stem cell line apply for and receive approval of the registration of the cell line through the established NIH application procedures: [http://hescregapp.od.nih.gov/NIH\\_Form\\_2890\\_Login.htm](http://hescregapp.od.nih.gov/NIH_Form_2890_Login.htm). Due to the timing uncertainty associated with establishing an embryonic stem cell line in the NIH registry, the use of existing human embryonic stem cell lines in the NIH Embryonic Stem Cell Registry may be preferred by applicants or current award recipients. The NIH Embryonic Stem Cell Registry is located at: [http://grants.nih.gov/stem\\_cells/registry/current.htm](http://grants.nih.gov/stem_cells/registry/current.htm).

A proposer or current award recipient proposing to use a registered embryonic stem cell line will be required to document an executed agreement for access to the cell line with the provider of the cell line, and acceptance of any established restrictions for use of the cell line, as may be noted in the NIH Embryonic Stem Cell Registry.

If the proposal includes exempt and/or non-exempt research activities involving human subjects the following information is required in the proposal:

- (1) The name(s) of the institution(s) where the research will be conducted;
- (2) The name(s) and institution(s) of the cognizant IRB(s), and the IRB registration number(s);
- (3) The FWA number of the applicant linked to the cognizant IRB(s);
- (4) The FWAs associated with all organizations engaged in the planned research activity linked to the cognizant IRB;
- (5) If the IRB review(s) is pending, the estimated start date for research involving human subjects;
- (6) The IRB approval date (if currently approved for exempt or non-exempt research);

(7) If any FWAs or IRB registrations are being applied for, that should be clearly stated.

Additional documentation may be requested, as warranted, during review of the proposal, but may include the following for research activities involving human subjects that are planned in the first year of the award:

- (1) A signed (by the study principal investigator) copy of each applicable final IRB-approved protocol;
- (2) A signed and dated approval letter from the cognizant IRB(s) that includes the name of the institution housing each applicable IRB, provides the start and end dates for the approval of the research activities, and any IRB-required interim reporting or continuing review requirements;
- (3) A copy of any IRB-required application information, such as documentation of approval of special clearances (i.e. biohazard, HIPAA, etc.) conflict-of-interest letters, or special training requirements;
- (4) A brief description of what portions of the IRB submitted protocol are specifically included in the proposal submitted to NOAA, if the protocol includes tasks not applicable to the proposal, or if the protocol is supported by multiple funding sources. For protocols with multiple funding sources, NOAA will not approve the study without a nonduplication-of-funding letter indicating that no other federal funds will be used to support the tasks proposed under the proposed research or ongoing project;
- (5) If a new protocol will only be submitted to an IRB if an award from NOAA issued, a draft of the proposed protocol may be requested;
- (6) Any additional clarifying documentation that NOAA may request during review of proposals to perform the NOAA administrative review of research involving human subjects.

### **2.2.2 IRB Education Documentation**

A signed and dated letter is required from the Organizational Official who is authorized to enter into commitments on behalf of the organization documenting that appropriate IRB education has been received by the Organizational Official, the IRB Coordinator or such person that coordinates the IRB documents and materials if such a person exists, the IRB Chairperson, all IRB members and all key personnel associated with the proposal. The NOAA requirement of documentation of education is consistent with NIH notice OD-00-039 (June 5, 2000). Although NOAA will not endorse an educational curriculum, there are several curricula that are available to organizations and investigators which may be found at: <http://grants.nih.gov/grants/guide/notice-files/NOT-OD-00-039.html>.

## 2.3 Research Projects Involving Vertebrate Animals

Any proposal that includes research involving live vertebrate animals must be in compliance with the National Research Council's "Guide for the Care and Use of Laboratory Animals," which can be obtained from National Academy Press, 500 5<sup>th</sup> Street, N.W., Department 285, Washington, DC 20055. In addition, such proposals must meet the requirements of the Animal Welfare Act (7 U.S.C. § 2131 et seq.), 9 C.F.R. Parts 1, 2, and 3, and if appropriate, 21 C.F.R. Part 58. These regulations do not apply to proposed research using preexisting images of animals or to research plans that do not include live animals that are being cared for, euthanized, or used by the project participants to accomplish research goals, teaching, or testing. These regulations also do not apply to obtaining animal materials from commercial processors of animal products or to animal cell lines or tissues from tissue banks.

NOAA reserves the right to make an independent determination of whether your research involves live vertebrate animals. If NOAA determines that your research project involves live vertebrate animals, you will be required to provide additional information for review and approval. If an award is issued, no research activities involving live vertebrate animals subjects shall be initiated or costs incurred under the award until the NOAA CO issues written approval.

If the proposal includes research activities involving live vertebrate animals, the following information is required in the proposal:

- (1) The name(s) of the institution(s) where the animal research will be conducted;
- (2) The assurance type and number, as applicable, for the cognizant Institutional Animal Care and Use Committee (IACUC) where the research activity is located. [For example: Animal Welfare Assurance from the Office of Laboratory Animal Welfare (OLAW) should be indicated by the OLAW assurance number, i.e. A-1234; a USDA Animal Welfare Act certification should be indicated by the certification number i.e. 12-R-3456; and an Association for the Assessment and Accreditation of Laboratory Animal Care (AAALAC) should be indicated by AAALAC.]
- (3) The IACUC approval date (if currently approved);
- (4) If the review by the cognizant IACUC is pending, the estimated start date for research involving vertebrate animals;
- (5) If any assurances or IACUCs need to be obtained or established, that should be clearly stated.

Additional documentation will be requested, as warranted, during review of the proposal, but may include the following for research activities involving live vertebrate animals that are planned in the first year of the award:

- (1) A signed (by the Principal Investigator) copy of the IACUC approved Animal Study Proposal (ASP);

- (2) Documentation of the IACUC approval indicating the approval and expiration dates of the ASP; and
- (3) If applicable, a nonduplication-of-funding letter if the ASP is funded from several sources.
- (4) If a new ASP will only be submitted to an IACUC if an award from NOAA issued, a draft of the proposed ASP may be requested.
- (5) Any additional clarifying documentation that NOAA may request during review of proposals to perform the NOAA administrative review of research involving live vertebrate animals.

## **2.4 Funding Agreement Addendums**

## 2.4.1 SBIR Funding Agreement Certification

**All small businesses must complete this certification with their proposal submission** and any other time set forth in the funding agreement that is prior to performance of work under this award. This includes checking all of the boxes and having an authorized officer of the awardee sign and date the certification each time it is requested.

Please read carefully the following certification statements. The Federal government relies on the information to determine whether the business is eligible for a Small Business Innovation Research (SBIR) Program award. A similar certification will be used to ensure continued compliance with specific program requirements during the life of the funding agreement. The definitions for the terms used in this certification are set forth in the Small Business Act, SBA regulations (13 C.F.R. part 121), the SBIR Policy Directive and also any statutory and regulatory provisions referenced in those authorities.

If the funding agreement officer believes that the business may not meet certain eligibility requirements at the time of award, they are required to file a size protest with the U.S. Small Business Administration (SBA), who will determine eligibility. At that time, SBA will request further clarification and supporting documentation in order to assist in the verification of any of the information provided as part of a protest. If the funding agreement officer believes, after award, that the business is not meeting certain funding agreement requirements, the agency may request further clarification and supporting documentation in order to assist in the verification of any of the information provided.

Even if correct information has been included in other materials submitted to the Federal government, any action taken with respect to this certification does not affect the Government's right to pursue criminal, civil, or administrative remedies for incorrect or incomplete information given in the certification. Each person signing this certification may be prosecuted if they have provided false information.

The undersigned has reviewed, verified and certifies that (all boxes must be checked):

(1) The business concern meets the ownership and control requirements set forth in 13 C.F.R. §121.702.

☐ Yes

☐ No

(2) If a corporation, all corporate documents (articles of incorporation and any amendments, articles of conversion, by-laws and amendments, shareholder meeting minutes showing director elections, shareholder meeting minutes showing officer elections, organizational meeting minutes, all issued stock certificates, stock ledger, buy-sell agreements, stock transfer agreements, voting agreements, and documents relating to stock options, including the right to



convert non-voting stock or debentures into voting stock) evidence that it meets the ownership and control requirements set forth in 13 C.F.R. § 121.702.

☐ Yes                      ☐ No                      ☐ N/A

Explain why N/A: \_\_\_\_\_

\_\_\_\_\_

(3) If a partnership, the partnership agreement evidences that it meets the ownership and control requirements set forth in 13 C.F.R. §121.702.

☐ Yes                      ☐ No                      ☐ N/A

Explain why N/A: \_\_\_\_\_

\_\_\_\_\_

(4) If a limited liability company, the articles of organization and any amendments, and operating agreement and amendments, evidence that it meets the ownership and control requirements set forth in 13 C.F.R §121.702.

☐ Yes                      ☐ No                      ☐ N/A

Explain why N/A: \_\_\_\_\_

\_\_\_\_\_

(5) The birth certificates, naturalization papers, or passports show that any individuals it relies upon to meet the eligibility requirements are U.S. citizens or permanent resident aliens in the United States.

☐ Yes                      ☐ No                      ☐ N/A

Explain why N/A: \_\_\_\_\_

\_\_\_\_\_

(6) It has no more than 500 employees, including the employees of its affiliates.

☐ Yes ☐ No

(7) SBA has not issued a size determination currently in effect finding that this business concern exceeds the 500 employee size standard.

☐ Yes ☐ No

(8) During the performance of the award, the principal investigator will spend more than one half of his/her time as an employee of the awardee or has requested and received a written deviation from this requirement from the funding agreement officer.

☐ Yes ☐ No ☐ Deviation approved in writing by funding agreement officer: \_\_\_\_\_%

(9) All, essentially equivalent work, or a portion of the work proposed under this project (check the applicable line):

- ☐ Has not been submitted for funding by another Federal agency.
- ☐ Has been submitted for funding by another Federal agency but has not been funded under any other Federal grant, contract, subcontract or other transaction.
- ☐ A portion has been funded by another grant, contract, or subcontract as described in detail in the proposal and approved in writing by the funding agreement officer.

(10) During the performance of award, it will perform the applicable percentage of work unless a deviation from this requirement is approved in writing by the funding agreement officer (check the applicable line and fill in if needed):

- ☐ SBIR Phase I: at least two-thirds (66 2/3%) of the research
- ☐ SBIR Phase II: at least half (50%) of the research
- ☐ Deviation approved in writing by the funding agreement officer: \_\_\_\_\_%

(11) During performance of award, the research/research and development will be performed in the United States unless a deviation is approved in writing by the funding agreement officer.

☐ Yes ☐ No ☐ Waiver has been granted

(12) During performance of award, the research/research and development will be performed at my facilities with my employees, except as otherwise indicated in the SBIR application and approved in the funding agreement.

☐ Yes ☐ No

(13) It has registered itself on SBA's database as majority-owned by venture capital operating companies, hedge funds, or private equity firms.

☐ Yes ☐ No ☐ N/A

Explain why N/A: \_\_\_\_\_

(14) It is a Covered Small Business Concern [a small business concern that: (a) was not majority-owned by multiple venture capital operating companies (VCOCs), hedge funds, or private equity firms on the date on which it submitted an application in response to an SBIR solicitation; and (b) on the date of the SBIR award, which is made more than 9 months after the closing date of the solicitation, is majority-owned by multiple venture capital operating companies, hedge funds, or private equity firms].

☐ Yes ☐ No

☐ It will notify the Federal agency immediately if all or a portion of the work authorized and funded under this award is subsequently funded by another Federal agency.

☐ I understand that the information submitted may be given to Federal, State, and local agencies for determining violations of law and other purposes.

☐ I am an officer of the business concern authorized to represent it and sign this certification on its behalf. By signing this certification, I am representing on my own behalf, and on behalf of the business concern that the information provided in this certification, the application, and all other information submitted in connection with this application, is true and correct as of the date of submission. I acknowledge that any intentional or negligent misrepresentation of the information contained in this certification may result in criminal, civil or administrative sanctions, including but not limited to: (1) fines, restitution and/or imprisonment under 18 U.S.C. §1001; (2) treble damages and civil penalties under the False Claims Act (31 U.S.C. §3729 et seq.); (3) double damages and civil penalties under the Program Fraud Civil Remedies Act (31 U.S.C. §3801 et seq.); (4) civil recovery of award funds, (5) suspension and/or debarment from all Federal procurement and nonprocurement transactions (FAR Subpart 9.4 or 2 C.F.R. part 180); and (6) other administrative penalties including termination of SBIR/STTR awards.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Print Name (First, Middle, Last)

\_\_\_\_\_  
Title

\_\_\_\_\_  
Business Name

## 2.4.2 SBIR Funding Agreement Certification – Life Cycle Certification

All SBIR Phase I and Phase II awardees must complete this certification at all times set forth in the funding agreement (see §8(h) of the SBIR Policy Directive). This includes checking all of the boxes and having an authorized officer of the awardee sign and date the certification each time it is requested.

Please read carefully the following certification statements. The Federal government relies on the information to ensure compliance with specific program requirements during the life of the funding agreement. The definitions for the terms used in this certification are set forth in the Small Business Act, the SBIR Policy Directive, and also any statutory and regulatory provisions referenced in those authorities.

If the funding agreement officer believes that the business is not meeting certain funding agreement requirements, the agency may request further clarification and supporting documentation in order to assist in the verification of any of the information provided.

Even if correct information has been included in other materials submitted to the Federal government, any action taken with respect to this certification does not affect the Government's right to pursue criminal, civil, or administrative remedies for incorrect or incomplete information given in the certification. Each person signing this certification may be prosecuted if they have provided false information.

The undersigned has reviewed, verified and certifies that (all boxes must be checked):

- (1) The principal investigator spent more than one half of his/her time as an employee of the awardee or the awardee has requested and received a written deviation from this requirement from the funding agreement officer.

☐ Yes    ☐ No                      ☐ Deviation approved in writing by funding agreement officer: \_\_\_\_\_%

- (2) All, essentially equivalent work, or a portion of the work performed under this project (check the applicable line):

☐ Has not been submitted for funding by another Federal agency.  
☐ Has been submitted for funding by another Federal agency but has not been funded under any other Federal grant, contract, subcontract or other transaction.  
☐ A portion has been funded by another grant, contract, or subcontract as described in detail in the proposal and approved in writing by the funding agreement officer.

(3) Upon completion of the award it will have performed the applicable percentage of work, unless a deviation from this requirement is approved in writing by the funding agreement officer (check the applicable line and fill in if needed):

☐ SBIR Phase I: at least two-thirds (66 2/3%) of the research

☐ SBIR Phase II: at least half (50%) of the research

☐ Deviation approved in writing by the funding agreement officer: \_\_\_\_\_%

(4) The work is completed and it has performed the applicable percentage of work, unless a deviation from this requirement is approved in writing by the funding agreement officer (check the applicable line and fill in if needed):

☐ SBIR Phase I: at least two-thirds (66 2/3%) of the research

☐ SBIR Phase II: at least half (50%) of the research

☐ Deviation approved in writing by the funding agreement officer: \_\_\_\_\_%

☐ N/A because work is not completed

(5) The research/research and development is performed in the United States unless a deviation is approved in writing by the funding agreement officer.

☐ Yes

☐ No

☐ Waiver has been granted

(6) The research/research and development is performed at my facilities with my employees, except as otherwise indicated in the SBIR application and approved in the funding agreement.

☐ Yes

☐ No

☐ It will notify the Federal agency immediately if all or a portion of the work authorized and funded under this award is subsequently funded by another Federal agency.

☐ I understand that the information submitted may be given to Federal, State, and local agencies for determining violations of law and other purposes.

☐ I am an officer of the business concern authorized to represent it and sign this certification on its behalf. By signing this certification, I am representing on my own behalf, and on behalf of the business concern that the information provided in this certification, the application, and

all other information submitted in connection with the award, is true and correct as of the date of submission. I acknowledge that any intentional or negligent misrepresentation of the information contained in this certification may result in criminal, civil or administrative sanctions, including but not limited to: (1) fines, restitution and/or imprisonment under 18 U.S.C. §1001; (2) treble damages and civil penalties under the False Claims Act (31 U.S.C. §3729 et seq.); (3) double damages and civil penalties under the Program Fraud Civil Remedies Act (31 U.S.C. §3801 et seq.); (4) civil recovery of award funds, (5) suspension and/or debarment from all Federal procurement and nonprocurement transactions (FAR Subpart 9.4 or 2 C.F.R. part 180); and (6) other administrative penalties including termination of SBIR/STTR awards.

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Signature

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Date

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Print Name (First, Middle, Last)

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Title

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Business Name



## 3.0 PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

### 3.1 Proposal Requirements

NOAA reserves the right not to complete a technical review of any proposal which it determines has insufficient scientific and technical information, or one which fails to comply with the administrative procedures as outlined in the NOAA/SBIR Checklist in Section 9.7. Proposals that do not pass the screening criteria (outlined in Section 4.2) will be rejected without further consideration.

The offeror must provide sufficient information to demonstrate that the proposed work represents a sound approach to the investigation of an important scientific or engineering innovation. The proposal must meet all the requirements of the subtopic in Section 8 to which it applies.

A proposal must be self-contained and written with all the care and thoroughness of a scientific paper submitted for publication. It should indicate a thorough knowledge of the current status of research in the subtopic area addressed by the proposal. Each proposal should be checked carefully by the offeror to ensure inclusion of all essential material needed for a complete evaluation. The proposal will be peer reviewed as a scientific paper. All units of measurement should be in the metric system.

The proposal must not only be responsive to the specific NOAA program interests described in Section 8 of the solicitation, but also serve as the basis for technological innovation leading to **new commercial products, processes, or services**. An organization may submit different proposals on different subtopics or different proposals on the same subtopic under this Solicitation. When the proposed innovation applies to more than one subtopic, the offeror must choose that subtopic which is most relevant to the offeror's technical concept.

Proposals principally for the commercialization of proven concepts or for market research shall not be submitted for Phase I funding, since such efforts are considered the responsibility of the private sector.

The proposal should be direct, concise, and informative. Promotional and other material not related to the project shall be omitted.

NOAA will notify the various offerors whether they have been recommended for a potential award within 90 calendar days of the closing date of this solicitation. If selected for potential award and approved by the CO, the offeror can anticipate receiving an actual award within 180 calendar days of the closing date of the solicitation. The offeror shall **not** proceed with work until an official award is received.

### 3.2 Phase I Proposal Limitations

- Page Length - **no more than 26 pages**, consecutively numbered, including the cover page, project summary, main text, references, resumes, other applicable technical enclosures or attachments, and the Proposed Budget (Section 9.3). The only exceptions to the page count limitation are the additional Supplemental Budget Documentation for the Proposed Budget (See Section 9.4 for a more detailed discussion); SBIR Funding Agreement Certification (Form 9.5); SBIR.gov Company Registry documentation (see Section 3.3.2); and those pages necessary to comply with the itemization of prior SBIR Phase II awards, per Section 3.5. No additional attachments, appendices, or references beyond the 26 page limitation shall be considered in the technical proposal evaluation.
- Paper Size - must be standard size (21.6 cm X 27.9 cm; 8 ½" X 11").
- Format - must be easy to read with a font of at least 10 point. Margins should be at least 2.5cm / 0.984".
- Electronic Submission Size – Email submissions, which include email message text and all attachments, must not exceed 20MB in size.
- Electronic Format - All attachments must be compatible with either Adobe Portable Document Format (pdf) or Microsoft Word 2010 (.docx) format.

Supplementary material, revisions, substitutions, audio or video tapes, or other electronic media will **not** be accepted.

Proposals not meeting these requirements will be rejected without further review.

### 3.3 Phase I Proposal Submission Forms and Technical Content

This section includes instructions for completing required forms and writing the Technical Content section. A complete proposal application must include:

**Technical Proposals:** One (1) Adobe Portable Document Format (.pdf) or Microsoft Word 2010 (.docx) compatible electronic file(s) which includes each of the following (not to exceed a total of 26 printed pages):

- (a) Cover Page (required form, see Section 3.3.1 and 9.1)
- (b) Project Summary (required form, see Section 3.3.3 and 9.2)
- (c) Technical Content (up to 22 pages, see Section 3.3.4)
- (d) Proposed Budget (required form, see Section 3.6 and 9.3)

**Supplemental Budget and Other Information:** One (1) Adobe Portable Document Format (.pdf) or Microsoft Word 2010 (.docx) compatible electronic file(s) of each of the following (not counted towards 26 page limit):

- (a) Supplemental Budget documentation (required, see Section 9.4)
- (b) SBIR Funding Agreement Certification (required form, see Section 9.5)
- (c) Screen shot or similar copy of proposers' Company Registry as noted on SBIR.gov website (required, see Section 3.3.2)
- (d) List of prior Phase II awards for proposers awarded more than 15 SBIR Phase II awards in the prior five fiscal years (required, if applicable, but does not count toward the 26 page limit. See Section 3.5).
- (e) Letter from the relevant individual(s) that can commit the offeror to complete the required proposal, if awarded the contract. The letter shall be on the offeror's letterhead, dated, and indicate intent to perform the in accordance with the submitted proposal, if selected.
  - Individual. If the offeror is an individual, the letter shall be signed by that individual. The signature shall be followed by the individual's typed, stamped, or printed name and the words, "an individual doing business as \_\_\_\_\_" [insert firm's name].
  - Partnership. The letter shall provide a list of all partners with authority to bind the partnership shall be provided. The letter will be signed in the partnership name and contain at least one signatory of the partnership's name typed, stamped, or printed.
  - Corporation. The letter shall provide a list of the relevant individuals that have authority to bind the corporation. The letter will be signed in the corporate name followed by the word "by" and the signature and title of the person authorized to sign.

Proposals received missing any of these required items will be rejected without further review. For instructions on proposal submission, see Section 6.2.

### 3.3.1 Proposal Cover Sheet

Complete all items in the "Cover Page" (front and back side) required form and use as page 1 and 2 of the proposal. Ensure that required signatures<sup>3</sup> are included. The government may reject any unsigned offers received. **NO OTHER COVER PAGE WILL BE ACCEPTED.**

If you check the Yes box on #7 of the Cover Sheet, your contact information will be provided to National Institute of Standards and Technology (NIST) Hollings Manufacturing Extension Partnership (MEP). You may be contacted by your local MEP to explore business-related support services that could benefit the potential of the project you proposed.

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<sup>3</sup> Electronic signatures are acceptable if accompanied by a scanned signature. The Electronic signature must be from sources that meet the intent of the E-sign Act such as, but not limited to, Adobe Digital Signature, EchoSign, DocuSign, Citix RightSignature, etc. Otherwise, a scanned hardcopy signature must be provided.

Before NOAA can award a contract to a successful offeror under this solicitation, the offeror must be registered in the System for Award Management (SAM). To register, visit <https://www.sam.gov/portal/public/SAM/> or call 1-866-606-8220. This procurement shall be awarded as a “contract” and not a “grant.” Within SAM.gov, you must complete the Representations and Certifications Section and include the North American Industry Classification System (NAICS) code 541712 with your registration.

The Data Universal Numbering System (DUNS) number is a nine-digit number assigned by Dun and Bradstreet Information Services. If the offeror does not have a DUNS number, it should contact Dun and Bradstreet directly to obtain one. A DUNS number will be provided immediately by telephone at no charge to the offeror. For information on obtaining a DUNS number, the offeror, if located within the United States, should call Dun and Bradstreet at 1-866-705-5711, or access their website at <http://fedgov.dnb.com/webform>.

No award shall be made under this solicitation to a small business concern without proper registration in SAM.

Small Business Concerns may also be able to obtain free to low cost assistance with the SAM.gov website through their local state Procurement Technical Assistance Centers (PTAC). Information can be obtained at <http://www.aptac-us.org>.

Be sure to identify proposal page numbers that contain confidential information in the Proprietary Notice section at the end of the Cover Sheet.

### **3.3.2 Data Collection Requirement**

Each Phase I and Phase II applicant is required to provide information for SBA’s database ([www.SBIR.gov](http://www.SBIR.gov)). The following are examples of the data to be entered by applicants into the database:

- Any business concern or subsidiary established for the commercial application of a product or service for which an SBIR award is made.
- Revenue from the sale of new products or services resulting from the research conducted under each Phase II award.
- Additional investment from any source, other than Phase I or Phase II awards, to further the research and development conducted under each Phase II award.
- Update the information in the database for any prior Phase II award received by the SBC. The SBC may apportion sales or additional investment information relating to more than one Phase II award among those awards, if it notes the apportionment for each award.

Each Phase II awardee is required to update appropriate information on the award in the database upon completion of the last deliverable under the funding agreement and is

requested to voluntarily update the information in the database annually thereafter for a minimum period of 5 years.

### 3.3.3 Project Summary

Complete all sections of the “Project Summary” form and use as page 3 of your proposal. The technical abstract should include a brief description of the problem or opportunity, the innovation, project objective, and technical approach.

In summarizing anticipated results, include technical implications of the approach and the potential commercial applications of the research. **Each awardee’s Project Summary will be published on the NOAA SBIR website and, therefore, must NOT contain proprietary information.**

### 3.3.4 Technical Content

Beginning on page 4 of the proposal, the following sections are required: **(All headings must be included. If a particular section does not apply, please include the heading, followed by N/A)**

- (a) **Identification and Significance of the Problem or Opportunity.** Make a clear statement of the specific research problem, technical problem, or opportunity addressed. Indicate its innovativeness, commercial potential, and why it is important. Show how it applies to one of the specific subtopics in Section 8.
- (b) **Phase I Technical Objectives.** State the specific objectives of the Phase I research or R&D effort, including the technical questions it will try to answer to determine the feasibility of the proposed approach.
- (c) **Phase I Work Plan.** Include a detailed description of the Phase I research or R&D plan. The plan should indicate not only what will be done, *but also* where it will be done and how the research will be carried out. The method(s) planned to achieve each objective or task, mentioned in item (b) above, should be discussed in detail. In most cases, **this section is typically at least one-third of the proposal.**
- (d) **Related Research or R&D.** Describe research or R&D that is directly related to the proposal including any conducted by the principal investigator or by the proposer’s firm. Describe how it relates to the proposed effort, and describe any planned coordination with outside sources. **The purpose of this section is to demonstrate the offeror’s awareness of recent developments in the specific topic.**
- (e) **Key Individuals and Bibliography of Related Work.** Identify key individuals involved in Phase I, including their directly related education, experience, and bibliographic information. Where vitae are extensive, summaries that focus on most relevant

experience or publications are desired and may be necessary to meet proposal size limitation. List all other commitments that key personnel have during the proposed period of contract performance. It is important that these individuals be clearly identified as employed by the offeror. This should match and be reflected in the budget summary (Section 9.3) and supplemental budget (Section 9.4).

- (f) **Relationship with Future R&D.** Discuss the significance of the Phase I effort in providing a foundation for the Phase II R&D effort. Also state the anticipated results of the proposed approach, if Phases I and II of the project are successful.
- (g) **Facilities and Equipment.** The conduct of advanced research may require the use of sophisticated instrumentation or computer facilities. The proposer should provide a detailed description of the availability and location of the facilities and equipment necessary to carry out Phase I. NOAA facilities and/or equipment will be available for use by awardees only if specifically provided for in the subtopic description. All related transportation/shipping/insurance costs shall be the sole responsibility of the contractor. If expressed in the subtopic description that access to NOAA resources will be made available under mutual agreement between awardee and NOAA staff, the contractor shall not make arrangements until after award to visit NOAA labs, exchange or conduct samples testing, and make any collaborative discussions (see Section 1.6).
- (h) **Consultants and Subcontracts.** The purpose of this section is to show NOAA that: (1) research assistance from outside the entity materially benefits the proposed effort, and (2) arrangements for such assistance are in place at the time of proposal submission. It is important that these individuals be clearly identified as consultants or subcontractors. This should match and be reflected in the budget summary (Section 9.3) and supplemental budget section (9.4).

Outside involvement in the project is encouraged where it strengthens the conduct of the research. Outside involvement is not a requirement of this solicitation and is limited to no more than 1/3 of the research and/or analytical effort in Phase I (also see Section 1.5).

- Consultant – A person outside the firm, named in the proposal as contributing to the research, must provide a signed statement confirming his/her availability and role in the project. Additionally, it should document the total amount anticipated with hours and an agreed consulting rate for participation in the project. This statement is part of the page count.
- Subcontract – Similarly, where a subcontract is involved in the research, the subcontracting organization or institution must furnish a letter signed by an appropriate official describing the programmatic arrangements and confirming its agreed participation in the research. This letter is part of the page count. The proposed budget for this participation shall be included in the Supplemental Budget Documentation section and does not contribute to the 26 page count limitation.



No individual or entity may serve as a consultant or subcontractor if they (See Section 1.5):

1. Had any role in developing or reviewing the subtopic; or
2. Have been the recipient of any information on the subtopic not available to the public.
3. Received assistance from DOC in preparing the proposal for this specific solicitation (including any 'informal' reviews) prior to submission.

(i) **Potential Commercial Applications and Follow-on Funding Commitment.**

Describe in detail the commercial potential of the proposed research, how commercialization would be pursued, benefits over present products on the market, and potential use by the Federal Government. Address the following:

- Market opportunity – Describe the current and anticipated target market, the size of the market, and include a brief profile of the potential customer.
- Technology and competition – Describe the competitive landscape, the value proposition and competitive advantage of the product or service enabled by the proposed innovation. Also include what critical milestones must be met to get the product or process to market and the resources required to address the business opportunity.
- Finances – Describe your strategy for financing the innovation.

(j) **Cooperative Research and Development Agreements (CRADA).** State if the applicant is a current CRADA partner with NOAA, or with any other Federal agency, naming the agency, title of the CRADA, and any relationship with the proposed work. An Agency may NOT enter into, nor continue, a CRADA with an awardee on the subtopic of the award.

(k) **Guest Researcher.** State if the offeror or any of its consultants or subcontractors is a guest researcher at NOAA, naming the sponsoring laboratory.

(l) **Cost Sharing.** Cost-sharing is permitted for proposals under this program solicitation; however, cost-sharing is not required. Cost-sharing will not be an evaluation factor in consideration of your Phase I proposal. Explain what cost sharing is being provided in this section.

### 3.4 Similar Proposals or Awards. \*\*\* WARNING \*\*\*

While it is permissible, with proposal notification, to submit identical proposals or proposals containing a significant amount of essentially equivalent work for consideration under numerous Federal program solicitations, **it is unlawful to enter into funding agreements requiring essentially equivalent work.** If there is any question concerning this, it must be disclosed to the soliciting agency or agencies before award.



If an applicant elects to submit identical proposals or proposals containing significant amount of essentially equivalent work under other Federal program solicitations, a statement must be included in each such proposal indicating:

- (a) the name and address of all agencies to which a proposal was submitted or from which awards were received;
- (b) the date of proposal submission or date of award;
- (c) the title, number, and date of solicitation(s) under which a proposal(s) was submitted or award(s) received;
- (d) the specific applicable research topic for each proposal submitted or award received;
- (e) the title of the research project; and
- (f) the name and title of the principal investigator or project manager for each proposal submitted or award received.

If no equivalent proposal is under consideration or equivalent award received, a statement to that effect **must** be included in this section of the technical content area of the proposal and certified within the Cover Page.

### **3.5 Prior SBIR Phase II Awards**

If a small business concern has received more than 15 SBIR Phase II awards from any of the Federal agencies in the prior five (5) fiscal years, it must submit as an attachment to its Phase I proposal the following list of items: name of awarding agency; date of award; funding agreement number; amounts of award; topic or subtopic title; follow-on agreement amount; source and date of commitment; and current commercialization status for each Phase II. The offeror shall document the extent to which it was able to secure Phase III funding to develop concepts resulting from previous Phase II SBIR Awards. **This required information shall not be considered part of the Phase I page count limitation.**

### **3.6 Proposed Budget**

Complete the "NOAA SBIR Proposed Budget" (See Section 9.3) for the Phase I effort and include it as the last page of the technical proposal. Verify the total request is accurate and does **not exceed \$120,000**. Proposals exceeding \$120,000.00 shall be automatically rejected. The Proposed Summary Budget must be signed by the Corporate Official. Some items of the form under Section 9.3 may not apply to every proposal. Additionally, some firms may have different accounting practices for their overhead rates. Offerors should use indirect rates consistent with their own accounting system, even if different from the rate categories shown on the form. These differences should be discussed in the Supplemental

Budget Documentation. Enough information, though, should be provided on the Proposed Budget to allow NOAA to understand how the offeror plans to use the requested funds if the award is considered. A complete cost breakdown should be provided giving direct costs, indirect costs, other direct costs G&A, and profit. The offeror is to submit a cost estimate with detailed information consistent with the offeror's cost accounting system. A reasonable profit will be allowed.

As a reminder in completing the Proposal Budget Summary for Phase I, a minimum of two-thirds of the research and/or analytical effort must be performed by the proposing small business concern. The total cost for all consultant fees, facility leases, usage fees, and other subcontract or purchase agreements may not exceed one-third of the contract price. For Phase II, a minimum of one-half of the research and/or analytical effort must be performed by the proposing small business concern. The total cost for all consultant fees, facility leases, usage fees, and other subcontract or purchase agreements may not exceed one-half of the contract price.

Offerors shall provide additional supplemental budget documentation for the Proposed Budget for the Government's Cost and Pricing Review. ***This Supplemental Budget Documentation shall NOT be utilized for evaluation of the Technical Proposal. Offerors must ensure that all relevant technical information is included within the 26 page technical proposal.*** The Supplemental Budget Documentation does **NOT** count towards the 26 page count requirement. The Supplemental Budget Documentation shall include a cover sheet and be organized and easy to understand. The information should only supplement and help to justify and explain the amounts requested on the Proposed Budget sheet. Additionally, the documentation should indicate any known or anticipated source, quantity, unit price, competition obtained, and basis used to establish source and reasonable costs (e.g. other direct costs, equipment, and travel, etc.).

A more detailed discussion of completing the Proposed Budget and the Supplemental Budget Documentation is provided in Section 9.4.

### **3.7 Multiple Proposals**

Offerors may submit multiple proposals to this solicitation. Offerors should submit separate proposal packages for each topic area they wish to be considered. If offerors have multiple proposals with different methods or deliverables that they wish to propose on the same topic area, a separate proposal package should be provided for each method or deliverable.

### **3.8 Kickoff Meeting**

All Phase I award recipients will be required upon award to travel to the NOAA SBIR Program office in Silver Spring, Maryland to attend a Kickoff Meeting for one day. The official date shall be determined by the government at a later date. This is currently planned to be a full day. Awardees should factor in the cost of this trip for no more than two individuals in the proposed budget. Failure to factor in the travel for this trip could result in additional cost to the awardee.

## 4.0 METHOD OF SELECTION AND EVALUATION CRITERIA

### 4.1 Introduction

All Phase I and II proposals will be evaluated and judged on a competitive basis. **A proposal will not be deemed acceptable if it represents presently available technology.** Proposals will be initially screened to determine responsiveness (See Section 4.2 and 9.7). Proposals passing this initial screening will be technically evaluated by engineers or scientists (reviewers may be NOAA employees or outside of NOAA) to determine the most promising technical and scientific approaches. Each proposal will be judged on its own merit. NOAA is under no obligation to fund any proposal or any specific number of proposals in a given topic. It also may elect to fund several or none of the proposed approaches to the same topic or subtopic.

### 4.2 Phase I Screening Criteria

Phase I proposals that do not satisfy all of the screening criteria shall be rejected without further review and will be eliminated from consideration for award. Rejected proposals may not be resubmitted (with or without revision) under this solicitation. The screening criteria (also see Section 9.7) are:

- (a) The proposing firm must qualify as a small business, in accordance with Section 1.7.14.
- (b) The Phase I proposal must meet **all** of the requirements stated in Section 3.
- (c) The Phase I proposal must be limited to one subtopic and clearly address research for that subtopic.
- (d) Phase I proposal budgets must not exceed \$120,000.
- (e) The project duration for the Phase I feasibility research must not exceed six months.
- (f) The proposing firm must carry out a minimum of two-thirds of expenditures under each Phase I project.
- (g) All work must be performed by the small business concern and its subcontractors in the United States, unless a waiver has been granted in advance by the CO (see Section 1.5).
- (h) The proposal must contain information sufficient to be peer reviewed as research.

### 4.3 Phase I Evaluation and Selection Criteria

Phase I proposals that comply with the screening criteria will go through the following process:

**Step 1:** The proposals will be evaluated by internal NOAA and/or external scientists or engineers via peer review in accordance with the following criteria:

- (1) The technical approach and the anticipated agency and commercial benefits that may be derived from the research (25 points).
- (2) The adequacy of the proposed effort and its relationship to the fulfillment of requirements of the research subtopic (15 points).
- (3) The level of innovation the proposed effort offers to the research subtopic (20 points).
- (4) Consideration of a proposal's commercial potential as evidenced by the SBC's Commercialization Plan (25 points).
- (5) Qualifications of the proposed principal/key investigators, supporting staff, and consultants (15 points).

Technical reviewers will base their rankings on information contained in the proposal. It is assumed that reviewers are not acquainted with any experiments referred to, key individuals, or the firm. No technical clarifications may be made after proposal submission.

**Step 2:** A NOAA-wide selection panel will review the content of the proposals based on the following evaluation factors to develop a final ranking:

- (1) Proposal priority ranking resulting from Step 1.
- (2) Economic impact (e.g., ability of the company to develop a commercially viable product, service or process); number and record of past performance for SBIR and STTR awards; consideration given to companies without previous SBIR awards; existence of outside non-SBIR funding or partnering commitments; and/or the presence of other relevant supporting material contained in the proposal that indicates the commercial potential of the idea (such as letters of support, journal articles, literature, Government publications, etc.).

Final award recommendation decisions will be made by NOAA based upon rankings assigned by the selection panel and consideration of additional factors, **including possible duplication of other research**, the importance of the proposed research as it relates to NOAA needs, and the availability of funding. In the event of a "tie" between proposals, manufacturing-related projects as well as those regarding energy efficiency and renewable energy systems will receive priority in the award selection process. NOAA may elect to fund several or none of the proposals received on a given subtopic. Upon recommendation of a proposal for a Phase I award, NOAA reserves the right to review and negotiate, if necessary, the amount of the award.

#### **4.4 Phase II Evaluation and Selection Criteria**

During the feasibility study project performance period, Phase I awardees will be provided instructions for preparation and submission of Phase II proposals. Phase II proposals that comply with the screening criteria as stated in those instructions will be evaluated by NOAA and external scientists and engineers in accordance with the step 1 and 2 evaluation criteria (see 4.3 above). The Phase II proposal process may require a company presentation in Silver Spring, MD.

Upon selection of a proposal for Phase II award, NOAA reserves the right to review and negotiate, if necessary, the amount of the award. NOAA is not obligated to fund any specific Phase II proposal.

#### **4.5 Release of Proposal Review Information**

Notifications to the various offerors of recommendations of potential selection or non-selection of award that passed the screening criteria will be advised within 90 calendar days of closing of the solicitation. Copies of the technical evaluations shall be provided tentatively 30 days after completion of potential selection or non-selection of award. The identity of the reviewers will not be disclosed.

## 5.0 CONSIDERATIONS

### 5.1 Awards

NOAA will award firm-fixed price contracts to successful offerors for both Phase I and II. A firm-fixed price contract identifies a price that is not subject to any adjustment on the basis of the contractor's cost expenditure in performing the effort. This agreement type places upon the contractor the risk and full responsibility for all costs and resulting profit or loss. It provides maximum incentive for the contractor to control costs and perform effectively and imposes a minimum administrative burden upon both parties. NOAA also does not allow any advance payments to be made on its awards. The firm-fixed price shall be inclusive of all transportation/shipping/insurance costs for government furnished property (if requested in the proposal and accepted by the government) made available for use by awardee and all deliverables/prototypes to be furnished to NOAA.

Contingent upon availability of funds, NOAA currently anticipates making approximately **sixteen (16) to twenty-one (21)** Phase I firm-fixed price contracts of no more than **\$120,000** each. Total performance period shall be no more than six (6) months. Historically, NOAA has funded about ten percent of the Phase I proposals submitted.

Phase II awards shall be for no more than \$400,000. The period of performance to complete Phase II effort will depend upon the scope of the research, but the final report due date must not exceed 24 months (which includes completion of all objectives or tasks in the proposal). Upon completion of the R&D activity, the awardee will have a one year period to pursue and report on their commercialization activities. The total period of performance for Phase II is anticipated to be approximately 36 months (which includes the 12 month commercialization activities).

It is anticipated that **approximately half of the Phase I awardees will receive Phase II awards**, depending upon the availability of funds. To provide for an in-depth review of the Phase I final report and the Phase II proposal and commercialization plan, Phase II awards will be made approximately five months after the completion of Phase I.

For planning purposes, proposers should understand that Phase I awards are tentatively planned for June 2017. Phase II proposals are tentatively due to NOAA in February 2017 and Phase II awards are tentatively planned for July 2017.

**This Solicitation does not obligate NOAA to make any awards under either Phase I or Phase II. Furthermore, NOAA is not responsible for any monies expended by the proposer before award of any contract resulting from this Solicitation.**

### 5.2 Reports

Phase I awardees will be required to submit two progress reports and a final report. Phase I reports are due at 2, 4, and 6 months after award. The final report shall encompass

completion of all the objectives or tasks from the proposal.

Phase II awardees will be required to submit four progress reports, a final report, and a commercialization report. Phase II reports are due at 2, 6, 12, 18, and 24 months, or as to be negotiated on a case by case basis. The commercialization report is due 36 months after award. The payment schedule in paragraph 5.3 is tied to these reports.

Phase I and Phase II progress reports should be brief letter reports and include all technical details regarding the research conducted up to that point in the project and will provide detailed plans for the next stages of the project. The acceptance of each progress report will be contingent upon appropriate alignment with the solicited and proposed milestones. Consideration will be given to changes from the solicited and proposed milestones if results from experimentation warrant a deviation from plan. Inclusion of proprietary information within the progress reports and final report may be necessary in order to effectively communicate progress and gain appropriate consultation from NOAA experts regarding next steps. All such proprietary information will be marked according to instructions provided in Section 5.5.

Final reports submitted under Phase I and Phase II shall include a single-page project summary as the first page, identifying the purpose of the research, and giving a brief description of the research carried out, the research findings or results, and the commercial applications of the research in a final paragraph. The remainder of the report should indicate in detail the research objectives, research work carried out, results obtained, and estimates of technical feasibility.

All final reports must carry an acknowledgement on the cover page such as: *“This material is based upon work supported by the National Oceanic and Atmospheric Administration (NOAA) under contract number \_\_\_\_\_. Any opinions, findings, conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of NOAA.”*

The information provided in the Phase II commercialization update reports will be compiled and used as general statistics to help determine the value of NOAA SBIR Program, educate stakeholders about the outcomes and impact, and attract new entrants.

The Phase II commercialization update report shall include the following:

- a. A description of the company's efforts to further develop, commercialize and derive revenues from the technology resulting from this SBIR award. These may include but are not limited to: customer/potential customer base, overview of marketing and sales strategies, other uses of knowledge gained, partners, licensing, committed resources, market readiness, use of knowledge gained for other projects, manufacturing, and financing strategy. Also discuss difficulties, and barriers to entry.

If work has ended on the project, please provide an explanation as to why (i.e. technical objective not met, existing barriers to entry, could not obtain follow-on funding, technology not economically viable, alternative technology entered the market, or other explanation).



b. Information about any follow-on funding commitment(s) and investments to further the development and/or commercialize the Phase II technology.

If follow-on funding was not obtained, provide possible reasons (i.e. technical objective not met, technology not economically viable, alternative technology entered the market, or other explanation).

c. Details about products and /or processes being developed, used for other projects, or currently in the marketplace resulting from the SBIR project.

d. A list of any patents or published patent applications resulting from the SBIR project.

e. Sales revenue from new products or processes received from the commercialization of this SBIR project include: sales, manufacturing, product licensing, royalties, consulting, contracts, or other.

To help assess the effectiveness of our program in meeting programmatic and SBIR objectives, NOAA may periodically request information from small businesses about progress taken towards commercialization of the technology after the completion of Phase I and II contracts.

### **5.3 Payment Schedule**

If selected for award, the government shall contact the potential awardee to confirm the appropriate amounts tied to the reports in paragraph 5.2. Typically, they have been even amounts for each payment period. The specific payment schedule (including payment amounts) for each award will be incorporated into the resulting contract.

No advance payments will be allowed. To receive an SBIR payment the SBC must re-certify that they remain eligible as SBC to receive funding and have not changed their SBC status or any other terms of condition of initial award.

For Phase II, a total of six payments, in even amounts, are anticipated to coincide with the reports except for the last payment. The sixth payment for \$5,000.00 will be made after the commercialization report is accepted (see Section 5.2). Failure to submit the report within twelve months of the completion of the R&D activity period for Phase II may result in a de-obligation of the \$5,000.00.

### **5.4 Deliverables**

Offers submitted in response to subtopics that require delivery of a prototype should state in the proposal, the plan to develop and deliver the specified prototype. Shipping shall be Freight on Board (F.O.B) Destination which means that the contractor is responsible for all transportation/shipping/insurance costs for deliverables. Notwithstanding the absence of such



an explicit statement in the offeror's proposal, delivery of the developed prototype as called for by the Solicitation subtopic is required for field testing or feasibility testing.

Even though a prototype may be required to be delivered for the project, it is important to note that this prototype is still the property of the offeror. NOAA would only do field or lab testing on that product to determine its potential feasibility in a production (or development) environment.

## **5.5 Innovations, Inventions, and Patents**

### **5.5.1 Proprietary Information**

Information contained in unsuccessful proposals will remain the property of the proposer. Any funded proposal will not be made available to the public, except for the "Project Summary" page.

The inclusion of proprietary information within the proposal is discouraged unless it is absolutely necessary for the proper evaluation. Information contained in unsuccessful proposals will remain the property of the offeror. The Government may, however, retain copies of all proposals. Public release of information in any proposal submitted will be subject to existing statutory and regulatory requirements. If proprietary information is provided by an offeror in a proposal, which constitutes a trade secret, proprietary commercial or financial information, confidential personal information or data affecting the national security, it will be treated in confidence, to the extent permitted by law. This information must be clearly marked by the offeror with the term "confidential proprietary information" and the following legend must appear on the first page of the technical section of the proposal:

"These data shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed in whole or in part for any purpose other than evaluation of this proposal. If a funding agreement is awarded to this offeror as a result of or in connection with the submission of these data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the funding agreement and pursuant to applicable law. This restriction does not limit the Government's right to use information contained in the data if it is obtained from another source without restriction. The data subject to this restriction are contained on pages \_\_\_\_\_ of this proposal."

Any other legend may be unacceptable to the Government and may constitute grounds for removing the proposal from further consideration, without assuming any liability for inadvertent disclosure. The Government will limit dissemination of such information to its employees and, where necessary for evaluation, to outside reviewers on a confidential basis.

Examples of laws that restrict the government to protect confidential/proprietary information about business operations and trade secrets possessed by any company or participant include: Freedom of Information Act (FOIA) – 5. U.S.C. § 552(b); Economic Espionage Act – 18 U.S.C. § 1832; and Trade Secrets Act – 18 U.S. C. § 1905.

In view of the above, proposers are cautioned that proposals are likely to be less competitive if significant details are omitted due to the proposer's reluctance to reveal confidential/proprietary information.

### **5.5.2 Rights in Data Developed under SBIR Contracts**

Except for copyrighted data, the Government shall normally have unlimited rights to data in Phase I, II, or III awards, such as:

- (a) data specifically identified in the SBIR contract to be delivered without restriction;
- (b) form, fit, and function data delivered under the contract;
- (c) data delivered under the contract that constitute manuals or instructions and training material for installation, operation, or routine maintenance and repair of items, components, or processes delivered or furnished for use under the contract; and
- (d) all other data delivered under the contract.

To preserve the SBIR Data Rights of the awardee, the following must be affixed to any submissions of technical data developed under that SBIR award:

#### **SBIR RIGHTS NOTICE (MAY 2014)**

**These SBIR data are furnished with SBIR rights under Contract No. \_\_\_\_\_ (and subcontract \_\_\_\_\_, if appropriate). For a period of 4 years, unless extended in accordance with FAR 27.409(h), after acceptance of all items to be delivered under this contract, the Government will use these data for Government purposes only, and they shall not be disclosed outside the Government (including disclosure for procurement purposes) during such period without permission of the Contractor, except that, subject to the foregoing use and disclosure prohibitions, these data may be disclosed for use by support Contractors. After the protection period, the Government has a paid-up license to use, and to authorize others to use on its behalf, these data for Government purposes, but is relieved of all disclosure prohibitions and assumes no liability for unauthorized use of these data by third parties. This Notice shall be affixed to any reproductions of these data, in whole or in part.**

**(END OF NOTICE)**

The Government's sole obligation with respect to any properly identified SBIR data shall be as set forth in the paragraph above. The four-year period of protection applies for Phases I, II, and III.

### 5.5.3 Copyrights

With prior written permission of the CO, the awardee normally may copyright and publish (consistent with appropriate national security considerations, if any) material developed with Government support. The Government receives a royalty-free license for the Federal Government and requires that each publication contain an appropriate acknowledgement and disclaimer statement.

### 5.5.4 Patents

Small business concerns normally may retain the worldwide patent rights to any invention made with Government support. In such circumstances, the Government receives a royalty-free license for Federal Government use, reserves the right to require the patent holder to license others in certain circumstances, and may require that anyone exclusively licensed to sell the invention in the United States must normally manufacture it domestically. To the extent authorized by 35 U.S.C. 205, the government will not make public any information disclosing a Government-supported invention for a minimum 4-year period (that may be extended by subsequent SBIR funding agreements) to allow the awardee a reasonable time to pursue a patent.

### 5.5.5 Invention Reporting

SBIR awardees must report inventions to the NOAA SBIR Program within two months of the inventor's report to the awardee. The reporting of patents and other patent obligations shall be completed [in](#) accordance with award agreement.

## 5.6 Considerations

Upon award of a funding agreement, the contractor will be required to make certain legal commitments through acceptance of numerous clauses in Phase I funding agreements. The outline that follows is illustrative of the types of clauses to which the contractor would be committed. This list is not a complete list of clauses to be included in Phase I funding agreements, and is not the specific wording of such clauses. Copies of complete terms and conditions are available upon request.

- (a) Standards of Work. Work performed under the contract must conform to high professional standards.
- (b) Inspection. Work performed under the contract is subject to Government inspection and evaluation at all reasonable times.

- (c) Examination of Records. The Comptroller General (or a duly authorized representative) shall have the right to examine pertinent records of the contractor involving transactions related to this contract.
- (d) Default. The Government may terminate the agreement if the contractor fails to perform the work contracted.
- (e) Termination for Convenience. The Government may terminate the contract at any time if it deems termination to be in the best interest, in which case the contractor will be compensated for work performed and for reasonable termination costs.
- (f) Disputes. Any dispute concerning the contract, which cannot be resolved by agreement, shall be decided by the Contracting Officer with right to appeal.
- (g) Contract Work Hours. The contractor cannot require an employee to work more than eight hours a day or 40 hours a week, unless the employee is compensated accordingly (i.e. overtime pay).
- (h) Equal Opportunity. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.
- (i) Affirmative Action for Veterans. The contractor will not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam era.
- (j) Affirmative Action for the Handicapped. The contractor will not discriminate against any employee or applicant for employment because he or she is physically or mentally handicapped.
- (k) Officials Not to Benefit. No Government official shall benefit personally from any SBIR contract.
- (l) Covenant Against Contingent Fees. No person or agency has been employed to solicit or secure the contract upon an understanding for compensation, except bona fide employees or commercial agencies maintained by the contractor for the purpose of securing business.
- (m) Gratuities. The Government may terminate the contract if any gratuity has been offered to any representative of the Government to secure the contract.
- (n) Patent Infringement. The contractor shall report each notice or claim of patent infringement based on the performance of the contract.

- (o) American-Made Equipment and Products. When purchasing either equipment or a product, under the SBIR funding agreement, purchase only American-made items whenever possible.

## 5.7 Additional Information

- (a) Projects. The responsibility for the performance of the principal investigator, and other employees or consultants, who carry out the proposed work, lies with the management of the organization receiving an award.
- (b) Organizational Information. Before award of an SBIR contract, the Government may request the proposer to submit certain organizational, management, personnel, and financial information to assure responsibility of the proposer.
- (c) **Duplicate Awards. If an award is made under this solicitation, the contractor will be required to certify that he or she has not previously been, nor is currently being, paid for essentially equivalent work by any agency of the Federal Government. Severe penalties may result from such actions.**
- (d) **Your firm is required to obtain a Dunn and Bradstreet Number (DUNS) and register in the System for Award Management (SAM) database and complete the Online Representations and Certifications (in order to be eligible to receive a contract award.**
- (e) **In addition, your firm is required to register in the SBIR database ([www.SBIR.gov](http://www.SBIR.gov)) and submit a copy of your firms registration information from the Company Registry.**
- (f) If there is any inconsistency between the information contained herein and the terms of any resulting SBIR contract, the terms of the contract are controlling.
- (g) The Government is not responsible for any monies expended by the offeror before award of any contract.
- (h) NOAA may provide technical assistance to awardees as allowed by legislation.

## 5.8 Technical Assistance for Proposal Preparation and Project Conduct

**National Institute of Standards and Technology (NIST)/Hollings Manufacturing Extension Partnership (MEP):** Proposers may wish to contact the NIST Hollings MEP for manufacturing and other business-related support services. The MEP works with small- and medium-sized companies to help them create and retain jobs, increase profits, and save time and money. The nationwide network provides a variety of services, from business development assistance to innovation strategies to process improvements and the

identification of commercialization opportunities. MEP is a nationwide network of locally managed extension centers with over 1,400 technical experts located in every state. To contact a MEP center, call 1-800-MEP-4MFG (1-800-637-4634) or visit MEP's website at [www.mep.nist.gov](http://www.mep.nist.gov).

**Commercialization Assistance Program (CAP):** NOAA is committed to providing assistance in commercialization planning of products, services or technologies developed Phase II awardees under the SBIR program. The NOAA Commercialization Assistance Program (CAP) is a program which can assist in the successful commercialization of these products, services or technologies developed in association with the DOC NOAA SBIR Program. The NOAA CAP may cover assistance in such areas as assessing small business commercialization needs; planning, developing, and assisting in the preparation of a Phase II commercialization plan; identifying markets and developing entry strategies; and helping determine key requirements and traits for market viable products or services.

The CAP is a mentoring and training program that includes one-on-one business counseling organized around topics that will contribute to the development of a strategic action plan, business plan, or a licensing or go-to-market strategy. Additionally, the CAP seeks to provide robust strategic and technical assistance to program participants seeking to commercialize their SBIR products initially funded by the NOAA SBIR Program.

NOAA has set aside the maximum legislatively allowed amount of funds available for CAP assistance for Phase II awardees interested in this assistance. The SBIR Phase II awardee has the option to not participate in this assistance effort that is available to them.

More information on the CAP Program will be provided in the Phase II proposal preparation instructions sent to each Phase I awardee.

Proposers may also contact independent state, regional, or area specific resources, for example, economic development agencies for additional assistance and resources.

## 6.0 SUBMISSION OF PROPOSALS

### 6.1 Deadline for Proposals and Modifications

**Deadline for Phase I proposal submission to the NOAA SBIR Program Office is 4:00 p.m. (Eastern Standard Time) on January 25, 2017. All submissions must be sent electronically via email. Specific instructions located in Section 6.2 below.**

Offerors are responsible for submitting proposals that adhere to the requirements of the solicitation (see Section 9.7 NOAA/SBIR Checklist) so as to reach the government office by the time specified in the solicitation.

**Any proposal that is received after the exact time specified for receipt of proposals is “late” and will not be considered. It is the offeror’s responsibility, when transmitting its proposal electronically, to ensure the proposal’s timely delivery by transmitting the proposal sufficiently in advance of the time set for receipt of proposals to allow timely receipt by the agency.**

**Late proposals and their modifications that are not considered shall be held unopened, except for identification, until after award and then shall be retained with other unsuccessful proposals.**

Modifications to proposals may be submitted at any time **before** the solicitation closing date and time, which includes responses to an amendment or correcting a mistake. For modifications, the offeror shall provide a completely revised proposal (Technical Proposal and Supplemental Budget and Other Information per Section 3.3) with a cover letter indicating that it is replacing a previously submitted proposal. The government will not swap partial files from a previously submitted version. A late modification of an otherwise successful proposal that makes its terms more favorable to the Government will be considered at any time it is received and may be accepted. Revised proposals may only be submitted when requested or allowed by the CO. Proposals may be withdrawn at any time before award. Withdrawals are effective upon receipt of notice by the CO.

**Letters of instruction will be sent to Phase I awardees (e.g. completed Phase I within the required time frame) to submit Phase II proposals. The Phase II proposals are due after receipt of the Phase I Final Report, approximately eight months after commencement of the Phase I contract.**

Offerors are cautioned of unforeseen delays that can cause late arrival of proposals at NOAA, resulting in them not being included in the evaluation procedures. No information on the status of proposals under scientific/technical evaluation will be available until formal notification is made.



## 6.2 Proposal Submission

**The technical proposal and supplemental budget information must be submitted electronically via email to [NOAA.SBIR@noaa.gov](mailto:NOAA.SBIR@noaa.gov).** Submission to any other address is not acceptable. This email address is ONLY for submission of proposals. Questions regarding the solicitation shall be forwarded to the contracting officer, and they shall not be submitted to this email address.

When emailing your proposal, the contractor shall follow these instructions:

- Subject line shall contain “FY2017-1 NOAA SBIR- Subtopic 8.xxx : Company Name”
  - Where xxx is the subtopic number (ex. 8.2.2F)
  - If multiple emails are required (in order to stay under 20 Megabytes), the contractor shall include after company name an annotation similar to “Email 1 of 2”, etc.
- All submissions are due no later than 4:00 pm EST on January 25, 2017. Please keep in mind that bigger email files may take time to reach our email servers, so you should plan accordingly. It is the contractor’s responsibility to ensure that the proposal and other supplemental information is received on time.
- Limit on email size (which includes mail text and all attachments) is 20 Megabytes (MB)
- All attachments must be in Adobe Portable Document Format (.pdf) or Microsoft Word 2010 (.docx) compatible format.
- Acknowledgment of receipt of the emailed proposal submission by the NOAA will be made. All correspondence relating to proposals must cite the specific **proposal number** identified in the acknowledgment.
  - This acknowledgement receipt will be sent via email to the address of the sender/offeree of the proposal
  - It is anticipated that all acknowledgment receipt notifications will be sent out no more than ten business days after close of this solicitation.
- Modifications - If the offeror needs to submit a modification to their proposal, they can do so, but it must follow these specific instructions:
  - Subject line should contain same info as requirement above, but with a prefix of the word “Modification” (ex. “Modification – FY2017-1 NOAA SBIR – Subtopic 8.2.2F : ACME Inc”)
  - Must be submitted by the deadline.
  - Must contain a full proposal submission (complete technical proposal and supplemental budget and other information). If only updates or changes are submitted, it will not be accepted as it will be considered an incomplete proposal.

To be considered a complete proposal, the application must include:

**Technical Proposals:** One electronic copy of the following (totaling a maximum of 26 pages):

- (a) Cover Page ( required form see Section 3.3.1 and 9.1)
- (b) Project Summary (required form, see Section 3.3.3 and 9.2)



- (c) Technical Content (up to 22 printed pages, see Section 3.3.4)
- (d) Proposed Budget (required form, see Section 3.6 and 9.3)

**Supplemental Budget and Other Information:** One electronic copy of the following (not counted towards the 26 page limit):

- (a) Supplemental Budget documentation (required, see Section 9.4)
- (b) SBIR Funding Agreement Certification (required form, see Section 9.5)
- (c) Screen shot or similar copy of proposers' Company Registry as noted on SBIR.gov website (required, see Section 3.3.2)
- (d) List of prior Phase II awards for proposers awarded more than 15 SBIR Phase II awards in the prior five fiscal years (required, if applicable, but not included in the 26 page limit. See Section 3.5)
- (e) Letter from the relevant individual(s) that can commit the offeror to complete the required proposal, if awarded the contract. The letter shall be on the offeror's letterhead, dated, and indicate intent to perform the in accordance with the submitted proposal, if selected.
  - Individual. If the offeror is an individual, the letter shall be signed by that individual. The signature shall be followed by the individual's typed, stamped, or printed name and the words, "an individual doing business as \_\_\_\_\_" [insert firm's name].
  - Partnership. The letter shall provide a list of all partners with authority to bind the partnership shall be provided. The letter will be signed in the partnership name and contain at least one signatory of the partnership's name typed, stamped, or printed.
  - Corporation. The letter shall provide a list of the relevant individuals that have authority to bind the corporation. The letter will be signed in the corporate name followed by the word "by" and the signature and title of the person authorized to sign.

Proposals in response to this solicitation shall be valid for a period of 240 calendar days after the closing date of the solicitation.

### 6.3 Warning

**While it is permissible, with proper notification to NOAA, to submit identical or essentially equivalent proposals for consideration under numerous Federal program solicitations, it is unlawful to enter into contracts requiring essentially equivalent effort. Offeror, if awarded, will be required at the time of the award and during the term of the award up to final payment to certify that essentially equivalent work is not being performed under funding agreements from any other federal agencies. If there is any question concerning this, it must be disclosed to the soliciting agency or agencies before award.**

## 7.0 SCIENTIFIC AND TECHNICAL INFORMATION SOURCES

## 7.1 General Information

The following web pages may be sources for additional technical information:

<http://www.noaa.gov>  
<http://techpartnerships.noaa.gov/>  
<http://www.lib.noaa.gov>

## 7.2 Oceanic and Atmospheric Science

- For more information on the Topic areas, please go to the NOAA Research Council page, specifically the Strategic Research Guidance Memo (SRGM). Link to the NOAA Research Council page is <http://nrc.noaa.gov/>
- Direct link to the SRGM that describes the Topic areas is located at:  
<http://nrc.noaa.gov/CouncilProducts/StrategicResearchGuidanceMemorandum.aspx>
- If there are any whitepapers called out by the subtopic write-up, it should have the sources right in those sections.

## 7.3 SBIR National Conferences

### **Federal R&D Opportunities for Technology Intensive Firms**

Marketing Opportunities for R&D and Technology Projects with Federal Agencies and Major Corporations.

Techniques and Strategies for Commercializing R&D through Venture Capital, Joint Ventures, Partnering, Subcontracts, Licensing, and International Markets.

Management Seminars in Marketing and Business Planning.

Working with Academia and the States.

Agency and company exhibits and/or One-on-One tables will be open for networking opportunities for all attendees!

For further information on dates and times of upcoming conferences, see the SBIR Homepage and go to the EVENTS section: [www.sbir.gov](http://www.sbir.gov)

## 8.0 RESEARCH TOPICS

### 8.1 TOPIC: Integrated Earth System Processes and Predictions

#### 8.1.1 SUBTOPIC: Improved Modeling for Aquaculture Site Selection, Evaluation, and Permitting

##### Summary:

Create/develop ways to add improved resolution, usability or functionality to new or existing models and/or develop “modules” for existing models that are specific to established aquaculture species that predict impacts of aquaculture on the ocean environment. These applications should be directed to site selection and to evaluation of environmental assessments that are part of the permitting process for new aquaculture operations. Targeted market is regulators who need tools which provide actionable science based information to make yes or no decisions on all aspects of marine aquaculture. Tools should be: 1) science-based and verified to be credible and defensible, 2) simple to be used by non-scientists, and 3) transparent to be trusted.

##### Project Goals

Currently, a number of very powerful and accurate models exist to help evaluate potential sites for new or expanding marine aquaculture installations. Whether an individual or company is expanding an existing operation or seeking to obtain a permit to install a new operation, they are always required to provide very specific information on potential impacts and conflicts that may arise as a result of their proposed work. While the models that generate that information work well, they are very complicated to run, requiring highly trained specialists to gather data, input the data into the model, and to interpret the results once the model has been run. If modules could be developed that would allow for certain subsets of “background data” to be pre-programmed, the time and labor required to complete a model run could be substantially decreased. For example, modules could be designed for specific regions or species that would allow modelling technicians to focus on other variables. Modelers would be free to take on more clients, and the clients themselves would not be charged as much for the service.

#### 8.1.2 SUBTOPIC: Robust Field-Deployable measurements of Aerosol Composition

##### Summary

Clouds and aerosols contribute the largest uncertainty to estimates and interpretations of the Earth’s changing energy budget. Atmospheric aerosol particles may be caused by natural or anthropogenic sources and may form either from emissions of primary particulates or through formation of secondary particulates from gaseous precursors. Knowledge of the composition of

aerosol particles is an important factor in understanding their impact on cloud formation or the radiation budget, and ultimate climate effects. Long-term measurements of aerosol composition, in concert with measurement of other key atmospheric, aerosol, and cloud parameters, are critical to improving the understanding and numerical modeling of aerosol and cloud formation processes. Major aerosol components of interest include secondary inorganic sulfate and nitrate compounds, mineral dust and sea spray, and carbonaceous material, which is typically a complex mix of oxidized organic material with a minor component of refractory “black carbon”. The latter material is so named because it is highly optically absorbing and, therefore, the major aerosol component with a tendency toward atmospheric heating.

Aerosol chemical composition is historically measured using a variety of techniques, typically more than one analytical method being required to measure all components efficiently. While many research-grade instruments are used for short-term studies involving intensive field campaigns, issues of cost, manpower, and durability limit the methods available for long-term continuous measurements of aerosol composition. Most long term networks use filter-based samplers to collect (typically 24 hr.) time-integrated samples followed by offline chemical analysis. This strategy allows relatively simple unattended and robust field operation suitable for unattended sites while allowing state of the art analytical techniques even when the samples are acquired at remote locations. It also allows minimization of the field portion of the operating costs, but requires considerable operational costs to maintain the analytical infrastructure. A further tradeoff is that bulk samples allow typically low detection limits at the expense of time resolution.

While existing technologies can measure atmospheric properties of interest under ideal conditions, technological innovations and improvements are required to develop instrumentation that is more robust and automated for long-term deployment at field sites and that has lower weight and power requirements for deployment at remote field sites with limited power.

### Project Goals

New measurement technology is sought to develop or improve present instruments using current measurement principles in order to allow long-term, continuous measurements of key atmospheric aerosol components listed above [black carbon (BC), non-refractory organics (commonly called OA), nitrate, sulfate, ammonium, mineral dust and at certain sites sea salt].

Measurements need to be autonomous or semi-autonomous with operations, calibrations and maintenance routinely conducted by general instrument technicians rather than experts in aerosol instrumentation. While prototype systems need not be immediately able to operate in autonomous mode, such operation should be anticipated or at least compatible with the system design and operating principle. Other desirable characteristics of robust field deployable systems include:

- Size: standard rack-mountable instrument or smaller.
- Power: ideally able to be powered from a variety of different international power supplies, e.g. 50 or 60 Hz, 110 or 220 V.

- Shipping: custom shipping container or recommended procedure for protecting the instrument when shipping internationally.
- Routine Operations
  - Low level of daily maintenance required to ensure high data quality.
  - Low level of training required for continuous measurements at remote field site locations.
- Calibrations: as automated as possible so that a high level of scientific expertise is not required to maintain the instrument at the field site to ensure high quality data. Some examples include, but are not limited to:
  - Automated valve switching for the routine sampling of a calibrant that does not require any manual switching from ambient sampling lines
  - Calibrations that a general technician can be trained to do routinely and do not require scientific expertise.
  - If solutions are required, that they are prepared autonomously and do not require wet chemistry skills/labor to be done in the field, e.g. the preparation of high precision chemical standards.
- Maintenance and Serviceability: spare parts and consumables are easy (not time-consuming) to procure, store, and ship to remote locations. For example, limited use for spares that require special offline upkeep, storage or shipping requirements (e.g., hazardous chemicals and/or radioactive materials).

Applicants should specify the proposed analytes, and document anticipated performance characteristics that represent improvements over other available techniques. Applicants should specifically address expected requirements for maintenance and calibration. Detection limits should be appropriate to the analytes, but adequate to measure expected fractions of ambient aerosols at relatively clean ( $< 5 \mu\text{g}/\text{m}^3$  average) locations. Applicants must provide convincing documentation (experimental data, calculations, and simulation as appropriate) to show that the sensing method is both sensitive (i.e., low detection limit), precise, and highly selective to the target analyte(s), (i.e., free of anticipated physical/chemical/biological interferences). Approaches that leave significant doubt regarding sensor functionality for realistic multi-component aerosol samples and realistic field conditions will not be considered.

### **8.1.3 SUBTOPIC: A robust HCl detector to characterize global halogen cycles**

#### Summary

Chemical cycling of halogens, particularly chlorine, has a profound effect on Earth's atmosphere. Chlorine cycles are responsible for stratospheric ozone depletion and the ozone hole, and they have a potentially important but poorly quantified effect on tropospheric ozone. Recent research has shown that chlorine cycling is widespread in the lower atmosphere and may be tightly coupled to anthropogenic nitrogen oxide (NO<sub>x</sub>) emissions and other components of air pollution. These cycles are ubiquitous, but especially prevalent in coastal cities such as Los Angeles, Houston, New York and megacities of Europe and Asia due to the

interaction of air pollution with chloride from sea salt. These cycles impact regional air quality and global climate through their influence on tropospheric ozone and oxidative processes.

Hydrogen chloride, HCl, is the major reservoir for atmospheric reactive chlorine and a key indicator for these atmospheric chemical cycles. Reliable measurements of this compound remain extremely limited. It is readily measured by wet chemistry, mass spectrometry and optical spectroscopy. Each of these methods has advantages and disadvantages. Wet chemical sampling is a very well characterized approach, but it can suffer from slow time response and cumbersome, offline analysis methods. Recent advances in mass spectrometry have made it a fast response, high precision option for HCl, but such instrumentation tends to be high in cost and can have significant weight, power and consumable gas requirements. Optical spectroscopy is robust and lightweight, but typically not as sensitive as other methods, such that it may lack the required precision for characterization of ambient HCl levels.

### Project Goals

The goal of this solicitation is to develop an accurate, high precision, fast response, lightweight, low power consumption gas-phase HCl sensor suitable for use in intensive field investigations in atmospheric chemistry, including deployment on research aircraft. Desired specifications would include a limit of detection of 50 parts per trillion or better with an integration time of 1 second and an inlet response time faster than 5 seconds for this sticky trace gas. The desired measurement accuracy is at least 10%, though higher accuracy is likely achievable. The instrument should be small enough to be packaged into a standard, 19" rack mountable footprint, with a weight not more than 50 kg. Power consumption should not exceed 500 watts if possible. Lower power consumption would be desirable. The instrument should be capable of deployment both for intensive field campaigns and longer-term, ground or ship based measurements during which it would be largely autonomous for periods of days to weeks.

## **8.1.4 SUBTOPIC: Data assimilation tool for improving NOAA operational forecasting systems**

### Summary

NOAA has been developing operational forecasting systems for the US coastal and the Great lakes regions since 1990s. The latest coastal operational forecast systems applied three-dimensional, high-resolution community ocean models to provide short-term forecast guidance of water levels, currents, temperature, and salinity. A critical challenge for the development and implementation of any 3-D predictive environmental model is the intelligent integration of observational assets.

In-situ measurements of water levels, currents and temperatures have been routinely used for model initialization, validation and verification, but rarely get assimilated into model simulations to reduce errors and improve short-term forecasts. Data assimilation is a necessary aspect of

any operational forecast system whereby observations are combined with a background forecast and their respective error statistics to provide an improved analysis. Three-dimensional variational assimilation (3DVAR) is recognized as a reliable, computational efficient data assimilation algorithm with flexibility to assimilate observations from both in situ and remotely sensed data.

This subtopic solicit proposals to develop an innovative data assimilative tool that is capable of handling model backgrounds from model grid as well as a variety of observation types to improve the accuracy of the NOAA OFS forecasts and reanalysis. Especially the data assimilation tool should be able to 1) incorporate various observation datasets into existing NOAA operational forecasting systems, 2) computationally efficient with a user friendly interface, 3) demonstrate improvement over unassimilated simulations.

### Project Goals

Improved water levels, currents and temperatures forecasts from NOAA coastal operational forecasting systems (OFS).

## **8.2 TOPIC: Environmental Observations: Observing Systems Optimization**

### **8.2.1 SUBTOPIC: Mobile coastal monitor**

#### Summary

There is a plethora of autonomous marine vehicles, primarily measuring physical – chemical parameters, e.g. salinity, temperature, currents, etc. of ocean basins and providing subsurface data, such as vertical profiles. We are seeking development of an autonomous mobile surface coastal monitor that uses “green” power source(s), has a modular component capability (plug and play) to address multiple applications, such as NOAA’s five line offices and other agencies missions, and provides calibration / validation for NOAA and other optical satellite sensors.

#### Project Goals

The coastal zone, where the terrestrial and oceanic interactions occur, off shore to approximately the 12 mile jurisdiction region, has become a focus area for many of the concerns of NOAA and other environmental and security agencies, academia as well as industry. This broad region covers both littoral as well as pelagic applications of benthos and fisheries. Weather and climate issues within the coastal regions are also of concern. There is an inadequacy of data for many coastal regions, as oceanographic endeavors are conducted further out to sea. Many of the sampling / measurements, e.g. health monitoring, is being conducted at the shoreline. Thus there is a gap between “blue water” and shoreline that can be largely solved by mobile coastal monitoring systems.

Having a routine monitoring system that can be quickly configured for specific application(s) will provide much needed data for management decision makers. For example, a chemical



spill could be mapped by adding a chemical sniffer sensor module to the mobile coastal monitor subsystem compartment(s), especially where unsafe conditions exist. Some examples of the “plug and play” type of modular component applications for NOAA are, National Marine Fisheries Service (NMFS) may want to employ an acoustic / camera subsystem for certain fish stock assessments using a quiet, small platform. National Weather Service (NWS) may want to know more exact winds and air sea data a mobile coastal monitor could provide. NOS may want chemical sniffers or detailed current measurements that could be other modular subsystem(s) on the platform. An example of routine subsystem would be a calibration / validation for the increasing armada of space borne platform sensors increasingly being used for coastal processes, critical for NESDIS product development. The modular design for subsystems would provide OAR capabilities to design new research capabilities. Developing “plug and play” modular application subsystems is not part of this SBIR, however scoping examples for the platform is desired and developing a subsystem for calibration / validation of optical remote sensing assets is to be designed and demonstrated. Additional possible sensor or modular components are for such measurements as turbidity, nutrients, radioactive and seismic determinations. Optical measurements, both for water and sky, are the calibration / validation category of measurements that are needed to be designed as a component of the mobile platform. Water column profiles and horizontal profiles would be other options available on the mobile device. Additionally it should have a docking station which allows for a “buoy-like” capability, where propulsion energy could be diverted to batteries and allows for ease of access via boat. Diurnal applications can be conducted as well as vertical profiles of optional measurements and/or sampling. A tethered system should be an option for the mobile coastal monitor.

The platform should have data communications, collision avoidance, beacon, GPS, and whenever possible designed for ease of maintenance and retrieval.

### **8.2.2 SUBTOPIC: Flow cytometry for aquatic single-particle optical properties**

#### Summary

Knowledge on hydrological and atmospheric optical properties provides the foundation for interpretation of satellite ocean color data. The light absorption and scattering coefficients of suspended particles are essential optical properties of natural waters. So far, almost all technologies on determination of these properties were designed to measure particulate samples in bulk. No method or instrument provides a capability to characterize the optical properties of individual particles other than the one introduced by Iturriaga et al. (1988). However, this method requires fixation of particles onto a microscope slide and manual operations during measurement, which are tedious and impossible to implement in an automated fashion. The concept of flow cytometry allows automated examination of individual particles one at a time and there have been many successful applications of this approach in oceanographic research. However, no flow cytometric instruments have been able to quantify the light absorption and scattering cross sections of single particles. Such a technological gap



has limited our ability to characterize optical properties of natural waters, often leading to oversimplifications in inverse optical models that are critical for analyzing satellite data.

### Project Goals

Optical characterization of natural waters using satellite imagery is necessary for accurate marine and fresh water quality forecasts. NOAA has an unmet need in field optical observations of aquatic suspended particles which would support modeling efforts to interpret ocean color satellite data.

NOAA is requesting proposals for a novel instrument that combines flow cytometric and microphotometric methods for determination of single-particle optical properties. As a minimum requirement, the instrument should be able to determine single-particle light absorption and backscattering cross sections at multiple visible wavelengths for particles commonly found in natural waters, such as phytoplankton cells, organic detritus, and minerals. Particles should be measured in the most undisturbed state possible; so no pretreatment should be applied on them before conducting optical measurements. Ideally, the following features are also desirable to have:

- Hyperspectral resolution;
- Wide spectral range from near UV through near IR;
- A wide size range, ~0.5 – 100  $\mu\text{m}$ ;
- Address elongated particles such as *Pseudo-nitzschia* cells;
- Fluorescence-activated cell sorting and collecting for subsequent analysis.

## **8.2.3 SUBTOPIC: Dart Improvement for Tagging Cetaceans**

### Summary

In order to effectively manage protected species such as endangered or depleted cetacean populations, we require detailed knowledge of their broad-scale habitat use, movements, and migration patterns, as well how they are affected by environmental factors and anthropogenic activities. In order to address this problem, researchers are increasingly turning to electronic tagging technology in order to track animals and provide data needed in stock assessments (Sheridan et al., 2007). Until the last decade, medium-sized cetaceans, including many of the toothed whales, could not be tagged because they were either too large to capture safely for direct application of electronic tags, or because they were considered too small to tolerate the recent generation of implantable satellite tags that penetrate more than 20 cm into tissue (e.g. Mate et al. 2007). Darts for tagging cetaceans have been developed and used during the last decade; however there is a high loss of tags from the dart detachments. Thus there is a need to redesign and commercialize a dart attachment system for improved tag retention for better tag attachment duration. This should also minimize potential impacts on their study species.

### Project Goals

There is a need to design, test, and make commercially available a dart that improves the retention of satellite tag used for tracking cetacean movements, thereby decreasing the chance of any dart breakage, while retaining or improving existing performance.

#### **8.2.4 SUBTOPIC: Single-Mast High-Frequency Radar Antenna (Long Range)**

##### Summary

The U.S. Integrated Ocean Observing System (IOOS) operates the nation's only high-frequency radar network that provides real-time information on the speed and direction of surface currents. This system supports search and rescue operations, response to oil spills, port navigation, monitoring and tracking harmful algal blooms, and understanding oceanographic phenomena such as the warm water mass off of the west coast. Research is underway to explore other uses of this technology, including application for national security, tsunami detection, and monitoring significant wave heights. The system currently consists of about 140 radars in nearly every coastal state as well as Puerto Rico. [1]

Approximately 1/3 of the radars in the network are considered "long-range (LR)", that is, achieving usable surface current data from distances of at least 150 km from the radar's location. Most of these radars operate in the 4-5 MHz band but four of them operate in the 8-9 MHz band.

Because of the 2012 ITU findings for oceanographic radar spectrum usage, the 8-9 MHz band will not be available for operational use when the USA fully implements the ITU spectrum recommendations. Hence, our need is for radars in the 4-5 MHz band only.

While the LR stations provide the greatest coverage and farthest measurement range, they are also more difficult for establishing sites because the separation required between transmit and receive antennas at the lower High Frequency (HF) band is 50+ meters. This precludes mounting of antennas on most storm-hardened structures near the coast and limiting antenna installations to ground mounts only. A reduced antenna footprint would allow for placement on existing resilient stations like NOAA Sentinels, where available, or other hardened, fixed structures like concrete buildings and parking structures. As real estate at the coast becomes scarcer, this smaller-footprint antenna would also expand the number of potential sites for deployment of HF radars for the IOOS network. Sentinels, water level observing stations operated by National Ocean Service (NOS) Center for Operational Oceanographic Products and Services (CO-OPS), have been strengthened to deliver real-time storm tide data during severe coastal events [2]. These stations are single-pile structures with square platforms 10 feet to a side mounted 25 – 32 feet above mean water level and are designed to withstand category 4 hurricanes. With such a small space on Sentinel and other coastal/offshore platforms, it is not currently possible to install a LR HF radar system requiring separated transmit and receive antennas. A single-mast transmit and receive antenna mounted on a Sentinel or on top of a concrete structure, could provide surface currents throughout the approach and landfall of a storm with significantly more protection from damage or loss.

## Project Goals

Design and develop a prototype of a combined transmit and receive HF radar antenna for ocean surface current mapping that could be mounted on fixed structures including Sentinel stations and other nearshore, or onshore, platforms. Considerations for mounting the antenna on Sentinels stations and other small footprint platforms would include: impact on existing equipment already installed (for the Sentinel platform), and power requirements for the small-footprint system.

### **8.2.5 SUBTOPIC: Seabed settling detection and measurement technique**

#### Summary

Deployment of oceanographic sensor packages to the seabed using the variety of platforms (e.g., landers, bottom mounts, benthic frames...) and methods (e.g., free falling, ROV placement, winch deposit...) is common practice for a variety of measurement applications. Currently, all commonly used seabed platforms lack the capability to detect and measure a time series sinking and settling rate while on the seabed. Whatever the reason for placement of the instrument onto the seabed, a box core study of nematodes, a geochemist using electrodes to measure diagenesis or oceanographers using pressure sensors to detect water level changes, the disposition (settling, sinking, or neither) of the seabed platform is most times guess work, while often vertical position of the platform relative to a land based reference frame is of critical importance. We have in the past used different methods such as using resistivity sensors to detect changes in the sediment water interface, using small capillary core tubes to estimate depth of penetration, or marking the side of the bottom mount to determine sinking depth. However, these techniques alone do not provide the need precision, accuracy or rate of settling. This proposed project is to develop an automated sensor to detect, measure, and record times series of settling rates for seabed platforms over the duration of their deployment.

#### Project Goals

There is currently no automated measurement system that we are aware of that can achieve what we have proposed. This project will look at various methodologies and technologies to develop a commercially available sensor for measuring sinking and settling rate time series for seabed platforms.

## **8.2.6 SUBTOPIC: Smartphone App for Marine Weather Observations**

### Summary

Social media is increasingly being used to report weather information in real time. This has been the case recently over land areas. Unfortunately, at this time, information of this nature from the marine community tends to be rare. While some sailors will log their weather information while on a cruise, they are not shared with forecasters, model developers, or fellow sailors. The general lack of marine weather observations makes it challenging for NOAA marine weather forecasters to maintain situational awareness or to validate forecasts and conditions. The general lack of information also makes it difficult for developers to validate the quality of the wind, wave, freezing spray, and ice guidance that they make available to mariners and forecasters.

Smartphone technology makes it possible to report geo-located and time-stamped marine weather information (including such parameters and wind, wave, ice accretion, visibility, and present weather) along with pictures to populate databases and to display them on social media. It is feasible that the information could be shared in real time while mariners are within cell coverage and after a mariner returns to port from a cruise or sailing. Information shared with forecasters and developers could be provided in the form of a database that is updated in real time.

### Project Goals

Real time or post cruise marine weather observations (geolocated and time stamped along with pictures) would address several needs of NOAA marine weather forecasters, NOAA ocean and weather model and technique developers, and nearby mariners. These include

- Increasing situational awareness of NOAA marine weather forecasters who have responsibility over the coastal and inland waters zones.
- Provide near real time weather information to nearby mariners who are monitoring social media.
- Provide feedback to NOAA forecasters and model developers on the quality of their forecasts and guidance.

## **8.2.7 SUBTOPIC: Advanced analysis software for new-generation gas chromatographs and mass spectrometers**

### Summary

Gas chromatography (GC) and mass spectrometry (MS) are two of the most common environmental analytical techniques utilized by research laboratories around the world. NOAA deploys an array of GC- and MS-based instruments to monitor the composition of Earth's

atmosphere for long-lived climate relevant gases and shorter-lived gases that may degrade local air quality. Many new mass spectrometric detectors, both custom-built and commercially available, are to accurately identify and quantify an ever-growing suite of environmental contaminants. Recent advances in GC and MS hardware development, especially the advent of high mass resolution time-of-flight (TOF) detectors, has outpaced the capabilities of the available analysis software needed to turn the resulting wealth of multidimensional TOF data into useful information. The majority of the commercially available software is proprietary to specific instrument manufacturers and does not allow for the required flexibility of working on an array of mass spectrometers. Standard chromatographic software typically relies on basic peak-integration techniques (e.g., dropping baselines); however, peak-fitting (i.e., mathematically solving for individual peak shapes and areas) provides largely untapped information aiding in peak identification and better quality control. New peak-fitting software is critical for both well-established and novel GC and MS techniques and is required to fully exploit the flood of data generated by these state-of-the art instruments. Currently, the lack of sophisticated software is the largest “bottleneck” for researchers handicapped by analysis tools developed for an earlier generation of instruments.

### Project Goals

There is a pressing need for a stand-alone, highly automated, and flexible software tool to fully analyze, digest, and interpret the vast amount of data collected by modern GC and MS instruments as quickly and accurately as possible. The proposed software should specifically address the following criteria:

- The new analysis software must be compatible with an array of mass spectrometers, including but not limited to high mass resolution TOF-MS detectors, in a customizable and user-friendly interface. The peak-fitting software must be compatible with multiple file types, including \*.hdf from TOF-MS instruments and \*.cdf from quadrupole-MS instruments run in both total ion mode (full mass scans) and selected ion mode (discontinuous mass signals). The ability to ingest files natively is highly desired. The program must also be compatible with previously collected data allowing for older datasets to be re-analyzed.
- The software must utilize (i) peak-fitting algorithms for a variety of peak shapes including asymmetric peaks as well as (ii) standard peak-integration protocols. All fit parameters and variables for individual peaks should be (i) customizable, (ii) readily accessible for quality control purposes, (iii) exportable by the user for more detailed analysis, (iv) easily archived or accessed at a later date by a different user, and (v) efficiently use standard computing power such that it can run on a standard laptop (Mac and PC platforms).
- The software must be able to efficiently and accurately analyze large quantities of highly complex and variable environmental samples collected by field-deployed instruments that are operated under non-ideal (e.g., condition-controlled) settings. The analysis program must be able to accurately deal with retention-time shifts ( $\pm 20$  seconds), sloping baselines, multiple co-eluting peaks, and identify “new” peaks of which the operator may be unaware. An idealized workflow includes the ability to (i) fit a single peak in a large batch (e.g., 1000’s of files), (ii) to fit all peaks (e.g., 100+ peaks) in a

single file, (iii) analyze sub-sets of much larger datasets by sample type (e.g., calibrations, zeros, blanks, ambient samples, etc.), (iv) scan chromatograms for new peaks and identify these species, and (v) produce final concentration data for instruments with linear and non-linear sensitivities.

### **8.2.8 SUBTOPIC: Maritime and Arctic Observations (MAS) with Unmanned Aircraft System (UAS)**

#### Summary

The Office of Oceanic & Atmospheric Research (OAR) in support of NOAA's science mission across the line offices has a federal mandate to understand and predict changes in climate, weather, oceans and coasts and to conserve and manage coastal marine ecosystems and resources. The NOAA UAS Program has examined the use of state-of-the-art unmanned systems technologies to survey the most remote and dangerous parts of the world including oceanic and Arctic environments.

Recently, the Papahānaumokuākea Marine National Monument more than quadrupled the size to 582,578 square miles of land and sea in the Northwestern Hawaiian Islands, increasing the scale and scope for management monitoring and activities. Initial analysis of these sources indicates that only 10% of vessels transiting the Monument submit reports in compliance with the International Maritime Organization's Particularly Sensitive Sea Area (PSSA) regulations governing the area. Additionally, climate change is making Arctic ecosystems more vulnerable while enabling maritime and industrial activities to expand. Both these areas highlight the need for additional, wide area, long-endurance environmental intelligence to fill these data voids. Unmanned systems may safely, efficiently, effectively and economically fill these voids in an environmentally friendly way while collecting valuable insitu atmospheric and oceanic data.

#### Project Goals

Specific NOAA/OAR/Line Office goals include:

- In support of cross-NOAA LO requirements research, design, develop and prototype the next generation long endurance, shipboard, unmanned systems tools and technologies for maritime surveys for marine domain awareness, Arctic and ice surveys, ecosystem assessments, weather, climate and other NOAA maritime missions. These multi-mission, transdisciplinary platforms will simultaneously fulfill several NOAA missions while being in direct support of our operational partners at the U.S. Coast Guard and U.S. Navy, and builds on past transition to operations, applications and commercialization (or other use) (R2X) successes.
- Develop, integrate and test new low Cost – Size, Weight and Power (C-SWAP) calibrated payloads onto autonomous unmanned systems for atmospheric boundary layer data capture while conducting maritime and Arctic missions.



- Leverage this data and information for climatology, ecosystem monitoring and for satellite support including calibration, validation, and verification (CAL/VAL/VER) of satellite sensors.

As Unmanned Aircraft Systems (UAS) mature in flight capabilities, operational readiness, and affordability, they provide a feasible alternative to maritime and Arctic observations. As such, there are three viable objectives with MAS, all of which can be efficiently achieved through a single system of shipboard (and land based) long endurance UASs with a high level of autonomy. The primary objective of MAS operations is to obtain routine shipboard, electro-optical and infrared (EO/IR) and full motion video (FMS) surveys while monitoring Automatic Identification System (AIS) which is an automatic tracking system used on ships. Additionally, conduct high-fidelity meteorological observations of the lower atmosphere, with particular emphasis on the planetary boundary layer (PBL). Acquiring these data will serve two purposes:

1. Provide the NOS, NMFS and associated maritime partners with a cost-efficient, operationally-feasible means of deploying UAS for maritime and Arctic surveys for marine monitoring, wildlife monitoring and ice monitoring. While capable of performing routine missions, the autonomous and mobile UAS platforms will also have the capability to be deployed for non-routine rapid-response maritime and Arctic operations for oil spills, marine debris, and search and rescue. Fulfillment of this objective will save on time and resources while gaining access to difficult to access remote and dangerous locations possibly saving lives.
2. As an extension of the primary objective, provide various atmospheric measurements within and near the PBL is the second MAS objective, which can be easily fulfilled through many of the same operational maneuvers and aboard the very same UAS platforms used for first objective. The low C-SWAP of these sensors has been studied.

#### Key Driving Requirements for Low Altitude Maritime Survey + Planetary Boundary Layer Sampling

- a) Data
  - Primarily EO/IR and Full Motion Video (FMV) + Atmospheric Sensing
  - AIS
  - Temperature
  - Humidity
  - Wind Speed
  - Wind Direction
  - Pressure
  - Air Quality, O3, CO2 NO2, actinic flux (sunlight)
  - Other
- b) Accuracy of Data for Potential Sensors
  - EO/IR A resolution of approximately 2.5 cm x 6 cm would be necessary to read marine mammal tags, and 30 cm x 30 cm to read marine mammal bleach marks
  - FMV: "Reasonable" quality video (at least 5 MP) for opportunistic preliminary damage assessments (HD resolution 720p or 1080i)--AIS Standard feed
  - Temperature: +/- 0.2 C

- Humidity: +/- 5% RH
- Wind Speed: +/- 0.5 m/s
- Wind Direction: +/- 5 degrees azimuth
- Pressure: +/- 1.0 hPA
- Air Quality: +/- 5.0 ppbv O3, ±0.5 ppbv NO2; 2% actinic flux
- c) Sensor Response Time
  - EO/IR, FMV, AIS - Real-time
  - Atmospheric and Air Quality -Less than 5 seconds
- d) Altitude range
  - Surface to 6,000 m
- e) Vertical Data Resolution (Atmospheric)
  - 10 m for air quality measurement operations
  - 25 m for meteorological measurement operations
- f) Horizontal range
  - Threshold: 10 nm, Objective: 1000 nm
- g) Max Frequency of Deployments/Flights
  - Constant deployment of one system (orbit) Threshold: 1 week, Objective: 5 months
- h) Operating Condition Ranges
  - Wind Speed: 45 m/s (inflight), Take-off/Landing: Threshold: 25 Knots, Objective: 35 Knots
  - Temperature: -30 to +40 degrees C
  - Humidity: 0-100% RH
  - Ongoing precipitation / Types: All weather
- i) Endurance
  - Threshold: 24 hours, Objective: 36 hours
- j) Ascent Rate
  - Ranging from 1 to 5 m/s, but ultimately dependent on sensor response / hysteresis
- k) Shipboard Footprint & Launch/Recovery Area
  - On-load of system without crane services
  - Launch/Recovery Area: Threshold: 20'x20', Objective: 10'x10'
- l) Beyond Visual Line of Sight Equipment
  - The UAS must be equipped with current beyond visual line of sight operations equipment.

*NOTE: Even though a prototype may be required to be delivered for the project, it is Important to note that this prototype is still the property of the offeror. NOAA would only do field or lab testing on that product to see its feasibility in a production (or development) environment*



### **8.3 TOPIC: Environmental Observations: Data Science Advancements**

#### **8.3.1 SUBTOPIC: Position Error Maps for GPS/GNSS**

##### Summary

Customers are requesting improved products for assessing positioning errors for satellite navigation systems such as the Global Positioning Satellite (GPS) system. The GPS system has become widely used for position, navigation, and timing. Single frequency GPS navigation systems are part of nearly every automobile or smart phone sold today. Dual and even three frequency GPS systems are used for more precise position and timing information and are widely used in maritime and aviation navigation, surveying, agriculture, oil and mineral exploration, and banking. Even the NWS weather models incorporate GPS data in their data assimilation schemes. Nearly everyone in industrialized nations of the world has become reliant on satellite navigation systems.

The density variations of the ionosphere modify the path and speed of the signal from the GPS satellite to the ground receiver and thus, introduce errors. The NOAA Space Weather Prediction Center (SWPC) currently provides products that help customers identify when and where these sorts of disturbances occur. But customers have indicated that the space weather impacts on their systems are not well captured by the current products and do not provide adequate information on what the user impacts are. For instance, the primary product from SWPC is a North American map of Total Electron Content or TEC as observed from a number of ground-based GPS receivers across the US, Canada, and Mexico. This parameter provides a broad indication of when and where the ionospheric disturbances might affect GPS but it does not provide accurate information on the magnitude of the positioning errors for the different types of systems.

As the GPS technology has advanced, so has our understanding of how to best measure and understand the impacts of space weather on these systems. There are new ways of processing the existing ground GPS data to provide more accurate estimates of positioning errors that are more applicable to the needs of the end user. Based on the large number of commercial and private sector users of GPS and new analysis and data processing techniques, it is highly likely that new products and services could be developed, using existing data, that would have the potential for commercial services.

##### Project Goals

The specific goal of this project would be to develop a better way of processing the existing, publically available, ground-based GPS data, to create a new product or products that would give the users of the GPS position, navigation, and timing system a better indication of when, where, and how, space weather could be impacting their systems. This product should provide a real-time assessment of the environmental impacts on the accuracy and errors of the position and timing information generated by the GPS devices and, if possible, provide a short term forecast of how these impacts may change. The ultimate goal of this project would be to

provide the numerous users of GPS satellite navigation better more accurate information on how their systems are performing.

### **8.3.2 SUBTOPIC: Development of VTOL Fixed Wing UAS with 15 lb Payload**

#### Summary

Measurements of atmospheric aerosols, gases and meteorological parameters are critical components of NOAA's climate and air quality studies (e.g., NEAQS, TexAQS, CalNEX, FIREX, CICC). Unmanned Aerial Systems (UAS) provide a means to obtain these measurements from ships and land based regions not easily accessible by manned aircraft. Several upcoming NOAA experiments (FIREX, SOCRATES, Gulf of Mexico-BOEM collaboration) have called out a need for UAS measurements. At this time there is no UAS with 1) a maximum take-off weight under 55 lb as per FAA regulations, 2) that can be deployed and recovered from a ship, 3) has a payload of at least 15 lb (needed to carry the aerosol measurement payload) and 4) has a pusher engine so as to not interfere with gas and aerosol inlets on the front of the plane. Vertical take off and landing (VTOL) fixed wing UAS could answer this need however, there is currently no such UAS on the market that meets the above requirements.

#### Project Goals

Ship deployable UAS will fill many needs within NOAA including marine mammal surveys, coastal ecosystem health monitoring, climate and air quality studies, and surveillance missions. The VTOL technology allows the UAS to be launched and recovered within a small deck footprint. The fixed wing capability gives the UAS endurance for longer flights. At this time, VTOL fixed wing UAS have not been optimized for use aboard ships. Shipboard operations present some additional challenges not experienced in land based operations. The magnetometer used on the UAS will not work on metal ship. The turbulence around the ship due to the ship superstructure will require a more powerful VTOL motor than needed on land. Our mission requirement of a take-off weight of less than 55 lb, the ability to carry a 15 lb payload, and a pusher engine will require a trade off with fuel weight and thus endurance. The funded project will need to take these challenges and requirements into account to optimize the UAS design.

### **8.3.3 SUBTOPIC: Low Cost, High Precision Citizen Science Coastal and Ocean Monitoring Tools**

#### Summary

Public participation in scientific research through citizen science and crowd-sourcing programs produce scientific data that is used to help shape fundamental environmental questions. Data

and other information generated through citizen science and crowdsourcing programs have been shown to be reliable and accurate, and the in-kind contributions to research have an economic value of up to \$2.5 billion per a year. In September 2015 a Federal Memorandum recommended agencies build capacity for citizen science and crowdsourcing.

Citizen science volunteers partake in environment-related studies and can sample wide geographic areas, creating large amounts of spatial and temporal data that can be used to obtain valuable insights into scientific questions. A major challenge volunteers face is a lack of low-cost, innovative equipment, as well as resources for better communication and information sharing. Citizen science programs typically utilize equipment that produce low cost measurements (several dollars to approximately \$50 per analysis) and financial limitations often prevent the use of modern instrumentation for laboratory and field data collection.

### Project Goals

New, low-cost instrumentation is needed to increase capabilities of citizen science data monitoring projects. Proposals are requested for laboratory and field instrumentation and equipment that produce robust and verifiable scientific-quality, monitoring data at an economical cost. Volunteers from a diverse age group participate in citizen science programs, so equipment needs to be rugged and have a simple, user-friendly design. Budget constraints often limit programs from purchasing state of the art scientific equipment. The proposed equipment must be affordable to programs that only spend several dollars to approximately \$50 per unit. In addition to field and laboratory equipment, proposals to create new applications for citizen science data portals are encouraged. Citizen science monitoring programs need open source application platforms that enables volunteers to upload verifiable data into a user friendly interface.

## **8.4 TOPIC: Decision Science, Risk Assessment, and Risk Communication**

### **8.4.1 SUBTOPIC: Automated tools for detecting risks associated with aquaculture or the environment**

#### Summary

Machine vision and/or artificial intelligence tools to detect and respond to various classes of risk associated with aquaculture operations or the environment such as, but not limited to, interactions of offshore marine aquaculture systems with marine mammals and turtles, or the detection of escapes, predators, disease and/or mortality in remote aquaculture operations. The creation and deployment of a system that can anticipate and/or alert aquaculture operators when there is an increased likelihood of an event or conflict (e.g. entanglement). This could be real time detection/monitoring or a combination of real time detection and modeling. The next step would be to act on the information provided by that tool; systems which could respond (or at least have a pathway to effect a response) to risks with mitigation measures are preferred.

## Project Goals

These types of products address two key needs in the marine aquaculture industry: protection of livestock (as well as the local environment) and safety of employees. Currently, most of the crises that could occur at an offshore aquaculture installation would remain unknown to the operators without a human site visit or surveillance. Paying salaries and ensuring the safety for 24 hour staffing to monitor a farm site is prohibitively expensive, and operators are forced to gamble by estimating how much risk they are actually carrying. If technology could be developed and deployed that could detect a particular threat and alert the owners, they could take a very specific, target action in response (as opposed to visiting the site, discovering a problem and having to make a return trip to the site to resolve it). The types of risks that could be reduced or avoided by this technology include predation, damage to equipment, escape events, changes in water quality, the presence of harmful algal blooms, etc. For some threats, this technology could be designed to be capable of resolving the threat without the intervention of human operators (i.e. active deterrence of predators, or changing the position of a submerged cage to better protect it from dangerous weather).

### **8.4.2 SUBTOPIC: Sensor for detecting the toxins that cause Paralytic Shellfish Poisoning**

#### Summary

Consumption of seafood contaminated with the marine toxin saxitoxin (STX) can lead to severe and debilitating illness in both humans and shellfish, fish, seabirds, and marine mammals. STX intoxication leads to paralytic shellfish poisoning and symptoms include nausea, vomiting, diarrhea, abdominal pain, tingling sensations, shortness of breath and confusion. It is a major concern in New England and along the entire US West coast as well as many other regions worldwide. STX can cause respiratory failure and death within hours if respiratory support is not provided. There are very few rapid tests that can be used to detect STX quickly in order to protect the seafood supply by responding quickly to contamination events. One rapid test (the Jellett Rapid Test) is currently available, which is based on antibody detection. However, this test can produce false positive or negative results of toxicity due to issues with antibody cross-reactivity to extraneous compounds in solution. The Jellett Rapid Test for STX is expensive (\$75 per single sample test), only gives a qualitative yes/no result, and has low sensitivity to some STX analogs or metabolites (e.g. neoSTX), which has made widespread use impractical. One technique that offers rapid testing in conjugation with sensitivity for the various toxins are receptor binding assays. Currently, these assays are based on radioactively labeling the toxin and then mixing the labeled toxin with a sample extract and the target receptor on the cell surface to which the toxin binds. In the case of STX, the receptors added are isolated sodium channel receptors. If there is no unlabeled STX in the sample extract only radioactive STX binds the sodium channel receptors, and high counts are recorded when the assay is read. In contrast, the more STX in the sample, quantitatively less radioactive STX is bound. This inverse relationship allows for a sensitive and accurate determination of the toxin content in the sample. Despite this accuracy, the rRBA sensor

system is problematic because of variability in stability of the radioactive STX and the concurrent cost, training, and specialized facilities/equipment required. Getting stable batches of the radioactively labeled STX has proven problematic over the past few years leading to periods when screening was impossible. A potential solution to these issues is to develop fluorescent RBAs (fRBA) based sensor system. Such a system would have greater stability than the current radioactively labeled STX sensor system, equal or superior sensitivity, and lower cost due to the reduced need for waste handling, specialized equipment and facilities, and more stringent training and certification requirements.

### Project Goals

The current radioactive receptor binding assay (rRBA) sensor system for detecting the saxitoxins (STXs) which cause paralytic shellfish poisoning is problematic. Because this reagent is difficult to manufacture and often unstable stability, there are periods when it is not available which limits our ability to test for this important seafood toxin. The rRBA is also expensive to run due to costs associated with waste disposal, maintenance of a radioactive license, and concurrent training and specialized facilities/equipment required. Consequently, there is a need for an alternative STX sensor system which is more stable and cost effective. A fluorescence-based sensor system has the potential to address this need because they offer comparable sensitivity, are more stable and easier to use. Such fluorescent sensor systems, however, have not yet been applied extensively for the detection of seafood toxins because the coupling chemistry needed to make the labeled toxin required is challenging. If a solution to this coupling problem can be found, it would allow construction of fluorescent RBAs (fRBA) based sensor systems for STX and other marine toxins. Given this potential, the funded project would be for development of a fRBA which (1) quantitatively detects toxic analogs/congeners of saxitoxin (e.g. STX, neoSTX, GTX1/4) without detecting the non-toxic/less toxic analogs (e.g. C toxins and analogs), (2) yields low false positive and negative results, (3) provides comparable sensitivity to the radioactive assay, and (4) can be successfully implemented in a 96-well plate format that can be read by fluorescent plate readers commonly available in many laboratories. The benefit of this approach would be faster, more cost effective method for measuring one of the major seafood toxins of concern in the US and worldwide. There is both a national and international market for an fRBA sensor system. If successful, the product could be easily commercialized and potentially be expanded in phase II to include development of detection assays for other marine toxins.

### **8.4.3 SUBTOPIC: Standards for environmental molecular assays for toxic and harmful organisms**

#### Summary

NOAA has invested significant resources in the development of DNA-based molecular assays for monitoring harmful bacteria and microalgae which adversely affect human and animal health and that cause significant economic loss to the nation. These assays work well and resource managers and public health officials have begun to employ these assays in some

locations for routine monitoring aimed at identifying when significant environmental threats are present. These molecular assay are a preferred monitoring method because they can distinguish toxic species from co-occurring beneficial species that are morphologically identical using traditional light microscopy or other counting methods. There are also efforts underway to implement the assays in field portable devices. The transfer of these methods to a broader user base, however, is currently being hampered by the lack of a commercial source of standards required to calibrate the assays. NOAA laboratories are currently providing these standards to user groups on a case by case basis, but this is becoming a significant burden and does not represent a viable long-term strategy for implementing and commercializing these technologies. This grant would be for development of a cost effective method of producing standards for molecular based environmental monitoring assays. If successful, there are numerous standards from NOAA and other sources that could be profitably commercialized.

### Project Goals

There is a significant monitoring need for molecular assays to detect toxic and pathogenic organisms in the environment. Numerous effective molecular detection assays for this purpose have been developed and published by NOAA, other Federal, and research institutions. The widespread application of these assays, however, has been hampered by the commercial availability of DNA standards needed for calibrating the assays. This grant is for developing a cost effective method for producing these DNA standards used in molecular environmental assays based on quantitative PCR and other methods. These assays typically require approximately 100 ng of standard template DNA per standard curve. The successful applicant would be required to produce and accurately quantifying  $\mu\text{g}$  quantities of DNA standard that can be partitioned into individual tubes where each tube can be used for constructing a standard curve. The ideal cost point is in \$10-\$20 per standard curve. The quantification of the DNA concentration must be precisely determined by digital PCR or some other method and stability for evaluated over a multiple month period. NOAA will provide the DNA templates to serve as the test subject for producing the standard curve DNA. The DNA standards produced within this scope of work will not have to meet the rigorous quality control measures required for human disease testing. If a cost effective way of producing standards can be successfully developed, there is a wide range of customers including natural resource managers, public health officials and academic researchers that would be interested in purchasing or ordering custom standards.

8.5 TOPIC: SBIR - Technology Transfer (SBIR-TT)

#### **8.5.1 SUBTOPIC: Automated tools for detecting risks associated with aquaculture or the environment**

##### Summary

The Patent Pending NOAA NOy-Cavity Ring-Down Spectrometer is a sensitive, compact detector that measures total reactive nitrogen (NOy), as well as NO<sub>2</sub>, NO and O<sub>3</sub> using cavity ring-down spectroscopy (CRDS). This product is unique in that the optical cage system holds



four optical cavities (with associated sample cells) and a laser together, allowing a measurement of all four trace gases simultaneously and with a robust calibration in a small package. The NOAA CRDS is compact and has lower power, size, weight, and vacuum requirements than chemiluminescence-based instruments while approaching equivalent sensitivity, precision and time response.

Climate science and air quality monitoring provide ongoing applications for instrumentation to accurately measure atmospheric trace gases. The precision and accuracy of this instrument make it a versatile alternative to standard chemiluminescence-based NOy instruments currently on the market.

The markets for scientific instruments in the U.S. and abroad are well-established and supported by a number of known scientific instrument manufacturers, including at least three domestic and three international commercial manufacturers of a cavity ring down NO2 instruments. Given the compact and efficient performance and other unique features of this instrument for measuring ambient air across a range of environments and measurement platforms, it is an excellent licensing opportunity for the scientific instrument manufacturing sector

### Project Goals

The NOAA NOy CRDS was developed for the Earth System Research Laboratory in Boulder, CO, in order to support the lab's research activities. There is one prototype in existence, which is in regular use by the lab. The goal of NOAA's Technology Transfer program is to encourage the broader use of NOAA's patented or patent-pending technologies in commercial markets and/or to encourage the development of new uses for our technologies. The project goal, therefore, for this SBIR Technology Transfer solicitation is to receive proposals from companies that are interested and able to develop a more compact and commercially viable version of the NOAA NOy for sale.

In order to accomplish this goal, companies sending proposals against this SBIR Technology Transfer topic would be required to sign a one-year, no-cost research and technology which may be renewed under Phase II, should the Phase I activities be deemed successful.

Further information regarding this project can be located at:

[http://techpartnerships.noaa.gov/sites/orta/CRDS\\_LicenseOpp\\_pg2\\_finaldraft.pdf](http://techpartnerships.noaa.gov/sites/orta/CRDS_LicenseOpp_pg2_finaldraft.pdf)



## 9.0 SUBMISSION FORMS AND CERTIFICATIONS

### 9.1 NOAA Small Business Innovation Research (SBIR) Phase I Cover Page

Solicitation No.:	<input type="text" value="NOAA-2017-1"/>	Closing Date:	<input type="text" value="January 25, 2017"/>
Name of Submitting Firm:	<input type="text"/>		
Address of Firm (including Zip Code +4):	<input type="text"/>		
Title of Proposed Project:	<input type="text"/>		
Requested Amount:	<input type="text"/>	Proposed Duration:	<input type="text"/>
Solicitation Subtopic Title:	<input type="text"/>		
Solicitation Subtopic No.:	<input type="text"/>		

THE ABOVE ORGANIZATION CERTIFIES THAT:

1. It is a small business firm as defined in this Solicitation. Yes ☐ No ☐
2. The primary employment of the principal investigator will be with the firm at the time of award and during the conduct of the research. Yes ☐ No ☐
3. A minimum of two-thirds of research will be performed by this firm in Phase I. Yes ☐ No ☐
4. It qualifies as a minority and disadvantaged small business as defined in this Solicitation. Yes ☐ No ☐
5. It qualifies as a woman-owned small business as defined in this Solicitation. Yes ☐ No ☐
6. It will permit the government to disclose contact information of the corporate official of your concern, if your proposal does not result in an award, to appropriate local and State-level economic development organizations that may be interested in contacting you for further information. Yes ☐ No ☐
7. It authorizes contact information and project title to be provided to the NIST Manufacturing Extension Partnership (MEP) Program after awards have been announced. Yes ☐ No ☐
8. This firm and/or Principal Investigator ☐ has ☐ has not submitted proposals for essentially equivalent work under other federal program solicitations, or ☐ has ☐ has not received other federal awards for essentially equivalent work.
9. The offeror and/or any of its principals ☐ are ☐ are not presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency; and ☐ have ☐ have not within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a Federal, state or local government contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and ☐ are ☐ are not presently indicted for, or otherwise criminally or civilly charged by a Government entity with, commission of any of these offenses.
10. It is a veteran-owned small business concern. Yes ☐ No ☐  
It is a service-disabled veteran-owned small business concern. Yes ☐ No ☐
11. It is a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material change in ownership and control, principal office of ownership or HUBZone employee percentage has occurred since it was certified by the Small Business Administration in accordance with 13 CFR Part 126; and Yes ☐ No ☐

It is a joint venture that complies with the requirements of 13 CFR Part 126, and the representation above is accurate for the HUBZone small business concern, or concerns that are participating in the joint venture. [The offeror shall enter the name or names of the HUBZone small business concern or concerns that are participating in the joint venture]:

Yes ☐ No ☐

Each HUBZone small business concern participating in the joint venture shall submit a separate signed copy of the HUBZone representation.

12. The company was not involved in the selection of any topic or subtopic. The company shall not participate in the review of the proposals.

Yes ☐ No ☐

13. The company is registered in SAM.gov and the Representations and Certifications are completed. The NAICS code 541712 is included in the registration.

Yes ☐ No ☐

### **PRINCIPAL INVESTIGATOR**

Name:

Title:

Day Telephone No.:

Signature & Date:

Email:

Fax No.:

### **CORPORATE OFFICIAL (BUSINESS)**

Name:

Title:

Day Telephone No.:

Signature & Date:

Email:

Fax No.:

### **OTHER INFORMATION**

Year Firm Founded

Number of Employees: Avg. Previous 12 mos.

Currently

Has a proposal for essentially equivalent work been submitted to another agency?

Yes ☐ No ☐

If yes, what Agency?

Is your company registered in SAM?

☐ Yes

☐ No

Taxpayer Identification Number:

Data Universal Numbering System (DUNS) Number:

### **PROPRIETARY NOTICE**

These data shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed in whole or in part for any purpose other than evaluation of this proposal. If a funding agreement is awarded to this applicant as a result of or in connection with the submission of these data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the funding agreement and pursuant to applicable law. This restriction does not limit the Government's right to use information contained in the data if it is obtained from another source without restriction. The data subject to this restriction are contained on pages \_\_\_\_\_ of this proposal.

## 9.2 NOAA SBIR Project Summary Form

NAME OF FIRM:

---

AMOUNT REQUESTED:

---

ADDRESS:  
PHONE #:  
FAX #:  
E-MAIL:

---

PRINCIPAL INVESTIGATOR (NAME AND TITLE):

---

TITLE OF PROJECT:

---

SOLICITATION SUBTOPIC NUMBER: SOLICITATION SUBTOPIC TITLE:

---

TECHNICAL ABSTRACT (LIMIT 200 WORDS):

---

SUMMARY OF ANTICIPATED RESULTS:

### 9.3 NOAA SBIR Proposed Budget

<b>Company Name</b>				
<b>A. PERSONNEL (Employee(s)) NAME</b>	<b>ROLE IN PROJECT</b>	<b>EST. HOURS</b>	<b>HOURLY RATE</b>	<b>TOTAL COST</b>
1	Principal Investigator/ Project Manager			\$ -
2				\$ -
3				\$ -
4				\$ -
5				\$ -
6				\$ -
<b>Total Direct Labor / [ ] See Supplemental Budget for Additional Details or Information</b>				\$ -
<b>Fringe Benefits</b>			<b>0%</b>	\$ -
<b>Total Direct Labor &amp; Fringe Rate</b>				\$ -
<b>B. EQUIPMENT (specify type, whether purchased, or leased, and cost)</b>			<b>Cost of Item</b>	
			\$ -	
			\$ -	
			\$ -	
<b>Total Equipment Costs/ [ ] See Supplemental Budget for Additional Details or Information</b>				\$ -
<b>C. TRAVEL (include purpose and from/to)</b>			<b>Cost of Travel</b>	
Kick off Technical Meeting			\$ -	
			\$ -	
			\$ -	
<b>Total Travel Costs/ [ ] See Supplemental Budget for Additional Details or Information</b>				\$ -
<b>D. OTHER DIRECT COSTS</b>			<b>Total Cost</b>	
Materials and Supplies			\$ -	
Testing Services			\$ -	
Computer Services			\$ -	
Research Institution (Subcontract)			\$ -	
Other Subcontracts/Consultants			\$ -	
<b>Total Other Direct Costs/ [ ] See Supplemental Budget for Additional Details or Information</b>				\$ -
<b>E. TOTAL DIRECT COSTS &amp; FRINGE (A through D)</b>				\$ -
<b>F. INDIRECT COSTS (Specify type &amp; rate, as applicable)</b>			<b>Rate</b>	
			0%	
			0%	
			0%	
			0%	
<b>Total Indirect Costs/ [ ] See Supplemental Budget for Additional Required Information</b>				\$ -
<b>G. TOTAL COSTS (E+F)</b>				\$ -
<b>H. FEE OR PROFIT RATE</b>				0% \$ -
<b>I. TOTAL AMOUNT OF THIS REQUEST (G+H)</b>				\$ -
<p>J. Has any executive agency of the United States Government performed any review of your accounting system or records in connection with any other grant or contract within the past year? <input type="checkbox"/> Yes / <input type="checkbox"/> No</p> <p>If Yes, give name, address, and phone number of review office and official. We strongly encourage you to provide copies of any negotiated forward rate price agreements with your supplemental information</p>				

## 9.4 NOAA SBIR Budget Instructions

In accordance with Section 3.7 of the solicitation, the offeror is to submit a cost estimate with detailed information for each element, consistent with the offeror's cost accounting system.

### **NOAA SBIR Proposed Budget**

Complete the "NOAA SBIR Proposed Budget" (See Section 9.3) for the Phase I effort and include it as the last page of the technical proposal. Verify the total request is accurate and does **not exceed \$120,000.00**. A proposal that exceeds \$120,000.00 shall automatically be disqualified.

The Proposed Summary Budget shall be signed by the Corporate Official. Some items of the form under Section 9.3 may not apply to every proposal. Additionally, some firms may have different accounting practices for their overhead rates. Offerors should use indirect rates consistent with their own accounting system, even if different from the rate categories shown on the form. These differences should be discussed in the Supplemental Budget Documentation and, if necessary, a budget form (consistent with the firm's accounting practices) can be provided with the Supplemental Budget Documentation. Enough information should be provided on the Proposed Budget to allow NOAA to understand how the offeror plans to use the requested funds if award is considered. A complete cost breakdown should be provided giving direct costs, indirect costs, other direct costs, overheads, G&A, and profit. The offeror is to submit a cost estimate with detailed information consistent with the offeror's cost accounting system. A reasonable profit is allowed.

As a reminder in completing the Proposal Budget Summary for Phase I, a minimum of two-thirds of the research and/or analytical effort must be performed by the proposing small business concern. The total cost for all consultant fees, facility leases, usage fees, and other subcontracts may not exceed one-third of the total proposal price (also see Section 1.5). For Phase II, a minimum of one-half of the research and/or analytical effort must be performed by the proposing small business concern. The total cost for all consultant fees, facility leases, usage fees, and other subcontract or purchase agreements may not exceed one-half of the total proposal price.

### **Supplemental Budget Documentation**

Offerors shall provide additional supplemental budget documentation for the Proposed Budget for the Government's Cost and Pricing Review. ***This Supplemental Budget Documentation shall NOT be utilized for evaluation of the Technical Proposal. Offerors must ensure that all relevant technical information is included within the 26 page technical proposal.*** The Supplemental Budget Documentation does **NOT** count towards the 26 page count requirement and shall include a coversheet and be organized and easy to understand. The information should only supplement and help to justify and explain the amounts requested on the Proposed Budget sheet. Additionally, the documentation should indicate any known or anticipated source, quantity, unit price, competition obtained, and basis used to establish source and reasonable costs (e.g. other direct costs, equipment, and travel, etc.). If additional room is required, and not available on the SBIR Proposed Budget Form, it may be

incorporated into the Supplemental Budget Documentation. The Proposed Budget Form should annotate the location of this information appropriately.

### **Instructions for Proposed Budget Summary Form:**

**Lines A, Direct Labor.** List the key personnel by name and role/function in the project. Other direct personnel that are to be determined need not specifically named, but their role, such as “technician,” total hours and hourly rate should be entered. Personnel whose costs are indirect (e.g. administrative personnel) should be included in Line F. If a Fringe Benefits rate is utilized, it can be listed in the space provided. Provide the Fringe Benefit percentage rate in accordance with the firm’s accounting practices. In the Supplemental Budget Documentation, information shall be provided regarding the development of the Fringe Overhead rate or Other Indirect Rates, as applicable.

As a reminder, the PI/PM must be employed by the small business concern at the time of contract award and during the period of performance of the research effort. Additionally, at least 51% of the PI/PM's time must be spent with the awardee during the contract performance (also see Section 1.5).

**Line B, Equipment.** List items costing over \$5,000 and exceeding one year of useful life. Lesser items may be shown in Line D. Indicate in the Supplemental Budget Documentation whether equipment is to be purchased or leased along with supporting documentation on where it will be purchased or leased. List each individual item with the corresponding cost. If additional room is required for this information, you shall include it in the Supplemental Budget Documentation. Include a copy of the quote, online catalog screenshot, or catalog price with the Supplemental Budget Documentation. Providing this information helps the government in speeding up its cost or pricing review. Discuss any competition utilized, basis of source, and reasonableness of price. The inclusion of equipment will be carefully reviewed relative to need and appropriateness for the research proposed.

**Line C, Travel.** Include the overall requested Travel Amount on the 9.3 Budget Form. In the Supporting Documentation, the offeror shall itemize by destination, purpose, personnel, period, and cost for both staff and consultants. Budget breakdowns for travel funds must be justified and related to the needs of the project. Inclusion of travel expenses will be carefully reviewed relative to need and appropriateness for the research proposed. Foreign travel is not an appropriate expense. Ensure that the Technical Kickoff Expense is included (for no more than 2 individuals).

**Line D, Other Direct Costs.** The overall materials and supplies, testing and/or computer services, and subcontracts (including consultants), and any other direct costs required for the project must be identified on the 9.3 Budget Form. In the Supplemental Budget Documentation, it shall specify type, quantity and unit cost (if applicable), and total estimated cost of these other direct costs. Incorporate a quote/proposal or catalog price for any other direct costs listed in the Supplemental Budget Documentation. If one is not included, explain how you developed that estimate. The proposal should identify direct (e.g. labor categories,

hours, & rates), indirect, other direct costs (e.g. materials, travel, etc.), and profit, as applicable. Discuss any competition utilized, basis of source, and reasonableness of price. Be sure to include copies of any subcontracts (including Universities and consultants) and proposals with the Supplemental Budget Information, if not included elsewhere.

**Line E, Total Direct Costs.** Enter the sum of Lines A through D.

**Line F, Indirect Costs.** Cite your established Indirect Rates (e.g. Overhead (OH) and General and Administrative (G&A) rate, etc), as appropriate. If you utilize different or additional overhead rates in accordance with your accounting practices, incorporate this information in this section with appropriate rate information. If additional room is required, incorporate the information in the Supplemental Budget Documentation. Also include information on the development of your indirect cost and their pools in the Supplemental Budget Documentation. A discussion of Indirect Costs and samples can be obtained at [www.dcaa.mil/chap6.pdf](http://www.dcaa.mil/chap6.pdf). If you have a negotiated Indirect Cost Rates or Forward Rate Pricing Agreements with another federal agency, include a copy of this documentation with your Supplemental Budget Documentation.

**Line G, Total Costs.** Enter the total amount of the proposed project, the sum of Lines E and F.

**Line H, Profit.** The small business concern may request a reasonable profit. Include the rate proposed.

**Line I, Total Amount of this request.** Enter the sum of Lines G and H. This amount must equal the amount entered in the Cover Sheet Form. It cannot exceed \$120,000.00.

**Line J, Review of Accounts.** Answer yes or no. If yes, enter name, address, and phone number of reviewing office and official. Additional details can be provided with the Supplemental Budget Information, as needed.



## Appendix A – CERTIFICATIONS

### A. SBIR Funding Agreement Certification (at time of award)

All small businesses that are selected for award of an SBIR Funding Agreement must complete this certification at the time of award and any other time set forth in the Funding Agreement that is prior to performance of work under this award. This includes checking all of the boxes and having an authorized officer of the Awardee sign and date the certification each time it is requested.

Please read carefully the following certification statements. The Federal Government relies on the information to determine whether the business is eligible for a Small Business Innovation Research (SBIR) Program award. A similar certification will be used to ensure continued compliance with specific program requirements during the life of the Funding Agreement. The definitions for the terms used in this certification are set forth in the Small Business Act, SBA regulations (13 C.F.R. Part 121), the SBIR Policy Directive and also any statutory and regulatory provisions referenced in those authorities.

If the Funding Agreement officer believes that the business may not meet certain eligibility requirements at the time of award, they are required to file a size protest with the U.S. Small Business Administration (SBA), which will determine eligibility. At that time, SBA will request further clarification and supporting documentation in order to assist in the verification of any of the information provided as part of a protest. If the Funding Agreement officer believes, after award, that the business is not meeting certain Funding Agreement requirements, the agency may request further clarification and supporting documentation in order to assist in the verification of any of the information provided.

Even if correct information has been included in other materials submitted to the Federal Government, any action taken with respect to this certification does not affect the Government's right to pursue criminal, civil or administrative remedies for incorrect or incomplete information given in the certification. Each person signing this certification may be prosecuted if they have provided false information.

The undersigned has reviewed, verified and certifies that (all boxes must be checked unless otherwise directed):

(1) ☐ The Awardee business concern meets the ownership and control requirements set forth in 13 C.F.R. § 121.702.

(2) If a corporation, all corporate documents (namely: articles of incorporation and any amendments, articles of conversion, by-laws and amendments, shareholder meeting minutes showing director elections, shareholder meeting minutes showing officer elections, organizational meeting minutes, all issued stock certificates, stock ledger, buy-sell agreements, stock transfer agreements, voting agreements, and documents relating to stock options, including the right to convert non-voting stock or debentures into voting stock) must evidence that the corporation meets the ownership and control requirements set forth in 13 C.F.R. § 121.702. (Check one box).

☐ Yes      ☐ N/A Explain why N/A:

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(3) If a partnership, the partnership agreement evidences that it meets the ownership and control requirements set forth in 13 C.F.R. § 121.702. (Check one box).

☐ Yes      ☐ N/A Explain why N/A:

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(4) If a limited liability company, the articles of organization and any amendments, and operating agreement and amendments, evidence that it meets the ownership and control requirements set forth in 13 C.F.R. § 121.702. (Check one box).

☐ Yes      ☐ N/A Explain why N/A:

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(5) The birth certificates, naturalization papers, or passports show that any individuals it relies upon to meet the eligibility requirements are U.S. citizens or permanent resident aliens in the United States. (Check one box).

☐ Yes      ☐ N/A Explain why N/A:

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(6) ☐ The Awardee business concern has no more than 500 employees, including the employees of its Affiliates.

(7) ☐ SBA has not issued a size determination currently in effect finding that this business concern exceeds the 500 employee size standard.

(8) During the performance of the award, the Principal Investigator/Project Manager will spend more than one half of his/her time (based on a 40 hour workweek) as an employee of the Awardee or has requested and received a written deviation from this requirement from the Funding Agreement officer. (Check one box).

☐ Yes   ☐ Deviation approved in writing by Funding Agreement officer: %

(9) All, essentially Equivalent Work, or a portion of the work proposed under this project (check the applicable line):

- ☐ **Has not** been submitted for funding to this Agency or another Federal agency.
- ☐ **Has** been submitted for funding to this Agency or another Federal agency but has not been funded under any other grant, contract, subcontract or other transaction.
- ☐ A portion has been funded by another grant, contract, or subcontract as described in detail in the proposal and approved in writing by the Funding Agreement officer.

(10) During performance of award, the Awardee will perform the applicable percentage of work unless a deviation from this requirement is approved in writing by the Funding Agreement officer (check the applicable line and fill in if needed):

- ☐ SBIR Phase I: at least two-thirds (66 2/3%) of the research.
- ☐ SBIR Phase II: at least half (50%) of the research.
- ☐ Deviation approved in writing by the Funding Agreement officer: \_\_\_\_\_%

(11) During performance of award, the research/research and development will be performed in the United States unless a deviation is approved in writing by the Funding Agreement officer (Check one box).

- ☐ Yes ☐ Waiver has been granted

(12) ☐ During performance of award, the research/research and development will be performed at the Awardee's facilities by the Awardee's employees, except as otherwise indicated in the SBIR application and approved in the Funding Agreement.

(13) The SBIR Awardee has registered itself on SBA's database as majority-owned by venture capital operating companies, hedge funds or private equity firms (check one box).

- ☐ Yes ☐ No ☐ N/A Explain why N/A:

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(14) The SBIR Awardee is a Covered Small Business Concern (a small business concern that: (a) was not majority-owned by multiple venture capital operating companies (VCOCs), hedge funds, or private equity firms on the date on which it submitted an application in response to an SBIR NOFO; and (b) on the date of the SBIR award, which is made more than 9 months after the closing date of the NOFO, is majority-owned by multiple venture capital operating companies, hedge funds, or private equity firms). (Check one box).

- ☐ Yes ☐ No

15) ☐ I will notify this Federal agency immediately if all or a portion of the work authorized and funded under this award is subsequently funded by another Federal Agency.

16) ☐ I understand that the information submitted may be given to Federal, State and local agencies for determining violations of law and other purposes.

17) ☐ I am an officer of the business concern authorized to represent it and sign this certification on its behalf. By signing this certification, I am representing on my own behalf, and on behalf of the business concern that the information provided in this certification, the application, and all other information submitted in connection with this application, is true and correct as of the date of submission. I acknowledge that any intentional or negligent misrepresentation of the information contained in this certification may result in criminal, civil or administrative sanctions, including but not limited to: (1) fines, restitution and/or imprisonment under 18 U.S.C. § 1001; (2) treble damages and civil penalties under the False Claims Act (31 U.S.C. § 3729 *et seq.*); (3) double damages and civil penalties under the Program Fraud Civil Remedies Act (31 U.S.C. § 3801 *et seq.*); (4) civil recovery of award funds, (5) suspension and/or debarment from all Federal procurement and nonprocurement transactions (FAR Subpart 9.4 or 2 C.F.R. Part 180); and (6) other administrative penalties including termination of SBIR/STTR awards.

**Signature** \_\_\_\_\_ **Date** \_\_\_\_/\_\_\_\_/\_\_\_\_

**Print Name (First, Middle, Last)**

\_\_\_\_\_

**Title**

\_\_\_\_\_

**Business Name**

\_\_\_\_\_

## **B. SBIR Funding Agreement Certification (Life-Cycle Certification)**

All SBIR Phase I and Phase II Awardees must complete this certification at all times set forth in the Funding Agreement (see §8(j) of the SBIR Policy Directive). This includes checking all of the boxes and having an authorized officer of the Awardee sign and date the certification each time it is requested.

Please read carefully the following certification statements. The Federal government relies on the information to ensure compliance with specific program requirements during the life of the Funding Agreement. The definitions for the terms used in this certification are set forth in the Small Business Act, the SBIR Policy Directive, and also any statutory and regulatory provisions referenced in those authorities.

If the Funding Agreement officer believes that the business is not meeting certain Funding Agreement requirements, the agency may request further clarification and supporting documentation in order to assist in the verification of any of the information provided.

Even if correct information has been included in other materials submitted to the Federal Government, any action taken with respect to this certification does not affect the Government's right to pursue criminal, civil, or administrative remedies for incorrect or incomplete information given in the certification. Each person signing this certification may be prosecuted if they have provided false information.

The undersigned has reviewed, verified and certifies that (all boxes must be checked except where otherwise directed):

(1) The Principal Investigator/Project Manager spent more than one half of his/her time (based on a 40 hour workweek) as an employee of the Awardee or the Awardee has requested and received a written deviation from this requirement from the Funding Agreement officer. (Check one box).

☐ Yes      ☐ No      ☐ Deviation approved in writing by Funding Agreement officer: \_\_\_\_\_%

(2) All Essentially Equivalent Work, or a portion of the work, performed under this project (check applicable line):

- ☐ **Has not** been submitted for funding to this Agency or another Federal Agency.
- ☐ **Has** been submitted for funding to this Agency or another Federal agency but has not been funded under any other grant, contract, subcontract or other transaction.
- ☐ A portion has been funded by another grant, contract, or subcontract as described in detail in the proposal and approved in writing by the Funding Agreement officer.

(3) Upon completion of the award, the Awardee will have performed the applicable percentage of work, unless a deviation from this requirement is approved in writing by the Funding Agreement officer (check the applicable line and fill in if needed):

- ☐ SBIR Phase I: at least two-thirds (66 2/3%) of the research.  
☐ SBIR Phase II: at least half (50%) of the research.  
☐ Deviation approved in writing by the Funding Agreement officer: \_\_\_\_\_%

(4) The work is completed and the small business Awardee has performed the applicable percentage of work, unless a deviation from this requirement is approved in writing by the Funding Agreement officer (check the applicable line and fill in if needed):

- ☐ SBIR Phase I: at least two-thirds (66 2/3%) of the research.  
☐ SBIR Phase II: at least half (50%) of the research.  
☐ Deviation approved in writing by the Funding Agreement officer: \_\_\_\_\_%  
☐ N/A because work is not completed.

(5) The research/research and development is performed in the United States unless a deviation is approved in writing by the Funding Agreement officer. (Check one box).

- ☐ Yes      ☐ No      ☐ Waiver has been granted

(6) The research/research and development is performed the Awardee's facilities by the Awardee's employees, except as otherwise indicated in the SBIR application and approved in the Funding Agreement. (Check one box).

- ☐ Yes      ☐ No

(7) ☐ I will notify this Federal agency immediately if all or a portion of the work authorized and funded under this award is subsequently funded by another Federal agency.

(8) ☐ I understand that the information submitted may be given to Federal, State and local agencies for determining violations of law and other purposes.

(9) ☐ I am an officer of the Awardee business concern authorized to represent it and sign this certification on its behalf. By signing this certification, I am representing on my own behalf, and on behalf of the business concern, that the information provided in this certification, the application, and all other information submitted in connection with the award, is true and correct as the date of submission. I acknowledge that any intentional or negligent misrepresentation of the information contained in this certification may result in criminal, civil or administrative sanctions, including but not limited to: (1) fines, restitution and/or imprisonment under 18 U.S.C. § 1001; (2) treble damages and civil penalties under the False Claims Act (31 U.S.C. § 3729 *et seq.*); (3) double damages and civil penalties under the Program Fraud Civil Remedies Act (31 U.S.C. § 3801 *et seq.*); (4) civil recovery of award funds,

(5) suspension and/or debarment from all Federal procurement and non-procurement transactions (FAR Subpart 9.4 or 2 C.F.R. Part 180); and (6) other administrative penalties including termination of SBIR/STTR awards.

**Signature** \_\_\_\_\_ **Date** \_\_\_\_/\_\_\_\_/\_\_\_\_

**Print Name (First, Middle, Last)**

\_\_\_\_\_

**Title**

\_\_\_\_\_

**Business Name**

\_\_\_\_\_



## 9.7 NOAA/SBIR Checklist

Please review this checklist carefully to assure that your proposal meets the NOAA requirements. Failure to meet these requirements may result in your proposal being rejected without consideration.

**Email submission of the proposals (Technical and Supplemental Budget and Other Information) must be received by 4:00 p.m. (EST) January 25, 2017.**

- \_\_\_\_\_ 1. The **COVER PAGE** (Form 9.1) has been completed and is page 1 and 2 of the proposal. Required signatures are included (see Section 3.3.1)
- \_\_\_\_\_ 2. The **PROJECT SUMMARY** (Form 9.2) has been completed and is page 3 of the proposal. The abstract contains no proprietary information (see Section 3.3.3).
- \_\_\_\_\_ 3. The **TECHICAL CONTENT** of the proposal begins on **PAGE 4** and includes the items identified in **SECTION 3.3.4** of the solicitation. The technical content section of the proposal is limited to 22 pages in length.
- \_\_\_\_\_ 4. The **PROPOSED BUDGET** (Form 9.3) has been completed, including signature, and is the **last page** of the proposal. The proposal budget is for \$120,000 or less. No more than one-third of the budget is allocated to outside parties such as consultants and/or subcontractors. See Section 3.6 for additional information.
- \_\_\_\_\_ 5. Other Supplemental Budget Documentation is provided in accordance with Section 9.4.
- \_\_\_\_\_ 6. SBIR Funding Agreement Certification (Form 9.5) completed and provided; offeror meets program requirements including eligibility requirements in Paragraph 1.5 for transition rates.
- \_\_\_\_\_ 7. In accordance with Section 3.5, provide list of prior Phase II awards for proposers awarded more than 15 SBIR Phase II awards in the prior five fiscal years, if applicable.
- \_\_\_\_\_ 8. Screen shot or similar copy of Company Registry is provided in accordance with Section 3.3.2.
- \_\_\_\_\_ 9. The entire technical proposal, including forms and technical content, is **26 pages or less in length** (excluding Other Supplemental Budget Documentation, SBIR Funding Agreement Certification, SBIR.gov Company Registry documentation, and those pages necessary to comply with the itemization of prior SBIR Phase II awards) (see Section 3.2).
- \_\_\_\_\_ 10. The proposal, cover page and project summary contains an easy-to-read font of at least 10 points (see Section 3.2).
- \_\_\_\_\_ 11. The proposal contains only pages of 21.6cm x 27.9cm size (8 ½" x 11") (see Section 3.2).
- \_\_\_\_\_ 12. The proposal is limited to only one of the subtopics in Section 8 and 3.3.4(a).
- \_\_\_\_\_ 13. The Principal Investigator/Project Manager will be employed by the company at least 51% of the time during the award period (see Section 1.5 and 1.7.9).
- \_\_\_\_\_ 14. All work must be performed by the small business concern and its subcontractors in the United States, unless a waiver has been granted in advance by the CO (see Section 1.5). All supplies, materials, and equipment must be American Made unless a waiver has been granted by the CO.
- \_\_\_\_\_ 15. Followed specific electronic submission instructions (see Section 6.2).

**NOTE: Proposers are cautioned that late arrival of proposals shall result in them being rejected without evaluation.** Potential offerors are advised to sign up within <https://www.fedbizopps.gov> to receive notification of any amendment or questions and answers to the solicitation that may be released after opening date.