



SBIR

Small Business Innovation Research

Notice of Funding Opportunity (NOFO)

FY2020

Funding Opportunity Number:	NOAA-OAR-OAR TPO-2020-2006320
Assistance Listings or Catalog of Federal Domestic Assistance (CFDA) Number:	11.021 NOAA Small Business Innovation Research (SBIR) Program
Opening Date:	December 19, 2019
Closing Date:	February 3, 2020

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

FY 2020 NOAA Small Business Innovation Research Program
Open Date: December 19, 2019 Close Date: February 3, 2020

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**US DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
FY 2020 SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM
NOTICE OF FUNDING OPPORTUNITY (NOFO)**

1.0 PROGRAM DESCRIPTION AND FEDERAL AWARD INFORMATION

1.1 Introduction

The Department of Commerce (DOC) National Oceanic and Atmospheric Administration (NOAA) invites small businesses to submit research proposals under this NOFO. Firms with the capability to conduct research and development (R&D) in any of the topic areas listed in Section 9 of this announcement 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.

Only FY 2020 Phase I applications may be submitted in response to this NOFO. Phase II applications are not being accepted at this time. NOAA will publish a Phase II NOFO approximately 30 days prior to the end of the previous year's Phase I period of performance to request Phase II applications. That NOFO will provide instructions for Phase I awardees to prepare a Phase II application and the closing date for submission of applications; only the previous year's Phase I awardees are eligible to submit a Phase II application.

The Small Business Innovation Research (SBIR) program was originally established in 1982 by the Small Business Innovation Development Act (P.L. 97-219), codified at 15 U.S.C. § 638. It was then expanded and extended by the Small Business Research and Development (R&D) Enhancement Act of 1992 (P.L. 102-564), and received subsequent reauthorization and extensions, the most recent of which extends the SBIR program through 2022. (P.L. 114-328).

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 businesses owned 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

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proposals in subtopics that fall within NOAA's mission.

NOAA is not obligated to make any awards under this NOFO, and all awards are subject to the availability of funds. NOAA is not responsible for any costs expended by the applicant in the development of the proposal and prior to award of any finance assistance award.

1.2 Three-Phase Program

The SBIR statute (15 U.S.C. § 638) 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 SBIR Policy Directive found on <http://www.sbir.gov>. The NOAA specific program authority will vary depending on the nature of the proposed project. A list of the most prevalent assistance authorities are 15 U.S.C. 1540; 16 U.S.C. 661 et seq.; 16 U.S.C. 1456c; 15 U.S.C. 2901 et. seq.; 33 U.S.C. 883a-d; 33 USC 893a; 33 U.S.C. 1442; 49 U.S.C. 44720(b).

The funding vehicles for the NOAA SBIR program in both Phase I and Phase II are through grants. While the Phase II proposal process is covered in this announcement, this NOFO is for Phase I applications only. A separate NOFO will be issued requesting Phase II application 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 financial assistance awards under a given subtopic. Moreover, applications not responding to subtopics listed herein are not eligible for SBIR awards.

1.2.01 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. Applicants are encouraged to consider, and discuss in their proposal, whether the research or research and development (R&D) being proposed to NOAA also has private sector potential, either for the proposed application or as a basis for other applications. Only DOC NOAA SBIR Phase I awardees will be eligible to submit a Phase II application.

NOAA Phase I awards are up to \$150,000 with up to a six (6) month period of performance. While number of awards are dependent on NOAA's budget, in a typical fiscal year, NOAA anticipates providing up to 25 SBIR Phase I awards. To accommodate the following Phase II, no-cost extensions are not permitted in Phase I projects that intend to advance to Phase II. Thus, if an awardee requests a no-cost extension for the Phase I project, the awardee will not be eligible to submit an application and compete in Phase II

1.2.02 Phase II – Research and Development

In Phase II, work from Phase I that exhibits potential for commercial application is further developed. Phase II is the R&D or prototype development phase. To apply for a Phase II award, each Phase I awardee will be required to submit a comprehensive application outlining the proposed research and a detailed plan to commercialize the final product.

Phase II awards shall be for no more than \$500,000. The period of performance for the completion of the Phase II will depend upon the scope of the research but is typically 24 months. There is another one year allowed after the 24 month period for the awardee to develop the commercialization report. For planning purposes, NOAA's goal is to make Phase II awards around May or June of the same year that the Phase II instructions are sent to current Phase I companies.

All Phase I awardees under this NOFO will be given the opportunity to submit a Phase II application following completion of Phase I. Instructions for Phase II application preparation and submission requirements will be published in a NOFO approximately 30 days prior to the end of the Phase I performance period to request the next year's Phase II grant applications.

1.2.03 Phase III – Commercialization

Under Phase III, the small business entity obtains 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 domestic or international marketplace. 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 NOFO. 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

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 NOFO. 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 SBIR Applicant Eligibility and Limitation

1.5.01 Applicant Qualification

Each applicant must qualify as a small business concern for research or research and development (R/R&D) purposes, as defined in Section 1.7 of this NOFO, 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.

In addition, the primary employment 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. Further, a small business may only replace the principal investigator on an SBIR Phase I award if the NOAA Grants Officer provides prior written approval.

The R/R&D work must be performed in the United States. Requests for an exemption must be submitted in writing at the time of application submission. Only rare and unique circumstances will be considered for an exemption. The NOAA Grants Officer must approve each exemption and its terms in writing.

For Phase I, a minimum of two-thirds of the research and/or analytical effort must be performed by the awardee. The total cost for all consultant fees, facility leases, usage fees, and other subcontract/sub-award or purchase agreements may not exceed one-third of the total award. For Phase II, a minimum of one-half of the research and/or analytical effort must be performed by the awardee. The total cost for all consultant fees, facility leases, usage fees, and other subcontract/sub-award or purchase agreements may not exceed one-half of the total award.

NOAA has elected to not use the provision that would allow venture capital operating companies (VCOCs), hedge funds or private equity firms to participate in the SBIR Program. Therefore, applications in which work would be performed by VCOCs will not be considered for award.

Applications 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 9 will be considered.

Applicants (and any affiliated individuals) may not participate in the selection of any topic or subtopic. Additionally, they may not participate in the review of proposals. All associated entities to applicants to this NOFO (including Guest Researchers, 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 NOFO or other public means; and
- Have not received any assistance from DOC in preparing the proposal for this specific NOFO (including any 'informal' reviews) prior to submission.

NOAA may not enter into, or continue, an existing CRADA with an awardee under this program.

Each applicant will be required to provide certain information via www.sbir.gov as well as other information required by the SBIR Policy Directive (see Appendices V-VI), found at https://www.sbir.gov/sites/default/files/sbir_pd_with_1-8-14_amendments_2-24-14.pdf. Each Small Business Concern (SBC) applying for an award is required to update the appropriate information in SBIR.gov for any of its existing and prior SBIR awards.

1.5.02 Company Registry Requirements

SBA maintains and manages a Company Registry at <http://www.sbir.gov/registration> to track ownership and affiliation requirements for all companies applying to the SBIR Program. **Each Phase I applicant must register in the Company Registry prior to submitting an application. The applicant must save its information from the registration in a .pdf document and append this document to the SF-424 form as described at the end of Section 8.1 of this NOFO.** All applicants are required to report and/or update their registration information in the SBA Company Registry prior to each SBIR application submission or if any information changes prior to an award.

1.5.03 Performance Benchmark Ratings Requirements

All Phase I applicants with a current Small Business Administration (SBA) assessment of their *Phase I to Phase II Transition Rate* must at the time of the application under this FY20 NOFO have satisfied the requirements of that Performance Benchmark to be eligible for a new Phase I award. NOAA will not consider (and will automatically disqualify) proposals from firms that are currently ineligible for Phase I awards as a result of failing to meet the benchmark rate at the last assessment.

The *Phase I to Phase II Transition Rate* requirement applies only to SBIR Phase I applicants that have received more than 20 (21 or more) Phase I awards over the past 5 fiscal years (excluding the most recent year). For these applicants, the ratio of the number of Phase II awards (awarded during the past 5 fiscal years) to the number of Phase I awards (awarded during the past 5 years excluding the most recent year) must be at least 0.25. For the purposes of this NOFO, the applicable five fiscal year period is fiscal year 2014 to fiscal year 2018. On June 1st of each year, the SBA assesses the Performance Benchmark rates for all applicable SBIR and Small Business Technology Transfer (STTR) awardees in the Company Registry. STTR is another program that expands funding opportunities in the federal innovation research and development arena. See <https://www.sbir.gov/about/about-sttr>. Performance Benchmark rates are based on a company's total SBIR/STTR awards, across all the participating agencies. Companies that fail to meet the Performance Benchmark requirements are not eligible

to submit a Phase I proposal for a period of one year from the assessment: from June 1st through May 31st. Note that this does not affect a company's eligibility for Phase II or Phase III awards.

The **Commercialization Rate** is not applicable for FY 2020. When in effect, the **Commercialization Rate** requirement applies to SBIR and STTR Phase I applicants that have received more than 15 (16 or more) Phase II awards over the past 10 fiscal years, excluding the last two years. These companies must have realized, to date, an average of at least \$100,000 of sales and/or investments per Phase II award (awarded during this period), or have received a number of patents resulting from the SBIR work equal to or greater than 15% of the number of Phase II awards.

SBA sends three notifications each year to companies affected by the benchmark performance requirements:

April 1st – SBA runs a preliminary assessment to determine which companies appear to be failing a benchmark given the data in the system on that date. SBA sends a Warning Notice to these companies so that they can review the award in the Company Registry (SBIR.gov) and update as needed.

June 1st – SBA identifies companies that fail a benchmark and notifies them that they are not eligible to submit a Phase I proposal for a period of one year.

All applicants should verify their *Transition Rate* eligibility for Phase I awards. When logged in to the Company Registry at <https://www.sbir.gov/registration>, awardees can view their last assessed *Transition Rate* by clicking on the "Performance Benchmark" side-bar. These company-specific rates appear under the heading "At Last Assessment." A thumbs-up/thumbs-down indicator shows whether or not the company passed the benchmark rates at the last assessment. If at any time, a company believes the award information on SBIR.gov is not correct, it should notify SBA using the *dispute* link provided. If a company's dispute of the data used for the rates is under review, it will see "TBD" under the "At Last Assessment" heading. Companies with less than the threshold number of awards (21 Phase I awards for the *Transition Rate*) will see "N/A" displayed because the requirement did not apply to them.

Under the heading "Current (On-Going)", the page displays a running calculation of the benchmark rates using the next years' time periods (each period moved up by one year) and current data in the system. Companies should monitor these rates to anticipate their standing for each upcoming June 1 Assessment. Prior to proposal preparation, all applicants to this NOFO that have received more than 20 Phase I awards across all federal SBIR/STTR agencies over the past five (5) years should verify that their company will not have a failing status on the *Transition Rate* Benchmark at the time of award.

General information on the Performance Benchmark requirements is available at <https://www.sbir.gov/performance-benchmarks>

1.6 Contact with NOAA

In the interest of competitive fairness, with the exception of the public Question and Answer (Q&A) portion concerning additional information on the technical subtopics described in Section 9 of this NOFO, oral or written communication with NOAA or any of its components **is strictly prohibited.**

For the Q&A portion, questions may be submitted through the NOAA SBIR Program Office via email, and all responses will be publicly, though anonymously, posted on the NOAA SBIR web site (<http://techpartnerships.noaa.gov/SBIR>). Questions and answers will not be accepted through nor posted on Grants.gov.

In order to permit timely posted responses, all questions pertaining to subtopics (Section 9) of this NOFO are due **no later than January 13, 2020 at 11:59 p.m. Eastern Time to the NOAA SBIR Program Office, via the email address provided below.** When sending questions, you must include the NOFO Announcement Number in the header “NOAA-OAR-OAR TPO-2020-2006320” as a subject line. Questions sent to any other email address will not be answered. After that date and time, **NO ADDITIONAL QUESTIONS SHALL BE ACCEPTED.**

For general programmatic, electronic submission, or grants questions, please contact the appropriate individual:

Subject Area	Point of Contact
Programmatic Questions	Kelly Wright NOAA SBIR Program Manager (Acting) 1305 East West Highway, Room: 7607 Silver Spring, MD 20910 Phone: (301) 628-1009 E-mail: Kelly.wright@noaa.gov

<p>NOAA SBIR Program Office NOFO Question and Answer</p> <p>(Only open from December 19, 2019 to January 13, 2020)</p>	<p>noaa.sbir@noaa.gov</p> <p>Subject line: NOAA-OAR-OAR TPO-2020-2006320</p> <p>All responses (with name/company who submitted the question redacted) will be made public via the NOAA SBIR website: http://technpartnerships.noaa.gov/SBIR</p>
<p>Electronic Application Submission through Grants.gov</p>	<p>Grants.gov Phone: 1-800-518-4726 Email: support@grants.gov</p>
<p>Grant Administrative Rules and Regulations</p>	<p>Janet Johnson Russell Phone: (301) 628-1062 Email: Janet.J.Russell@noaa.gov</p>

1.7 Definitions

Except as specifically noted by citation or reference, all definitions below are excerpted from the SBA SBIR Policy Directive, available at http://sbir.gov/sites/default/files/sbir_pd_with_1-8-14_amendments_2-24-14.pdf.

Applicant – The organizational entity that qualifies as a Small Business Concern (SBC) at all pertinent times and that submits a contract proposal or a grant application for a funding agreement under the SBIR Program.

Application – Also referred to as a “proposal”

Authorized Organizational Representative - The individual(s), named by the applicant/recipient organization, who is legally authorized to act for the applicant/recipient and to assume the obligations imposed by the federal laws, regulations, requirements, and conditions that apply to grant applications or awards.

Non-Federal Entity – The organizational entity that receives a SBIR Phase I, Phase II or Phase III award, i.e., awardee.

Commercialization - The process of developing products, processes, technologies, or services and the production and delivery (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.

Contract – A mutually binding legal relationship obligating the seller to furnish equipment, goods or services and the buyer to pay for them.

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 the objective are the same or closely related to another proposal or award, regardless of the funding source.

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

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

Funding Agreement Officer. Per the SBIR Policy Directive, a funding agreement officer is defined as a federal contracting officer, a grants officer, or a cooperative agreement officer.

Grant. A financial assistance mechanism providing money, property, or both to an eligible entity to carry out an approved project or activity authorized by law of the United States (31 U.S.C. 6101(3)). A grant is used whenever the Federal agency anticipates no substantial programmatic involvement with the awardee during performance.

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

Joint Venture – See 13 C.F.R. § 121.103(h).

National Environmental Policy Act (NEPA) The National Environmental Policy Act, or NEPA, is a United States environmental law that promotes the enhancement of the environment and was enacted as law on January 1, 1970 (Pub.L. 91-190). All NOAA SBIR Phase I and Phase II awards must go through an agency internal NEPA assessment before a full award is made. The purpose is to capture any details of the project that may potentially or inadvertently pollute/affect the environment

This definition is from the NOAA's NEPA implementation.

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

Project Narrative – This is the main document outlining the detailed innovative solution by the applicant. Under this NOFO, it is interchangeable with the “Technical Proposal”

Proposal – Also referred to as an “application.”

Research or Research and Development (R/R&D) - Any activity that is:

- (1) a systematic, intensive study directed toward greater knowledge or understanding of the subject studied;
- (2) a systematic study directed specifically toward applying new knowledge to meet a recognized need; or
- (3) a systematic application of knowledge toward the production of useful materials, devices, services, or methods, and includes design, development, and improvement of prototypes and new processes to meet specific requirements.

SBIR Policy Directive – As mandated by the SBIR legislation, the Small Business Administration (SBA) authors this policy that outlines how the SBIR program is run in each participating agency. The link to this policy can be found on sbir.gov.

SBIR Technical Data - All data generated during the performance of an SBIR award.

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.

Small Business Concern (SBC) – A concern that meets the requirements set forth in 13 C.F.R. § 121.702 (available at <http://www.gpo.gov/fdsys/granule/CFR-2011-title13->

[vol1.CFR-2011-title13-vol1-sec121-702](#)).

Socially and Economically Disadvantaged SBC (SDB) - See 13 C.F.R. Part 124, Subpart B.

Socially and Economically Disadvantaged Individual - See 13 C.F.R. §§ 124.103 and 124.104.

Sub-award – See 2 C.F.R. § 200.92.

Technical Proposal – See “Project Narrative” above

Women-Owned Small Business (WOSB) - An SBC that is at least 51% owned by one or more women, or in the case of any publicly 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

All applicants must complete the DoC OIG agency mandatory training and sign/submit the certification of completion along with their application. The link to the Fraud, Waste, and Abuse training slides is located here:

<http://www.techpartnerships.noaa.gov/SBIR.aspx>. Certification can be found at the end of the training module. All applicants must print, sign, and submit certification of completion as an attachment (as per end of Section 8.1).

As defined in the SBIR Policy Directive section 9(f), 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

- (iv) failure to pay taxes due on misused or converted SBIR award funds;
- (v) fabrication, falsification, or plagiarism in applying for, carrying out, or reporting results from an SBIR award;
- (vi) failure to comply with applicable federal costs principles governing an award;
- (vii) extravagant, careless, or needless spending;
- (viii) self-dealing, such as making a sub-award to an entity in which the PI has a financial interest;
- (ix) 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
- (x) 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 using the online Department of Commerce Office of Inspector General Complaint Form, available at <https://www.oig.doc.gov/Pages/online-hotline-complaint-form.aspx> or send an e-mail to: Hotline@oig.doc.gov.

Note: Because the Internet is not secure, it is possible, though unlikely, that e-mail complaints may be read by persons other than your intended source. If you are concerned about this, you may choose to call or mail. Contact information for the Office of Inspector General is available at: <https://www.oig.doc.gov/pages/Contact-Us.aspx>. Please do not include Personally Identifiable Information (PII) through the website or via e-mail. PII is considered to be items containing Social Security numbers, dates of birth, credit card and passport numbers, or other personally identifying information that could adversely affect an individual. Web submissions and e-mails containing such information will be blocked by our system administrator and will not be processed by our Complaint Department. Should you desire to provide this information, please contact the Hotline by telephone at the numbers listed below.

Phone:

Toll Free 800-424-5197
In the DC metro area 202-482-2495
TTD Toll Free 855-860-6950
TTD in the DC metro area 202-482-5923

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Mail:

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

Fax:

855-569-9235

1.9 Other Information**1.9.01 Personal and Business Information**

The applicant acknowledges and understands that information and data contained in applications for financial assistance, as well as information and data contained in financial, performance and other reports submitted by applicants, may be used by the Department of Commerce in conducting reviews and evaluations of its financial assistance programs. For this purpose, applicant information and data may be accessed, reviewed and evaluated by Department of Commerce employees, other Federal employees, and also by Federal agents and contractors, and/or by non-Federal personnel, all of whom enter into appropriate conflict of interest and confidentiality agreements covering the use of such information. As may be provided in the terms and conditions of a specific financial assistance award, applicants are expected to support program reviews and evaluations by submitting required financial and performance information and data in an accurate and timely manner, and by cooperating with Department of Commerce and external program evaluators. In accordance with 2 C.F.R. § 200.303(e), applicants are reminded that they must take reasonable measures to safeguard protected personally identifiable information and other confidential or sensitive personal or business information created or obtained in connection with a Department of Commerce financial assistance award.

In addition, Department of Commerce regulations implementing the Freedom of Information Act (FOIA), 5 U.S.C. Sec. 552, are found at 15 C.F.R. Part 4, Public Information. These regulations set forth rules for the Department regarding making requested materials, information, and records publicly available under the FOIA. Applications submitted in response to this Notice of Funding Opportunity may be subject to requests for release under the Act. In the event that an application contains information or data that the applicant deems to be confidential commercial information that should be exempt from disclosure under FOIA, that information should be identified, bracketed, and marked as Privileged, Confidential, Commercial or Financial Information. In accordance with 15 CFR § 4.9, the Department of Commerce will protect from disclosure confidential business information contained in financial assistance

applications and other documentation provided by applicants to the extent permitted by law.

2.0 CERTIFICATIONS

2.1 Performance Benchmark Ratings Requirements

Awardees will be required to certify size, ownership, and other SBIR Program requirements at the time of award and during the funding agreement life cycle using the SBIR Funding Agreement Certification and the SBIR Funding Agreement Certification – Life-Cycle Certification, which are provided in Appendix A of this NOFO.

2.2 Research Activities Involving Human Subjects, Human Tissue, Data or Recordings Involving Human Subjects

2.2.01 Protection of Human Subjects

Any application that includes 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 an applicant’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 Grants Officer issues written approval. Retroactive approvals are not permitted.

NOAA will accept applications 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. 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. 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.

An applicant 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 application:

- (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 non-duplication-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. (See 15 C.F.C. § 27.112 (Review by Institution))

2.2.02 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 application. 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 that may be found at: <http://grants.nih.gov/grants/guide/notice-files/NOT-OD-00-039.html>

2.3 Research Project Involving Live Vertebrate Animals

Any proposal that includes research involving live vertebrate animals must be in compliance with the “U.S. Government Principles for Utilization and Care of Vertebrate Animals Used in Testing, Research, and Training” (Principles). The Principles and guidance on these Principles are available in the National Research Council's “Guide for the Care and Use of Laboratory Animals,” which can be obtained from National Academy Press, 500 5th Street, N.W., Department 285, Washington, DC 20055, or as a free PDF online at <http://www.nap.edu/catalog/12910/guide-for-the-care-and-use-of-laboratory-animals-eighth>. In addition, such proposals must meet the requirements of the Animal Welfare Act (AWA)(7 U.S.C. § 2131 et seq.), the AWA rules (9 C.F.R. Parts 1, 2, and 3), and if appropriate, the Good Laboratory Practice for Nonclinical Laboratory Studies (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 Grants Officer 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 non-duplication-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 Certifications Regarding Federal Felony and Federal Criminal Tax Convictions, Unpaid Federal Tax Assessments and Delinquent Federal Tax Returns

In accordance with Federal appropriations law, an authorized representative of the selected applicant(s) may be required to provide certain pre-award certifications regarding federal felony and federal criminal tax convictions, unpaid federal tax assessments, and delinquent federal tax returns. As with NOAA's typical grants process, forms will be sent out to "selected for award" applicants during negotiation with the Grants Officer.

3.0 APPLICATION PREPARATION INSTRUCTIONS AND REQUIREMENTS

3.1 Phase I Application Requirements

Only FY 2020 Phase I applications may be submitted in response to this NOFO. Phase II applications are not being accepted at this time. NOAA will publish a Phase II NOFO approximately 30 days prior to the end of the previous year's Phase I period of performance to request Phase II applications. That NOFO will provide instructions for Phase I awardees to prepare a Phase II application and the closing date for submission of applications. To reiterate, only the previous year's Phase I awardees are eligible to submit a Phase II application.

NOAA reserves the right not to forward an application for technical review if NOAA determines the application has insufficient scientific and technical information or is missing any of the required forms and documents listed in Section 8.1. Applications that do not pass the screening criteria (outlined in Section 4.2) will be rejected without further consideration.

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 applicant 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 applicant must provide sufficient information to demonstrate that the proposed work represents a sound approach to the investigation of an important scientific or engineering innovation worthy of support. The proposal must not only be responsive to the specific NOAA program interests described in Section 9 of this NOFO but also serve as the basis for technological innovation leading to new commercial products, processes, or services that benefit the public.

Applications 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 should be omitted.

As required by the SBIR Policy Directive, NOAA will notify the various applicants

whether they have been recommended for a potential award within 90 calendar days of the closing date of this NOFO. If selected for potential award and approved by the Grants Officer, the applicant can anticipate receiving an actual award within 180 calendar days of the closing date of the NOFO. The SBC applicant shall not proceed with work until an official award is received and accepted.

All applicants are required to provide information for SBA's database (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.
- Updated information in the SBA database on sbir.gov for any prior 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.

All awardees are required to update appropriate information on the award in the database upon completion of the last program objective under the funding agreement and is requested to voluntarily update the information in the database annually thereafter for a minimum period of five years.

3.2 Phase I Application

A complete application must include a Project Narrative (or Technical Proposal) (described below) and all other forms and documents listed in Section 8.1 of this NOFO.

An applicant may submit one application on multiple subtopics or more than one application on one subtopic under this NOFO. When the proposed innovation applies to more than one subtopic, the applicant must submit its application under the subtopic that is most relevant to the applicant's technical concept. Applications on multiple subtopics or multiple applications to the same subtopic must be clearly differentiated.

The Project Narrative or Technical Proposal, both the SBIR-STTR Information Form Cover Sheet and Technical Content, is limited to 25 pages. The only exception to the 25-page limit is for applicants covered by the provision for prior SBIR Phase II Awards Section 3.2.02 (14)). Additional pages beyond the 25-page limit will not be considered in the

evaluation process. Pages should be of standard size (8 1/2" x 11"; 21.6 cm x 27.9 cm) with margins of 2.5 cm and type at least 10-point font. All units of measurement should be presented in metric units.

The Project Narrative or Technical Proposal portion of the application requires the following:

- (a) SBIR-STTR Information Form Cover Sheet (3.2.01) pages 1 and 2, and**
- (b) Technical Content (3.2.02) pages 3 through 25.**

The listing of all forms and documents needed to complete the application is given in Section 8.1 of this NOFO. The additional required forms and documents in Section 8.1 are not included in the 25-page count.

See Section 6.0 for information on the submission of applications in response to this NOFO.

3.2.01 SBIR-STTR Information Form Cover Sheet

A completed SBIR-STTR Information Form (or the SBIR Cover Sheet) is a required part of the Technical Proposal or Project Narrative. The Cover Sheet is counted as pages 1 and 2 of the Technical Proposal or Project Narrative.

In addition, the applicant must submit a one page document that contains a project abstract (limited to 200 words) and summary of potential commercial application of the research results (limited to 100 words). Each applicant's abstract and summary of potential commercial applications will be provided to the SBA and should not contain proprietary information. Awardee's abstract and summary of potential commercial applications will be published on the NOAA SBIR website and SBIR.gov

3.2.02 Technical Content

Beginning on page 3 of the application, 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).

- 1. Identification and Significance of the Problem or Opportunity.** Make a clear statement of the specific research problem or opportunity addressed, its innovativeness, commercial potential, and explanation of importance. Explain how it applies to a specific subtopic in Section 9.

2. **Phase I Technical Objectives.** State the specific objectives of the Phase I effort, including the technical questions it will try to answer, to determine the feasibility of the proposed approach.
3. **Phase I Work Plan.** Include a detailed description of the Phase I feasibility research plan. The plan should indicate what will be done, where it will be done, and how the research will be carried out. The method(s) planned to achieve each objective or task should be discussed in detail.
4. **Related R/R&D.** Describe significant R/R&D that is directly related to the application, including any conducted by the principal investigator or by the proposing SBC. Describe how it relates to the proposed effort, and describe any planned coordination with outside sources. The applicant must persuade evaluators of his or her awareness of key, recent R/R&D conducted by others in the specific topic area.
5. **Key Individuals and Bibliography of Related Work.** Identify key individuals involved in Phase I, including their related education, experience, and publications. Where vitae are extensive, summaries that focus on the most relevant experience and publications are desired and may be necessary to meet application size limitations.
6. **Relationship with Future R/R&D.** Discuss the significance of the Phase I effort in providing a foundation for the Phase II R/R&D effort. Also state the anticipated results of the proposed approach if Phases I and II of the project are successful.
7. **Facilities and Equipment.** A detailed description, availability, and location of instrumentation and physical facilities proposed for Phase I should be provided.
8. **Consultants, Contracts, and Sub-awards.** The purpose of this section is to show that any third-party research assistance would materially benefit the proposed effort and that arrangements for such assistance are in place at time of application submission.

For Phase I, a minimum of two-thirds of the research and/or analytical effort must be performed by the awardee. Outside involvement in the project is encouraged where it strengthens the conduct of the research. Outside involvement is not a requirement of this program and is limited to no more than one-third of the research and/or analytical effort in Phase I. The total cost for all

consultant fees, facility leases, usage fees, and other subcontract/sub-award or purchase agreements may not exceed one-third of the total award.

No individual or entity may serve as consultant, contractor, or sub-recipient if they (a) had any role in suggesting, developing, or reviewing the NOAA subtopic; or (b) have been the recipient of any NOAA information on the subtopic not available to the public.

The following definitions apply to this NOFO:

- Consultant - A person outside the firm, named in the application as contributing to the research, must provide a signed statement confirming his/her availability, role in the project, and agreed consulting rate for participation in the project.
- Contract - Similarly, where a contract is involved in the research, the contractor institution must furnish a letter signed by an appropriate official describing the programmatic arrangements and confirming its agreed participation in the research, with its proposed budget for this participation.
- Sub-awards - As the funding instrument used in this program is financial assistance, an awardee might pass through funds to another organization to carry out part of the Federally-supported project. A “sub-award” relationship fits the circumstances more appropriately than a contract to carry out part of the Federally-supported project. See 2 CFR §§ 200.92 (sub-award), 200.93 (sub-recipient), and 200.330 (Sub-recipient and contractor determinations), respectively.

The sub-recipient institution must furnish a letter signed by an appropriate official describing the programmatic arrangements and confirming its agreed participation in the research, with its proposed budget and budget justification for this participation.

9. **Potential Commercial Application.** A program goal is to provide opportunities for small businesses to convert research into technological innovation in the private sector. All proposed research should have some potential commercial outcome. Describe in detail the commercial potential of the proposed research, and how commercialization would be pursued and potentially used by the private sector and/or the Federal Government. Include any optional letters of support and relevant supporting material such as references to journal articles, literature, or government publications. Provide any indicators of commercial potential, and address the following:
 - Market opportunity – Describe the current and anticipated target market

and the size of the market, and include a brief profile of the potential customer(s).

- Technology and competition – Describe the competitive landscape and 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 beyond the SBIR award. Describe the existence of any outside, non-SBIR funding or partnering commitments including any Phase II funding commitments from private sector or non-SBIR funding sources and/or the existence of Phase III follow-on commitments for the subject research.

10. **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, or continue, a CRADA with an awardee under this NOFO on the subtopic of the award.

11. **Guest Researcher.** State if the applicant or any of its consultants or subcontractors is a guest researcher at NOAA, naming the sponsoring laboratory.

12. **Cost Sharing.** Cost sharing is not required and is not considered during the evaluation process for Phase I applications.

13. **Similar Applications or Awards. WARNING** -- While it is permissible to submit identical applications or applications containing a significant amount of essentially equivalent work for consideration under numerous Federal program funding announcements, **it is unlawful to enter into a funding agreement requiring essentially equivalent work to an SBIR award (see 15 U.S.C. § 638(bb)(3)).** If there is any question concerning this, it must be disclosed to the soliciting agency or agencies before award.

If an application submitted in response to this NOFO is substantially the same as another application that has been funded, is now being funded, or is pending with another Federal Agency, the applicant must provide the following information

- a) Names and addresses of agencies to which an application was submitted or from which an award was received.

- b) Date of application submission or date of award.
- c) Title, number, and date of NOFO(s) under which an application was submitted or award received.
- d) Specific applicable research topic(s) for each application submitted or award received.
- e) Title of research projects for each application submitted or award received.
- f) Name and title of principal investigator or project manager for each application submitted or award received.

If no equivalent application is under consideration or award for equivalent work received, a statement to that effect **must** be included in this section of the technical content area of the application.

14. **Prior SBIR Phase II Awards.** If the SBC has received more than 15 Phase II awards in the prior five fiscal years, the SBC must submit the following information in its Phase I application: name of the awarding agency; date of award; funding agreement number; amount of award; topic or subtopic title; follow-on agreement amount; source and date of commitment; and current commercialization status for each Phase II award. This required information will not be counted toward the 25-page Project Narrative (Technical Proposal) limitation.

4.0 METHOD OF SELECTION AND EVALUATION CRITERIA

4.1 Evaluation and Selection Process

All applications will be evaluated and ranked on a competitive basis. Applications will be evaluated based only on information provided in the application. Applications will be initially screened to determine responsiveness, eligibility, and completeness (see Sections 4.2 and 8.1). Applications passing these initial screenings will be technically evaluated in accordance with the evaluation criteria (see Section 4.3). Each application will be judged on its own merit. NOAA is under no obligation to fund any application or any specific number of applications in a given topic. NOAA may elect to fund several or none of the applications for the same topic or subtopic. If an application is submitted for a subtopic that requires a license to use a NOAA-owned invention covered by a patent or patent application and such NOAA-owned invention has become unavailable for licensing prior to the close of this NOFO in the field of use relevant to the subtopic, NOAA has the sole discretion to deem such application ineligible under the subtopic.

4.2 Phase I Screening Criteria

Please carefully read the entire NOFO and review the following Phase I Screening Criteria to assure that your application meets NOAA requirements. Phase I applications that do not satisfy all the screening criteria will not be reviewed and will be eliminated from consideration for award. However, NOAA, in its sole discretion, may continue the review process for an application that is missing minor non-substantive information, the absence of which may easily be rectified. The screening criteria are:

1. Each Phase I application package must be limited to one subtopic and clearly address research for that subtopic. Applicants may apply to more than one subtopic in this NOFO but must do so as separate applications. Applicants also may submit more than one application for the same subtopic but must ensure that each application is clearly differentiated.
2. Phase I application budgets must not exceed \$150,000.
3. The project duration for the Phase I feasibility research shall not exceed six months.
4. The proposing firm must carry out a minimum of two-thirds of expenditures under each Phase I project.
5. All work must be performed by the small business concern and its sub-award recipients in the United States, unless a waiver has been granted in advance by the NOAA Grants Officer (see Section 1.5.01).
6. The application must be received by NOAA before the deadline specified in Section 6.1.
7. The proposing firm must qualify as eligible according to the criteria provided in Section 1.5.
8. If an application is submitted for a subtopic that requires a license to use a NOAA-owned invention covered by a patent or patent application, the relevant NOAA-owned invention must be available for licensing prior to the close of this NOFO in the field of use relevant to the subtopic.
9. The Phase I application must include all required forms and documents listed in Section 8.1:
 - a) SF-424, Application for Federal Assistance, Research
 - b) SF424A, Budget Information – Non-Construction Programs
 - c) SF-424B, Assurances – Non Construction Programs
 - d) CD-511, Certification Regarding Lobbying
 - e) SF-LLL – Disclosure of Lobbying Activities (if applicable)
 - f) SBIR-STTR Information Form Cover Sheet – see Section 3.2.01
 - g) Project Abstract – See Section 3.2.01
 - h) Technical Content – see Section 3.2.02
 - i) Budget Narrative – see Section 8.1.7
 - j) Indirect Cost Rate Agreement – see Section 8.1.8

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- k) SBA Company Registry Form – see Section 8.1.9
- l) Research and Related Personal Data – see Section 8.1.10
- m) Compliance with SBIR Program Requirements, Applicant Fraud Awareness Training – Certificate of Training Completion – see Section 8.01.11

4.3 Phase I Evaluation Criteria

Phase I applications that comply with the screening criteria in Section 4.2 will undergo an internal, two-step scored review process.

Step 1: Technical Review. The applications will be evaluated by at least three NOAA and/or external reviewers via peer review in accordance with the following criteria:

1. The technical approach and the anticipated commercial benefits that may be derived from the research (20 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 an application's commercial potential and application (30 points).
5. Qualifications of the proposed principal/key investigators, supporting staff, and consultants (15 points).

Technical reviewers will base their evaluations only on information contained in the application. Applicants should be specific and clear when writing their applications and not assume information not clearly spelled out can be inferred by the reviewer. No technical clarifications may be made after application submission. Based upon the distribution of scores, the Program Manager will determine the average score above which applications will be considered "technically superior." Applications not rated as technically superior will not be considered further.

Step 2: Evaluation Panel. A selection panel will review the applications based upon the distribution of scores and consider the following evaluation factors to develop a final ranking:

1. Application's priority ranking resulting from Step 1: Technical Review.
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

application that indicates the commercial potential of the idea (such as letters of support, journal articles, literature, Government publications, etc.).

4.4 Phase I Award Selections

Final award recommendation decisions will be made by NOAA's Selecting Official based upon rankings assigned by the selection panel and upon consideration of the following selection factors:

- (1) rankings assigned by the evaluation panel;
- (2) diversity across the sub-topics and project types;
- (3) diversity across participants;
 - geographically
 - by type of institutions
 - by type of partners
 - by researchers
- (4) applicants prior award performance;
- (5) partnerships and/or participation of targeted groups;
- (6) possible duplication of other federally-funded research, and;
- (7) availability of funding

In the event of a "tie" between applications, 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 applications received on a given subtopic. Subsequent to the assessment and prior to award, NOAA may ask for supplemental information and may negotiate the scope and amount of the award. The final approval of selected applications and issuance of awards will be made by the NOAA Grants Officer. The award decisions of the NOAA Grants Officer are final.

4.5 Federal Awarding Agency Review of Risk Posed By Applicants

After applications are proposed for funding by the selecting official, the NOAA Grants Management Division (GMD) performs administrative reviews, including an assessment of risk posed by the non-Federal entity under 2 C.F.R. 200.205. These may include assessments of the financial stability of a non-Federal entity and the quality of the non-Federal entity's management systems, history of performance, and the non-Federal entity's ability to effectively implement statutory, regulatory, or other requirements imposed on non-Federal entities. Specific award conditions that address any risks determined to exist may be applied. Non-Federal entities

may submit comments to the Federal Awardee Performance and Integrity Information System (FAPIS) about any information included in the system about their organization for consideration by the awarding agency.

In addition, prior to making an award, NOAA GMD will review and consider the publicly available information about that applicant in the Federal Awardee Performance and Integrity Information System (FAPIS). An applicant may, at its option, review and comment on information about itself previously entered into FAPIS by a Federal awarding agency. As part of its review of risk posed by applicants, NOAA GMD will consider any comments made by the applicant in FAPIS in making its determination about the applicant's integrity, business ethics, and record of performance under Federal awards.

Upon completion of the pre-award risk assessment, the NOAA Grants Officer will make a responsibility determination concerning whether the applicant is qualified to receive the subject award and, if so, whether appropriate special conditions that correspond to the degree of risk posed by the applicant should be applied to an award.

4.6 Release of Application Review Information

After final award decisions have been announced, the reviewers' technical evaluations of applications that passed the screening criteria will be provided to the applicant with written notification of award/non-award. The identity of the reviewers will not be disclosed

5.0 CONSIDERATIONS

5.1 Awards

Contingent upon availability of funds, NOAA anticipates making a total number of approximately thirty (25) Phase I awards of no more than \$150,000 each. The total performance period shall be no more than six (6) months. Historically, NOAA has funded between ten to twenty percent of the Phase I applications received.

Phase II awards shall be for no more than \$500,000. The R&D activity period of performance in Phase II will depend upon the scope of the research but is typically 24 months. 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. Funding for the program listed in this NOFO is contingent upon the availability of appropriations

For planning purposes, applicants should understand that the Phase I award start date is tentatively planned for July 1, 2020. Phase II applications are tentatively due to NOAA in January 2021 and Phase II awards are tentatively planned around May 2021.

In no event will NOAA or the Department of Commerce be responsible for application preparation costs. This NOFO does not obligate NOAA or the Department of Commerce to make any awards under either Phase I or Phase II. Furthermore, NOAA will not fund any costs incurred by the applicants before awards are made. Publication of this NOFO does not obligate NOAA or the Department of Commerce to award any specific project or to obligate any available funds.

5.2 Reporting Requirements

Phase I awardees will be required to submit the Department of Commerce-required Research Performance Progress Report (RPPR, OMB Number: 0690-0032) covering the award's first three months during the fourth month of the period of performance and a final report six months after the start of the award. The final report shall encompass completion of all the objectives or tasks from the applicant's proposal.

The RPPR form can be found here:

http://www.osec.doc.gov/oam/grants_management/policy/documents/RPPR%20Fillable%20Final%20-%20OMB%200690-0032%20Expires%2008.31.2021%20v2.pdf

Associated documentation regarding the RPPR can be found here:

http://www.osec.doc.gov/oam/grants_management/policy/documents/RPPR%20Instructions%20and%20Privacy%20Statement.pdf

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 5.4.02.(d)(1).

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 grant 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.”*

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 awards.

5.3 Payment Schedule

NOAA grant will include an award term with electronic payment system information. Pursuant to 2 C.F.R. § 200.305 awardees are to be paid in advance, provided they maintain or demonstrate the willingness to maintain: written procedures that minimize the time elapsing between the transfer of funds and disbursement by the recipient and financial management systems that meet the standards for fund control and accountability as established in 2 C.F.R. § 200.302. Advances of funds to a recipient organization shall be limited to the minimum amounts needed and be timed to be in accordance with the actual, immediate cash requirements of the recipient organization in carrying out the purpose of the approved program or project.

The Department of Commerce policy requires that in the usual case, non-Federal entities time advance payment requests so that Federal funds are on hand for a maximum of three calendar days before being disbursed by the non-Federal entity for eligible award costs. In no case should advances exceed the amount of cash required for a 30-day period.

Unless otherwise provided for in the award terms, payments from DOC to recipients under this award will be made using the Department of Treasury’s Automated Standard Application for Payment (ASAP) system. Under the ASAP system, payments are made through preauthorized electronic funds transfers directly to the recipient’s bank account, in accordance with the requirements of the Debt Collection Improvement Act of 1996. To receive payments under ASAP, recipients are required to enroll with the Department of Treasury, Financial Management Service, Regional Financial Centers,

which allows them to use the on-line and Voice Response System (VRS) method of withdrawing funds from their ASAP established accounts. The following information will be required to make withdrawals under ASAP:

1. ASAP account number – the Federal award identification number found on the coversheet of the award;
2. Agency Location Code (ALC); and
3. Region Code.

Recipients enrolled in the ASAP system do not need to submit a Form SF-270 (Request for Advance or Reimbursement), for payments relating to their award. Awards paid under the ASAP system will contain a specific award condition, clause, or provision describing enrollment requirements and any controls or withdrawal limits set in the ASAP system.

When the Form SF-270 (Request for Advance or Reimbursement) or successor form is used to request payment, the recipient must submit the request no more frequently than monthly, and advances must be approved for periods to cover only expenses reasonably anticipated over the next 30 calendar days. .

The Federal award identification number must be included on all payment-related correspondence, information, and forms.

Non-Federal entities receiving advance award payments must adhere to the depository requirements set forth in 2 C.F.R. §§ 200.305(b)(7) through (b)(9). Interest amounts up to \$500 per non-Federal entity's fiscal year may be retained by the non-Federal entity for administrative expenses.

5.4 Innovations, Inventions and Patents

5.4.01 Proprietary Information

Information contained in unsuccessful applications will remain the property of the SBC applicant. To the extent permitted by Federal law, funded proposals will not be made available to the public, except for the Project Abstract information, a required document submitted as an attachment. (see Section 3.2, Section 8.1(6) for more info on the project abstract).

Applicants are discouraged from submitting proprietary information unless the information is deemed essential for proper evaluation of the application. If proprietary information is provided in an application, 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 applicant with the term “confidential proprietary information” and the following legend must appear on the title page 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 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.”

Any other legend may be unacceptable to the Government and may constitute grounds for removing the application from further consideration, without assuming any liability for inadvertent disclosure. The Government will limit dissemination of such information to within official channels. Information contained in unsuccessful proposals will remain the property of the applicant. 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. These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling.

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, applicants are cautioned that proposals are likely to be less competitive if significant details are omitted due to the applicant’s reluctance to reveal confidential/proprietary information.

5.4.02 Rights in Data Developed Under SBIR Funding Agreements

In lieu of the Department of Commerce Financial Assistance Standard Terms and Conditions (dated October 9, 2018), available at <https://go.usa.gov/xPV5K>, Section C.03, Intellectual Property Rights, the following terms and conditions will apply to and be included in all SBIR awards issues under this NOFO:

(a) Definitions. As used in regards to this NOFO and awards made pursuant to this NOFO:

“Computer database” or **“database”** means a collection of recorded information in a form capable of, and for the purpose of, being stored in, processed, and operated on by a computer. The term does not include computer software.

“Computer software” (1) means: (i) computer programs that comprise a series of instructions, rules routines, or statements, regardless of the media in which recorded, that allow or cause a computer to perform a specific operation or series of operations; and (ii) recorded information comprising source code listings, design details, algorithms, processes, flow charts, formulas, and related material that would enable the computer program to be produced, created, or compiled; and (2) does not include computer databases or computer software documentation.

“Computer software documentation” means owner’s manuals, user’s manuals, installation instructions, operating instructions, and other similar items, regardless of storage medium, that explain the capabilities of the computer software or provide instructions for using the software.

“Data” means recorded information, regardless of form or the media on which it may be recorded. The term includes technical data and computer software. The term does not include information incidental to contract administration, such as financial, administrative, cost or pricing or management information.

“Form, fit, and function data” means data relating to items, components, or processes that are sufficient to enable physical and functional interchangeability as well as data identifying source, size, configuration, mating and attachment characteristics, functional characteristics, and performance requirements. For computer software it means data identifying source, functional characteristics, and performance requirements but specifically excludes the source code, algorithms, processes, formulas, and flow charts of the software.

“Limited rights data” means data (other than computer software) developed at private expense that embody trade secrets or are commercial or financial and confidential or privileged.

“**Restricted computer software**” means computer software developed at private expense and that is a trade secret; is commercial or financial and confidential or privileged; or is copyrighted computer software; including modifications of the computer software.

“**SBIR data**” means data first produced by an Awardee that is a small business concern in performance of a small business innovation research award issued under the authority of 15 U.S.C. § 638, which data are not generally known, and which data without obligation as to its confidentiality have not been made available to others by the Awardee or are not already available to the Government.

“**SBIR rights**” means the rights in SBIR data set forth in the SBIR Rights Notice of paragraph (d) of this clause.

“**Technical data**” means recorded information (regardless of the form or method of the recording) of a scientific or technical nature (including computer databases and computer software documentation). This term does not include computer software or financial, administrative, cost or pricing, or management data or other information incidental to contract administration. (See 41 U.S.C. § 403(8)).

“**Unlimited rights**” means the right of the Government to use, disclose, reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, in any manner and for any purpose whatsoever, and to have or permit others to do so.

(b) Allocation of rights.

(1) Except as provided in paragraph (c) section regarding copyright, the Government shall have unlimited rights in—

- (i) Data specifically identified in this award as data to be delivered without restriction;
- (ii) Form, fit, and function data delivered under this award;
- (iii) Data delivered under this award (except for restricted computersoftware) that constitute manuals or instructional and training material for installation, operation, or routine maintenance and repair of items, components, or processes delivered or furnished for use under this award; and

(iv) All other data delivered under this award unless provided otherwise for SBIR data in accordance with paragraph (d) of this clause or for limited rights data or restricted computer software in accordance with paragraph (f) of this clause.

(2) The Awardee shall have the right to—

- (i) Assert copyright in data first produced in the performance of this award to the extent provided in paragraph (c)(1) of this clause;
- (ii) Protect SBIR rights in SBIR data delivered under this award in the manner and to the extent provided in paragraph (d) of this clause;
- (iii) Substantiate use of, add, or correct SBIR rights or copyright notices and to take other appropriate action, in accordance with paragraph (e) of this clause; and
- (iv) Withhold from delivery those data that are limited rights data or restricted computer software to the extent provided in paragraph (f) of this clause.

(c) Copyright.

(1) *Data first produced in the performance of this award.*

- (i) Except as otherwise specifically provided in this award, the Awardee may assert copyright subsisting in any data first produced in the performance of this award.
- (ii) When asserting copyright, the Awardee shall affix the applicable copyright notice of 17 U.S.C. § 401 or § 402 and an acknowledgment of Government sponsorship (including award number).
- (iii) For data other than computer software, the Awardee grants to the Government, and others acting on its behalf, a paid-up nonexclusive, irrevocable, worldwide license to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the Government. For computer software, the Awardee grants to the Government, and others acting on its behalf, a paid-up, nonexclusive, irrevocable, worldwide license in such copyrighted computer software to reproduce, prepare derivative works, and perform publicly and display publicly, by or on behalf of the Government.

(2) *Data not first produced in the performance of this award.* The Awardee shall not, without prior written permission of the Grants Officer, incorporate in data delivered under this award any data that are not first produced in the performance of this award unless the Awardee: (i) identifies such data; and (ii) grants to the Government, or acquires on its behalf, a license of the same scope as set forth in subparagraph (c)(1) of this clause.

(3) *Removal of copyright notices.* The Government will not remove any copyright notices placed on data pursuant to this paragraph (c), and will include such notices on all reproductions of the data.

(d) Rights to SBIR data

(1) The Awardee is authorized to affix the following “SBIR Rights Notice” to SBIR data delivered under this award and the Government will treat the data, subject to the provisions of paragraphs (e) and (f) of this clause, in accordance with such Notice:

SBIR Rights Notice

These SBIR data are furnished with SBIR rights under Award No. _____ (and contract or sub-award, if appropriate). For a period of four years, unless extended, after acceptance of all items to be delivered under this award, 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 Awardee, except that, subject to the foregoing use and disclosure prohibitions, these data may be disclosed for use by support contractors and/or sub-recipients. 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, except that any such data that is also protected and referenced under a subsequent SBIR award shall remain protected through the protection period of that subsequent SBIR award. This Notice shall be affixed to any reproductions of these data, in whole or in part.

(End of notice)

(2) The Government’s sole obligation with respect to any SBIR data shall be as set forth the paragraph above (d(1)). The four-year period of protection applies for Phases I, II and III.

(e) Omitted or incorrect markings

(1) Data delivered to the Government without any notice authorized by paragraph (d) of this clause shall be deemed to have been furnished with unlimited rights. The Government assumes no liability for the disclosure, use, or reproduction of such data.

(2) If the unmarked data has not been disclosed without restriction outside the Government, the Awardee may request, within six months (or a longer time approved

by the Grants Officer in writing for good cause shown) after delivery of the data, permission to have authorized notices placed on data at the Awardees' expense, and the Grants Officer may agree to do so if the Awardee—

- (i) Identifies the data to which the omitted notice is to be applied;
- (ii) Demonstrates that the omission of the notice was inadvertent;
- (iii) Establishes that the use of the proposed notice is authorized; and
- (iv) Acknowledges that the Government has no liability with respect to the disclosure or use of any such data made prior to the addition of the notice or resulting from the omission of the notice.

- (3) If the data has been marked with an incorrect notice the Grants Officer may—
- (i) Permit correction, at the Awardee's expense, if the Awardee identifies the data and demonstrates that the correct notice is authorized, or
 - (ii) Correct any incorrect notices.

(f) Protection of limited rights data and restricted computer software. The Awardee may withhold from delivery qualifying limited rights data and restricted computer software that are not identified in paragraphs (b)(1)(i), (ii), and (iii) of this clause. As a condition to this withholding the Awardee shall identify the data being withheld and furnish form, fit, and function data instead.

(g) Contracting and Sub-awards. The Awardee shall obtain from its contractors and sub-awardees all data and rights therein necessary to fulfill the Awardee's obligations to the Government under this award. If a contractor or sub-awardee refuses to accept terms affording the Government those rights, the Awardee shall promptly notify the Grants Officer of the refusal and not proceed with the contract or sub-award without further authorization in writing from the Grants Officer.

(h) Relationship to patents. Nothing contained in this subsection shall imply a license to the Government under any patent or be construed as affecting the scope of any license or other right otherwise granted to the Government.

5.4.03 NOAA-Owned Inventions

Awardees will not have any automatic rights to make, use or sell products or services incorporating NOAA-owned inventions, unless otherwise noted. For any SBIR award for a subtopic that requires a license to use a NOAA-owned invention covered by a patent or patent application, the SBIR awardee will be required to contact NOAA's Technology Partnerships Office for a patent license for research or for commercial use.

Such awardees will be granted a non-exclusive research license and will be given the

opportunity to negotiate a non-exclusive or an exclusive commercialization license to the NOAA-owned invention, in accordance with the Federal patent licensing regulations, set forth in 37 C.F.R. Part 404, and to the extent that such NOAA-owned invention is available for licensing and has not otherwise been exclusively licensed to another party.

5.4.04 Patent Rights

Normally, small business concerns may retain worldwide patent rights to any invention developed with Federal support. The specific requirements governing the development, reporting, and disposition of rights to inventions and patents resulting from Federal awards are described in more detail in 37 C.F.R. Part 401, which implements 35 U.S.C. 202 through 204 and includes standard patent rights clauses in 37 C.F.R. § 401.14, which will be incorporated by reference into all awards.

5.4.05 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. Inventions must also be reported through the iEdison Invention Reporting System at www.iedison.gov.

5.5 Cost Sharing

Cost sharing is permitted for applications under this program NOFO; however, cost sharing is not required and will not be considered in evaluation of applications.

5.6 Profit or Fee

As specified in the SBIR Policy Directive, awarding agencies must provide for a reasonable fee or profit on SBIR funding agreements, consistent with normal profit margins provided to profit-making firms for R/R&D work. For this NOFO, a reasonable profit or fee not to exceed 7% of the sum of the direct and indirect costs is allowed. This profit is outlined as a separate "Other Cost."

5.7 Joint Ventures or Limited Partnerships

See [13 C.F.R. § 121.103\(h\)](#). Joint ventures and limited partnerships are eligible, provided the entity created qualifies as a small business as defined in this NOFO. However, NOAA has elected to not permit awards to a small business concern that is majority-owned by venture capital operating company(s), hedge funds(s), or private equity firm(s). The

awardee may enter into contracts, sub-awards, or other agreements with universities or other non-profit organizations provided they still meet the requirements outlined in Section 1.7

5.8 Research and Analytical Work

For Phase I, a minimum of two-thirds of the research and/or analytical effort, per Section 1.5.01, must be performed by the proposing SBC. The total cost for all consultant fees, facility leases, usage fees, and other subcontract/sub-award or purchase agreements may not exceed one-third of the total award. For Phase II, a minimum of one-half of the research and/or analytical effort, per Section 1.03, must be performed by the applicant. The total cost for all consultant fees, facility leases, usage fees, and other sub-contract/sub-award or purchase agreements may not exceed one-half of the total award.

5.9 Awardee Commitments

Upon award of a funding agreement, the awardee will be required to review and accept the terms and conditions of the award, including making certain legal commitments through acceptance of numerous Specific Award Conditions (SAC) in the funding agreement. Awards also will be governed by the NOAA Finance Assistance Standard Terms and Conditions (October 9, 2018), Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards at 2 C.F.R. Part 200, adopted by the Commerce Department through 2 C.F.R. § 1327.101; when applicable, 48 C.F.R. Subpart 31.2, Contracts with Commercial Organizations; and the Department of Commerce Pre-Award Notification Requirements for Grants and Cooperative Agreements, 79 FR 78390 (December 30, 2014).

Section 5.10 describes the types of terms and conditions to which the awardee would commit. This list is not a complete list of terms and conditions to be included in Phase I and Phase II funding agreements and is not the specific wording of such terms and conditions.

5.10 Summary Statements

The following statements apply to Phase I and Phase II awards and are examples of some of the topic areas that will be addressed in the award terms and conditions.

- (1) Access to Records. Government officials have the right of timely and unrestricted access to records of awardees, including access to personnel for discussion

related to the records. See 2 C.F.R. § 200.336, available at www.gpo.gov/fdsys/pkg/CFR-2017-title2-vol1/pdf/CFR-2017-title2-vol1-sec200-336.pdf.

- (2) Termination. Awards may be terminated (a) by the NOAA Grants Officer, if an awardee materially fails to comply with the terms and conditions of an award, or for cause; (b) by the NOAA Grants Officer with the consent of the awardee, in which case the two parties shall agree upon the termination conditions, including the effective date and, in the case of partial termination, the portion to be terminated; (c) by the awardee upon sending to the NOAA Grants Officer written notification setting forth the reasons for such termination, the effective date, and, in the case of partial termination, the portion to be terminated. See 2 C.F.R. §§ 200.338-342 available at www.gpo.gov/fdsys/granule/CFR-2014-title2-vol1/CFR-2014-title2-vol1-sec200-338.
- (3) Non-Discrimination. The awardee will be required to comply with statutory and other non-discrimination requirements. No person in the United States shall, on the ground of race, color, national origin, handicap, age, religion, or sex, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving Federal financial assistance. See Department of Commerce Financial Assistance Standard Terms and Conditions, available at <https://go.usa.gov/xXRxK>, Section G.02.
- (4) Audit Requirements. Government officials may conduct an audit of an award at any time. Unless otherwise specified in the award, for-profit organizations that expend \$750,000 or more in federal funds during their fiscal year must have an audit conducted for that year in accordance with the DOC Financial Assistance Standard Terms and Conditions. See Department of Commerce Financial Assistance Standard Terms and Conditions, Section D.01(c).
- (5) Codes of Conduct. Codes of Conduct. Pursuant to the certification in Form SF-424B, paragraph 3, the awardee must maintain written standards of conduct to establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain in the administration of the award. See Department of Commerce Financial Assistance Standard Terms and Conditions, Section F.

5.11 Additional Information

- (1) If there is any inconsistency between the information contained herein and the terms of any resulting SBIR funding agreement, the terms of the funding agreement are controlling.
- (2) Before award of a SBIR funding agreement, the Government may request

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the applicant to submit certain organizational, management, personnel, and financial information to assure responsibility of the applicant.

- (3) The Government is not responsible for any funds expended by the applicant before award of any funding agreement.
- (4) This program NOFO is not an offer by the Government and does not obligate the Government to make any specific number of awards. Also, awards under the SBIR Program are contingent upon the availability of funds.
- (5) The SBIR Program is not a substitute for existing unsolicited application mechanisms. Unsolicited applications will not be accepted under the SBIR Program in either Phase I or Phase II.
- (6) If an award is made pursuant to an application submitted under this SBIR Program NOFO, a representative of the awardee will be required to certify that the concern has not previously been, nor is currently being, paid for essentially equivalent work by any Federal agency.
- (7) The responsibility for the performance of the principal investigator, and other employees or consultants who carry out the proposed work, including those of sub-recipients or contractors, lies with the management of the organization receiving an award.
- (8) NOAA is committed to the goal of commercialization of the results of SBIR projects and may provide discretionary technical and commercialization assistance to awardees as allowed by legislation.
 - a. Commercialization Assistance Program (CAP): NOAA is committed to providing assistance in commercialization planning of products, services or technologies developed by Phase II awardees under the SBIR program. The NOAA CAP is a program that 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 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 will be provided in the Phase II proposal preparation instructions sent to each Phase I awardee.

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

5.12 Technical Assistance for Application Preparation and Project Conduct

Applicants may wish to contact the National Institute of Standards and Technology (NIST) Hollings Manufacturing Extension Partnership (MEP), a nationwide network of locally managed extension centers whose sole purpose is to provide small- and medium-sized manufacturers with the help they need to succeed. The centers provide guidance to high-technology companies seeking resources and teaming relationships. To be referred to an MEP center for technical assistance, call 1-800-MEP-4-MFG (1-800-637-4634) or visit MEP's website at <http://www.nist.gov/mep>.

MEP Centers are also prepared to provide referrals to state and local organizations offering resources and technical assistance to all NOAA SBIR applicants after awards have been announced.

5.13 NOAA Grant Management Office Statements

DEPARTMENT OF COMMERCE PRE-AWARD NOTIFICATION REQUIREMENTS FOR GRANTS AND COOPERATIVE AGREEMENTS. The Department of Commerce Pre-Award Notification Requirements for Grants and Cooperative Agreements contained in the Federal Register notice of December 30, 2014 (79 FR 78390) are applicable to this NOFO and may be accessed online at <http://www.gpo.gov/fdsys/pkg/FR-2014-12-30/pdf/2014-30297.pdf>.

UNIFORM ADMINISTRATIVE REQUIREMENTS, COST PRINCIPLES, AND AUDIT REQUIREMENTS. Through 2 C.F.R. § 1327.101, the Department of Commerce adopted Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards at 2 C.F.R. Part 200, which apply to awards in this program. Refer to

<http://go.usa.gov/SBYh> and <http://go.usa.gov/SBg4>.

DOC TERMS AND CONDITIONS. Successful applicants who accept a NOAA award under this NOFO will be bound by Department of Commerce Financial Assistance Standard Terms and Conditions. This document will be provided in the award package in NOAA's Grants Online system at <http://www.ago.noaa.gov> and at <http://go.usa.gov/hKbj>.

UNPAID OR DELINQUENT TAX LIABILITY. In accordance with Section 523 of Division B and Sections 744 and 745 of Division E of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235) or a future public law, an authorized representative of the selected non-Federal entity(s) will be required to provide certain pre-award representations regarding federal felony and federal criminal tax convictions, unpaid federal tax assessments, and delinquent federal tax returns. The form must be completed and submitted with grant applications for: (a) all for-profit and non-profit organization applicants (Part I, and if required, Part II); and (b) all non-Federal entity applicants anticipating receipt of \$5 million or more in the current Federal Fiscal Year appropriated funding (Part II only). The form can be found at <http://www.ago.noaa.gov/grants/forms.html>.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA). NOAA must analyze the potential environmental impacts, as required by the National Environmental Policy Act (NEPA), for applicant projects or proposals that are seeking NOAA federal funding opportunities. Detailed information on NOAA compliance with NEPA can be found at the following NOAA NEPA website: <http://www.nepa.noaa.gov/>, including our NOAA Administrative Order 216-6 for NEPA, http://www.nepa.noaa.gov/NAO216_6.pdf, and the Council on Environmental Quality implementation regulations, http://energy.gov/sites/prod/files/NEPA-40CFR1500_1508.pdf. Consequently, as part of an applicant's package, and under their description of their program activities, applicants are required to provide detailed information on the activities to be conducted, locations, sites, species and habitat to be affected, possible construction activities, and any environmental concerns that may exist (e.g., the use and disposal of hazardous or toxic chemicals, introduction of non- indigenous species, impacts to endangered and threatened species, aquaculture projects, and impacts to coral reef systems). In addition to providing specific information that will serve as the basis for any required impact analyses, applicants may also be requested to assist NOAA in drafting an environmental assessment, if NOAA determines an assessment is required. Applicants will also be required to cooperate with NOAA in identifying feasible measures to reduce or avoid any identified adverse environmental impacts of their proposal. Failure to do so shall be grounds for not selecting an application. In some cases if additional information is required after an application is selected, funds can be withheld

by the Grants Officer under a special award condition requiring the recipient to submit additional environmental compliance information sufficient to enable NOAA to make an assessment on any impacts that a project may have on the environment.

MINORITY SERVING INSTITUTIONS - The Department of Commerce/National Oceanic and Atmospheric Administration (DOC/NOAA) is strongly committed to increasing the participation of Minority Serving Institutions (MSIs), i.e., Historically Black Colleges and Universities, Hispanic-serving institutions, Tribal colleges and universities, Alaskan Native and Native Hawaiian institutions, and institutions that work in underserved communities.

FREEDOM OF INFORMATION ACT (FOIA) - In the event that an application contains information or data that you do not want disclosed prior to award for purposes other than the evaluation of the application, mark each page containing such information or data with the words "Privileged, Confidential, Commercial, or Financial Information - Limited Use" at the top of the page to assist NOAA in making disclosure determinations. DOC regulations implementing the Freedom of Information Act (FOIA), 5 U.S.C 552, are found at 15 C.F.R. Part 4, which sets forth rules for DOC to make requested materials, information, and records publicly available under FOIA. The contents of funded applications may be subject to requests for release under the FOIA. Based on the information provided by the applicant, the confidentiality of the content of funded applications will be maintained to the maximum extent permitted by law.

SUBAWARD REPORTING: The Federal Funding Accountability and Transparency Act, 31 U.S.C. 6101 note, includes a requirement for awardees of applicable Federal grants to report information about first-tier sub-awards and executive compensation under Federal assistance awards. All awardees of applicable grants and cooperative agreements are required to report to the Federal Sub-award Reporting System (FSRS) available at <https://www.fsr.gov/> on all sub-awards over \$25,000. Refer to 2 CFR Parts 170.

NON-FEDERAL ENTITY: For the purpose of this NOFO, the terms "awardees," "applicants," and or "recipients" are used to describe the various audience of this announcement. However, all "awardees" or "recipients" of this SBIR NOFO grant will be referred to as "Non-Federal Entities" on all future correspondence and communications.

6.0 SUBMISSION OF APPLICATIONS

6.1 Deadline for Applications

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Phase I applications must be received no later than 11:59 p.m. Eastern Time, Monday, February 3, 2020. Only electronic applications submitted via Grants.gov will be accepted.

Applicants should be aware, and factor in their application submission planning, that the Grants.gov system is expected to be closed for routine maintenance at these times:

**December 21-23, 2019 Offline: Saturday December 21, 2019 at 12:01 AM ET.
Online: Monday December 23, 2019 at 6:00 AM ET.**

**January 18-21, 2020 Offline: Saturday January 18, 2020 at 12:01 AM ET.
Online: Tuesday January 21, 2020 at 6:00 AM ET.**

Applications cannot be submitted during those time spans listed above.

Applicants are cautioned to be careful of unforeseen delays that can cause late arrival of applications, with the result that they will not be forwarded for evaluation.

Applications not received by the specified due date and time, as recorded by Grants.gov, or that do not adhere to the other requirements of this NOFO (see Section 4.2 Screening Criteria and Section 8.1 Required Forms and Documents) will not be considered.

NOAA strongly recommends that applicants do not wait until the last minute to submit an application. NOAA will not make allowance for any late submissions. To avoid any potential processing backlogs due to last minute Grants.gov registrations, applicants are highly encouraged to begin their Grants.gov registration process early. No extensions will be granted.

When developing your submission timeline, please keep in mind that (1) all applicants are required to have a current registration in the System for Award Management (SAM.gov) **at the time of application**; (2) the free annual registration process in the electronic System for Award Management (SAM.gov) (see Section 6.3(2)) of this NOFO may take between three and five business days or as long as a month or more; (3) applicants are required to have a current registration in Grants.gov; and (4) applicants will receive a series of e-mail messages from Grants.gov over a period of up to two business days before learning whether a Federal agency's electronic system has received its application. **Please note that applications will be rejected if applicants are not registered in the System for Award Management (SAM) at the time of submission.** A federal assistance award cannot be issued if the designated recipient's registration in the System for Award Management (SAM.gov) is not fully up to date at

the time of the award.

Applicants will find instructions on registering with SAM.gov as part of the Grants.gov process at: <http://www.grants.gov/web/grants/applicants/organization-registration.html>.

6.2 Address to Request Application Package

The standard application package, consisting of the standard forms, i.e., SF-424, Application for Federal Assistance, SF- 424A, Budget Information – Non-Construction Programs – If applicable, when applying for a Multi-Year award (2-5 years), the non-Federal entity must submit a line item budget (SF-424A) and corresponding budget narrative for each of the funding periods anticipated, SF-424B, Assurances – Non-Construction Programs, SF-424C – Budget Information – Construction Programs, SF-424D – Assurances – Construction Programs, SF-LLL, Disclosure of Lobbying Activities and the CD-511, Certification Regarding Lobbying is available at www.grants.gov.

The budget justification/narrative requirement should reference the GMD Budget Narrative Guidance at <http://www.ago.noaa.gov/grants/training.html>.

The standard application package may be requested by contacting the NOAA personnel listed below:

Kelly Wright by email: Kelly.wright@noaa.gov

It can also be obtained by writing to:

National Oceanic and Atmospheric Administration
NOAA SBIR Program Office
Attn: Kelly Wright,
1305 East West Highway SSMC-IV, Room: 7607
Silver Spring, MD 20910

Please see Section 8.1 for a complete list of required forms and documents.

6.3 Application Submission

Applications must be submitted electronically through Grants.gov at www.grants.gov. Paper applications or applications submitted by other electronic means will not be accepted.

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Supplementary material, revisions, substitutions, audio or video tapes, or computer storage media or devices will **not** be accepted. While applicants may not submit replacement pages or missing documents once an application has been submitted, an applicant may submit a complete, new application including such information by the required deadline. The last application received in Grants.gov will be used for evaluation. Applications to multiple subtopics or multiple applications to the same subtopic must be clearly differentiated. (Applicants may apply to more than one subtopic in this NOFO but must do so as separate applications. Applicants also may submit more than one application for the same subtopic but must ensure that each application is clearly differentiated.)

Applications must be submitted via Grants.gov at www.grants.gov, under announcement NOAA-OAR-OAR TPO-2020-2006320.

- (1) Applicants should carefully follow specific Grants.gov instructions to ensure the attachments will be accepted by the Grants.gov system. A receipt from Grants.gov indicating an application is received does not provide information about whether attachments have been received. For further information or questions regarding the electronic application process for the 2020-NOAA-SBIR-01 announcement, contact Janet Johnson Russell by phone at (301) 628-1062 or by email at Janet.J.Russell@noaa.gov.
- (2) Applicants are strongly encouraged to start early and not wait until the approaching due date before logging on and reviewing the instructions for submitting an application through Grants.gov. The Grants.gov registration process must be completed before a new registrant can apply. If all goes well, the registration process takes three (3) to five (5) business days. If problems are encountered, the registration process can take up to two (2) weeks or more. Applicants must have a valid unique entity identifier number and must maintain a current registration in the Federal government's primary registrant database, the System for Award Management (www.sam.gov), at the time of application submission, as explained on the Grants.gov Web site. *See also* Section 8.03 of this NOFO. After registering, it may take several days or longer from the initial log-on before a new Grants.gov system user can submit an application. Only authorized individuals(s) will be able to submit an application, and the system may need time to process a submitted application. Applicants should save and print the proof of submission they receive from Grants.gov. If problems occur while using Grants.gov, the applicant is advised to (a) print any error message received and (b) call Grants.gov directly for immediate assistance. If calling from within the United States or from a U.S. territory, please call 800-518-4726. If calling from a place other than the United States or a U.S. territory, please call

606-545-5035. Assistance from the Grants.gov Help Desk will be available around the clock every day, with the exception of Federal holidays. Help Desk assistance will resume at 7:00 a.m. Eastern Time the day after Federal holidays. For assistance using Grants.gov, you may also contact support@grants.gov.

- (3) To find instructions on submitting an application on Grants.gov, Applicants should refer to the “Applicants” tab in the banner just below the top of the <http://www.grants.gov> home page. Clicking on the “Applicants” tab produces two exceptionally useful sources of information, Applicant Actions and Applicant Resources, which applicants are advised to review.
- (4) Applicants will receive a series of e-mail messages over a period of up to two business days before learning whether a Federal agency’s electronic system has received its application. Closely following the detailed information in these subcategories will increase the likelihood of acceptance of the application by the Federal agency’s electronic system.
- (5) Applicants should pay close attention to the guidance under “Applicant FAQs,” as it contains information important to successful submission on Grants.gov, including essential details on the naming conventions for attachments to Grants.gov applications.
- (6) The Grants.gov Online Users Guide available at the Grants.gov site (<http://go.usa.gov/cjaEh>) provides vital information on checking the status of applications. See especially the “Check My Application Status” option, found by clicking first on Applicants, and then by clicking on Applicant Actions. The application must be both received and validated by Grants.gov. The application is “received” when Grants.gov provides the applicant a confirmation of receipt and an application tracking number. If an applicant does not see this confirmation and tracking number, the application has not been received. After the application has been received, it must still be validated. During this process, it may be “validated” or “rejected with errors.” To know whether the application was rejected with errors and the reasons why, the applicant must log in to Grants.gov, select “Applicants” from the top navigation, and select “Track my application” from the drop-down list. If the status is “rejected with errors,” the applicant may still seek to correct the errors and resubmit your application before the deadline. If the applicant does not correct the errors, the application will not be forwarded to NOAA by Grants.gov.

NOAA uses the Tracking Numbers assigned by Grants.gov and does not issue Agency Tracking Numbers.

Applicants should be aware that adequate time must be factored into applicants’ schedules for delivery of their application. Submitters are advised that volume on Grants.gov may be

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extremely heavy leading up to the deadline date.

Refer to important information in Section 6.1, Deadline for Applications, to help ensure your application is received on time.

Any amendments to this NOFO will be announced through Grants.gov. Applicants can sign up for Grants.gov NOFO amendments

Applicants are advised to check the public Question and Answer website located at <http://techpartnerships.noaa.gov/sbir> for up-to-date information concerning specific technical clarifications on subtopics that may be posted during the NOFO open period.

7.0 SCIENTIFIC AND TECHNICAL INFORMATION SOURCES

Background information related to the research topic areas may be found on the following sources:

- <https://www.commerce.gov/file/us-department-commerce-2018-2022-strategic-plan>
- <http://www.noaa.gov>
- <http://techpartnerships.noaa.gov>
- <http://www.lib.noaa.gov>
- <https://uas.noaa.gov/>
- <https://oceanservice.noaa.gov/facts/ofs.html>

8.0 SUBMISSION FORMS AND CERTIFICATIONS

8.1 Required Forms and Documents

Applicants should review the following list carefully to ensure the application includes all required forms and documents. **Failure to include any of the applicable listed forms and/or documents will result in rejection of the application without consideration.** All required forms and documents must be complete. Please also review Section 4.2 Phase I Screening Criteria. Guidelines provided below are based on frequently asked questions and are not intended to be comprehensive – all forms must be fully completed.

A complete application contains the following forms and documents:

1. **SF-424, Application for Federal Assistance.** Item 12 should list the NOFO number NOAA-OAR-OAR TPO-2020-2006320. The response to #19 should be ‘no’ –the

NOAA SBIR Program is not covered by that Executive Order. For SF-424, Item 21, the list of certifications and assurances is contained in the SF-424B, which is item 3 in this list of Required Forms and Documents.

2. **SF-424A, Budget Information – Non-Construction Programs.** The budget should reflect all anticipated expenses for the project.

In Section A, the Grant Program Function or Activity on Line 1 under Column (a) should be entered as “NOAA Small Business Innovation Research (SBIR) Program”. The Catalog of Federal Domestic Assistance Number on Line 1 under Column (b) should be entered as “11.021”

In Section B, Acceptable fees (see Section 5.6 of this NOFO) should be included in “Other (h)”. These sections of the SF-424A should reflect funds for the entirety of the award: Section A; Section B; Section C; and Section D.

Section E is not relevant to the NOAA-OAR-OAR TPO-2020-2006320 program and therefore should be left blank.

3. **SF-424B, Assurances - Non-Construction Programs.**
4. **CD-511, Certification Regarding Lobbying.** Enter “2020-NOAA-SBIR-01” in the Award Number Field. Enter the title of the application used in field 15 of the SF-424, or an abbreviation of that title, in the Project Name field.
5. **SF-LLL, Disclosure of Lobbying Activities (if applicable).**
6. **SBIR-STTR Information, Project Abstract and Project Narrative (Technical Proposal).** Read Section 3.2 of this NOFO very carefully, and in its entirety, for directions on completing this section of the application. Attach these documents to the SF-424 as described at the end of Section 8.1.
7. **Budget Narrative.** In addition to other mandatory budget information, a separate Budget Narrative is required. There is no set format for the budget narrative; however, it should provide a detailed breakdown of costs under each applicable object class category as reflected on the SF-424A (personnel, fringe benefits, equipment, travel, supplies, other direct costs and indirect costs), and a written justification that includes the necessity and the basis for the cost. Proposed funding levels must be consistent with the project scope, and only allowable costs that fall within the spending limitations specified in Section

1.2.01 of this NOFO should be included in the budget. The proposed budget should reflect planned costs, but the awardee must charge actual costs to the award consistent with cost principles applicable to the type of awardee in accordance with the Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards at 2 C.F.R. Part 200, which apply to awards in this program. More information is available at <http://go.usa.gov/SBYh> and <http://go.usa.gov/SBg4>. Information needed for each category in the budget narrative is as follows. Attach this document to the SF-424 as described at the end of Section 8.1.

- a. Personnel** – At a minimum, the budget justification for all personnel should include the following: name,; job title; commitment of effort on the proposed project in terms of average number of hours per week or percentage of time; salary rate; total direct charges on the proposed project; description of the role of the individual on the proposed project; and the work to be performed. For Phase I, a minimum of two-thirds of the research and/or analytical effort must be performed by the awardee.
- b. Fringe Benefits** – Fringe benefits should be identified separately from salaries and wages and based on rates determined by organizational policy. Provide the fringe rate used. The items included in the fringe benefit rate (35% or higher) should include (e.g. health insurance, workers' compensation, etc.) and should not be charged under another cost category.
- c. Travel** – For all travel costs, the budget justification for travel should include the following: destination; names or number of people traveling; dates and/or duration; mode of transportation, lodging and subsistence rates; and description of how the travel is directly related to the proposed project. For travel that is yet to be determined, please provide best estimates based on prior experience. If a destination is not known, an approximate amount may be used with the assumptions given for the location of the meeting. Foreign Travel: Travel outside the areas specified above is considered foreign travel. Provide a narrative justification describing the same information as above. Follow above format. Certify compliance with the Fly America Act. The Fly America Act limits the use of foreign flag carriers to foreign travel. A waiver is only allowed for specific instances and will require prior approval. See <http://www.gsa.gov/portal/content/103191> for more information.
- d. Equipment** – Equipment is defined as an item of property that has an acquisition cost of \$5,000 or more (unless the organization has established lower levels) and an expected service life of more than one year. Any items that do not meet the threshold for equipment can be

included under the supplies line item. The budget justification should list each piece of equipment, the cost, and a description of how it will be used and why it is necessary to the successful completion of the proposed project. Please note that any general use equipment (computers, etc.) charged directly to the award should be allocated to the award according to expected usage on the project (i.e. prorated cost).

Provide a lease versus purchase analysis. This must accompany every equipment request over \$5,000 even if a lease vs purchase analysis cannot be completed, a statement is required to that effect. General purpose equipment such as office equipment and furnishings, and information technology equipment and systems are typically not eligible for direct cost support (2 CFR part 200.430).

Provide objective-related justification for all equipment items after the detailed budget. The source for determining the budget price for each unit of equipment should be included in the justification.

- e. **Supplies** — An explanation is necessary for supplies costing more than \$5,000, or five percent of the award, whichever is greater. Supplies are defined as all tangible personal property other than that described as equipment. Provide a list of each supply, and the breakdown of the total costs by quantity or unit of cost. Include the necessity of the cost for the completion of the proposed project.
- f. **Contractual (i.e. Contracts/Sub-awards)** – Provide separate budgets for each contract, regardless of the dollar value and indicate the basis for the cost estimates in the narrative. Describe products or services to be obtained and indicate the applicability or necessity of each to the project.

Provide both the annual and total for contractual. Do not incorporate contractual indirect costs under the indirect costs line item for the applicant/grantee on the SF-424A or budget narrative.

- **Name of Contractor or Vendor:** Include the name of the qualified contractor, affiliation, and contact.
- **Method of Selection:** Include how selection was made. If Sole Source, the justification must certify that the award of a contract through full and open competition is infeasible. Also that: (1) the item/service is available only from one source; (2) the public exigency or emergency for the requirement will not permit a delay resulting from

competitive solicitation; and (3) competition is determined inadequate after solicitation of a number of sources. Include qualifications.

- **Period of Performance:** Include the dates/length for the performance period. Include the performance period for each sub-award, which cannot exceed the performance period of the award.
 - **Scope of Work:** List and describe the specific tasks to be performed.
 - **Criteria for Measuring Accountability:** Include an itemized line item breakdown as well as total contract/award amount. If applicable, include any indirect costs paid under the contract/award and the indirect cost rate used.
- g Other Direct Costs** – This category contains both sub-awards and other items not included in the previous categories.
- **Sub-awards.** Provide separate budgets for each sub-award, regardless of the dollar value and indicate the basis for the cost estimates in the narrative. Indicate the applicability or necessity of each sub-award to the project. A sub-award is an award provided by a pass-through entity to a sub-recipient for the sub-recipient to carry out part of a Federal award, including a portion of the scope of work or objectives. Provide the name of the sub-recipient, method of selection, period of performance, scope of work, and criteria for measuring accountability for each sub-award. In addition, provide both the annual (for multiyear awards) and total for sub-awards and other items. Do not incorporate indirect costs incurred by sub-awards under the indirect costs line item for the applicant/grantee on the SF-424A or budget narrative. (It is recommended that sub-awards fall under the *other* section; however, the applicant may opt to categorize sub-awards under the *contractual*. The applicant should be clear in the different regulations/requirements between contracts and sub-awards).
 - **Other.** If any other costs are being requested then provide an explanation and breakdown costs exceeding \$5,000. In this section, the Profit margin shall be explicitly outlined. Profit or fee not to exceed 7% of the sum of the direct and indirect costs must be listed in this cost category if included in the applicant's

budget.

8. **Indirect Cost Rate Agreement.** Indirect costs are allowed provided the applicant has an approved indirect cost rate agreement from the Federal cognizant agency. If a non-Federal entity has not previously established an indirect cost rate with a Federal agency they may choose to negotiate a rate with the cognizant agency (The Federal agency from which the most grant funds are received) or use the de minimis indirect cost rate of 10% of Modified Total Direct Cost (MTDC) (as allowable under 2 C.F.R. §200.414). The negotiation and approval of a rate is subject to the procedures required by NOAA and the Department of Commerce Standard Terms and Conditions. The NOAA contact for indirect or facilities and administrative costs is: Lamar Revis, Grants Officer, NOAA Grants Management Division, 1325 East West Highway, 9th Floor, Silver Spring, MD 20910, or lamar.revis@noaa.gov.
9. **SBA Company Registry Form.** SBA maintains and manages a Company Registry at <http://www.sbir.gov/registration> to track ownership and affiliation requirements for all companies applying to the SBIR Program. The SBIR Policy Directive requires each Phase I applicant to register in the Company Registry prior to submitting an application. The applicant must save its information from the registration in a .pdf document. Attach this document to the SF-424 as described at the end of Section 8.1.
10. **Research & Related Personal Data.** Complete and print the form available at <https://www.grants.gov/web/grants/forms/r-r-family.html#sortby=1>. Attach this document to the SF-424 as described at the end of Section 8.1.
11. **Compliance with SBIR Program Requirements, Applicant Fraud Awareness Training - Certificate of Training Completion.** Complete the training at: <https://techpartnerships.noaa.gov/SBIR>. After completion, print and fill out the last page of the training presentation. Attach this document to the SF-424 as described at the end of Section 8.1.
12. **Registration in the System for Award Management (SAM).** Attach proof of registration. The system can be accessed at <https://www.sam.gov/portal/public/SAM/>. NOAA will not accept an application from an applicant that is not registered in SAM at the time of submission.

Items (1) through (5) above are part of the standard application package in Grants.gov and are completed through the download application process. **Items (6) through (12) must be completed and attached by clicking on “Add Attachments” found in item 15 of the SF-424, Application for Federal Assistance. This will create a zip file that allows for transmittal of the documents electronically via Grants.gov.** Applicants should carefully follow specific Grants.gov instructions at www.grants.gov to ensure the attachments will be accepted by the Grants.gov system. **A receipt from Grants.gov indicating an application is received does not provide information about whether attachments have been received.**

8.0 Verifying the Submission and Tracking the Application

Applicants are urged to use the Grants.gov Download Submitted Applications feature to check that all required attachments were contained in their submission. Go to the *Grants.gov Online Users Guide available at the Grants.gov site* (<http://go.usa.gov/cjaEh>), choose Applicants, then Applicant Actions, then select the “Check My Application Status” option, click on the Download Submitted Applications feature, and follow the directions.

Applicants can track their submission in the Grants.gov system by following the procedures at the Grants.gov site (<http://go.usa.gov/cjamz>). It can take up to two business days for an application to fully move through the Grants.gov system to NOAA.

8.1 Unique Entity Identifier and System for Award Management (SAM)

To enable the use of a universal identifier and to enhance the quality of information available to the public as required by the Federal Funding Accountability and Transparency Act, 31 U.S.C. 6101 note, to the extent applicable, any proposal awarded in response to this announcement will be required to use the System for Award Management (SAM), which may be accessed online at <https://www.sam.gov/portal/public/SAM/>. Applicants are also required to use the Dun and Bradstreet Universal Numbering System, as identified in OMB guidance published at 2 CFR Parts 25, which may be accessed at <http://www.ecfr.gov/cgi-bin/text-idx?SID=2dae4a7dcd5848a6364bb94d2d7786dd&mc=true&tpl=/ecfrbrowse/Title02/2subtitleA.tpl>.

NOAA will not accept an application from an applicant that is not registered in SAM at the time of submission. In addition, NOAA will not make a Federal award to an applicant until the applicant has complied with all applicable unique entity identifier

requirements and the SAM information is current and up to date. If an applicant has not fully complied with the requirements by the time that NOAA is ready to make a Federal award pursuant to this NOFO, NOAA may determine that the applicant is not qualified to receive a Federal award and use that determination as a basis for making a Federal award to another applicant.

9.0 RESEARCH TOPICS

The research topic areas that will be supported by the NOAA SBIR program are those aligned with the goals and priorities outlined in Department of Commerce Strategic Plan, 2018-2022

https://www.commerce.gov/sites/commerce.gov/files/us_department_of_commerce_2018-2022_strategic_plan.pdf

9.1 Aquaculture

9.1.01 Tool Development of Aquaculture Farm Management

A compelling case can be made for increasing scientific and technical knowledge for aquaculture to produce safe and nutritious seafood in the United States, create new jobs from the coastal communities to the agricultural heartland, foster sustainable aquaculture practices, and enhance or restore wild fisheries and habitats. The U.S. has bountiful freshwater and marine natural resources, plentiful feed grains, adequate aquaculture research infrastructures, and excellent scientists, pioneers, and entrepreneurs to drive innovation. The seafood supply chain ranges from farmers and fishermen to upstream and downstream industries (feed and equipment manufacturing, harvesting processing, distribution, and retail outlets) to consumers. A dramatic increase in domestic aquaculture is needed to complement well-managed wild-harvest fisheries and help meet the growing demand for seafood, a food source high in healthful protein and omega-3 fatty acids with many essential vitamins and minerals.

Currently cost effective tools to track seafood safety from harvest to plate are not readily available to farmers.

By investing in low cost farm management tools, farmers would be able to bring their product to market in many ways - from direct farm sales to commercial sales. Projects could range from app development to allow for inventory system of shellfish on a farm (sizes, locations, harvest availability); real time tracking of toxic blooms and real time analysis of project on farms that is cost efficient to allow for direct sales; cost effective tools to track temperature of aquaculture projects from farm to table; etc.

9.1.02 Disease in Aquatic Organisms

Risks to aquatic animal health within the context of marine aquaculture are a critical concern for both the economic security of seafood producers in the US and for the health and safety of seafood consumers. The ability to ensure and demonstrate a culture environment free from pathogens reduces those risks, and provides a potential marketing advantage for farmed products (thereby reducing pressure on wild fisheries). Tools to detect disease in these settings are limited, in both availability and relevance, and there have been no meaningful advancements in practical biosecurity measures for aquaculture in recent years.

Products produced as a result of this subtopic should be practical (i.e. not cost prohibitive for aquaculture practitioners and not prohibitively complicated to deploy) and effective. Tools for disease detection should focus on pathogens of concern (those known to pose an economic threat to growers and those that pose a known threat to human health) and should deliver actionable results to the end user (i.e. indicate whether the presence of a particular organism indicates a true risk).

9.1.03 Aquaculture Genetic Tools

Worldwide (but especially in the United States) aquaculture lags far behind other methods of protein production with regard to genetic tools used to increase production efficiency, protect the health of farmed and cultured organisms, and to protect the wild populations in adjacent habitats. While there have been a number of relatively recent advancements related to brood stock selection for both finfish and bivalves, there are numerous other areas where genetic tools have not yet been developed and deployed.

Innovative tools produced as a result of this subtopic should focus on reducing risk carried by marine aquaculture operations by addressing one of the three focus areas indicated: 1) Improving the health of finfish, shellfish or seaweed being raised on marine farms; 2) Increasing the productivity of marine aquaculture operations, such that more product and/or value can be created with an equal or lesser impact on the environment; 3) Reducing the potential for negative impacts on plants and animals that may exist in proximity to marine aquaculture installations.

9.2 Recreational and Commercial Fisheries

9.2.01 Lab-on-a-Chip: Ocean Iron Sensor

Substantial progress has been made in mapping the distributions of metal micronutrients throughout the ocean over the last 30 years, but there remain information gaps, particularly

during seasonal transitions and in remote regions. Trace metal micronutrients are integral to the functioning of marine ecosystems and the export of particulate carbon to the deep ocean. A remaining challenge is to develop in situ sensing technologies necessary to capture the spatial and temporal variabilities of micronutrients characterized with short residence times, variable sources, and nanomolar to sub-nanomolar concentrations in open ocean settings. Development of these sensors will allow investigation of the biogeochemical processes at the necessary resolution to constrain fluxes, residence times, and the biological and chemical responses to varying metal inputs in a changing ocean. To encourage a more widespread use of in situ sensors by academics and resource managers, the challenge is not only to develop devices that are robust, compact, easy to operate and amenable to longterm deployments (>month) but also to produce sensors that can meet or come close to the same stringent accuracy and precision criteria that are achieved in the laboratory. Specifically, one unmet need is a sensor capable of determining Fe concentrations in real time on CTD rosettes, moorings, and autonomous vehicles.

Significant progress can be made towards the development of an ocean Fe-sensor based the new generations of microfluidic, solid state, voltammetric, and other technologies. For example, advances in “Lab-on-a-Chip” technology combined with new chemical probes show promise in achieving limits of detection required to understand the oceanic Fe system. Some of these probes (such as for Zn) have been successfully adapted to seawater analysis at sub-nanomolar levels in the laboratory but none have been adapted for Fe, nor for in situ use. Similarly, immobilization of fluorescent probes onto fiber optic style sensors may hold promise as well. Electrochemical techniques exhibit high sensitivity in the lab, and their use in in situ sensor-systems is an area of possible development. The overall goal is the production of an in situ sensor capable of analyzing Fe at low to subnanomolar levels for periods of time exceeding 1 month. The chosen technology would preferably be applicable to other trace nutrients.

9.2.02 Low-cost Wireless Temperature and Depth Sensor Package for Deployment on Fishing Gear

A low-cost temperature and depth sensor package that utilizes wireless data transmission (satellite, cellular, WIFI) does not currently exist in the market, and would have a broad interest by scientists and the fishing industry deploying instrumentation on commercial fishing gear.

Needed features for the temperature depth sensor package include: high accuracy; fast satellite data acquisition and transmission; extended battery life; waterproofing; and ruggedized design. Developing a low-cost system for oceanographic monitoring on commercial fishing gear would open opportunities for cooperative fisheries research and

ocean modeling.

There is a need to design, test, and make commercially available a low-cost temperature and depth system that can be deployed on commercial fishing gear, wirelessly communicates with onboard computers, and transmits data via satellite, cellular, or WIFI. A secondary goal is to visualize the temperature and depth data collected by the sensors in near real time.

9.2.03 Automating Bearing and Distance Measurements in Big-Eye 25 x 150 Binoculars and Recording/Saving Images

Detecting and identifying marine mammals and other protected marine species (such as seabirds, sharks, and sea turtles) and collecting biological information is a singular concern for the scientific community, as well as the oil& gas, renewable energy, and fishing industries, including aquaculture. Specifically, these different sectors need information on the number, location, type of marine species, and distance to activity, vessel, or observation platform to either cease activity, collect additional data, or continue ongoing operations to satisfy monitoring requirements. Similarly, from a permitting perspective and to comply with statutory obligations, these different groups need abundance and density estimates to determine immediate and long-term impacts on marine mammals or other marine species that may be susceptible to population-level impacts in the area of operations.

Understanding the abundance, distribution, and density of animals is critical for industry to evaluate where to position their activity in the short- and long-term.

Traditional methods for estimating abundance, density, and distribution for multiple cetacean species rely almost exclusively on visual surveys conducted onboard ships, rigid ocean platforms, or from shore. Such surveys involve the use of “Big-Eye” 25 x 150 binoculars to manually scan for different marine species, especially marine mammals to a maximum distance of about 11-13 km from the ship. Scanning is done by trained observers who locate and identify species and estimate group sizes, which are ultimately used to estimate population abundance and in the development of habitat models. Two key measures are obtained using the binoculars, which include bearing and reticle distance to the sighted animal. While the bearing measurement is easy to obtain with accuracy, the reticle distance, however, is at best an estimate due to the motion of the vessel and sea state. In addition, reticle distance measurement errors can be compounded at distance and when the target animal is being tracked.

Like theodolite readings obtained on land, automated reading of bearing and reticle distance measurements would reduce or eliminate uncertainty while recording animalsightings. Further, a second issue is the lack of any photographic or video evidence of what the observer sees through the binocular. The availability of an image or video would help to

verify species identification in situations where the animal is too far to identify or close-in approaches to verify species identification is not possible.

The automation of the readings from the long-range binoculars has enormous benefits for monitoring and mitigation for both the research and commercial industry. Fisheries, oil& gas, renewable energy, defense, aquaculture sectors, and scientific research groups rely on human observer data to input into mathematical and statistical models to obtain reliable abundance and density estimate for various protected marine species. By improving the ease of data collection and accuracy of readings, these different sectors can improve the quality of data collected and require fewer trained observers in the long-term, thereby reducing costs.

There is a need to design, test, and make commercially available Big-Eye binoculars that can digitally show reticle measurements and bearings as the binocular is swiveled by the observer and simultaneously be recorded in a computer database. A secondary goal is the ability to obtain images or video of the observer visual field during a sighting or tracking of the animal.

9.2.04 Underwater Adhesive for Coral Restoration

Coral reef ecosystems are suffering globally from the effects of ocean warming and other stressors. Dealing with these issues is paramount to the long-term existence of reefs. However, active propagation of corals is critical to maintain reefs in the interim. Coral restoration has been shown to be successful at the reef scale, but significant scale- up and improved efficiency is necessary to be successful at larger scales.

While coral restoration can take on different forms from the deployment of fully grown corals (greater than 20cm and weighing in excess of 1 kg) to placement of small coral fragments (1cm and nearly weightless), almost all forms involve permanently securing small or large corals to existing or artificial reef. Today corals are primarily secured to the reef using a hand mixed two-part adhesive that has a clay/putty like consistency. This is time consuming, as the reef site has to be prepared; the adhesive needs to be hand mixed; set-up time is slow; and the material is not “tacky” and therefore requires precise placement. Currently, the time involved in physically attaching corals is one of the major bottlenecks to efficient coral restoration.

Applications in this subtopic might include innovative ideas for adhesives that are simply used underwater. While not required, some areas of interest within this subtopic include ones that address the following:

- Negatively buoyant in seawater. A consistency that is tacky/sticky underwater immediately with no wait time - that “grabs” both the substrate and the coral.

- Able to be deployed from a “caulk gun” type device as well as from a small nozzle or syringe.
- Ability to be used in large/bulk amounts (20ml for entire corals) or small/precise amounts (1ml for microfragments) depending on use and deployment device.
- Requires minimal surface prep.
- Initial set-up (requires external force to break free) time of 1- 2 minutes but less than 10 min.
- Full cure setup time of less than 12 hours,
- Able to work in salt water.
- Non-toxic to marine life.
- Minimal to no surface preparation.

9.2.05 Rapid Detection of Illegal, Unreported and Unregulated (IUU) Fishing in the Marketplace

On November 5, 2015 H.R. 774 was signed into law as the “Illegal, Unreported, and Unregulated Fishing Enforcement Act.” This legislation advances U.S. efforts to prevent illegally harvested fish from entering our ports and market and achieve sustainable fisheries globally. It also helps address key priorities in the action plan for combatting illegal, unreported, and unregulated (IUU) fishing and seafood fraud. Per the Presidential Task Force on Combating IUU Fishing and Seafood Fraud, the full extent of seafood fraud is difficult to determine, particularly as it often happens at the retail level. Cooperation with state and local authorities on addressing seafood fraud is essential in strengthening links of the supply chain that occur intrastate, or at the local level, and are sometimes outside federal jurisdiction.

There is a need for technology development to design, test, and make commercially available methods to rapidly detect IUU in the market place. Applications in this subtopic might include innovative technologies that develop rapid methods or technologies to check on more of the U.S. seafood supply than is currently available. These include, but are not limited to:

- Methods/Technologies to preventing aqua-cultured imports with banned pharmaceuticals from entering the U.S.
- Development of rapid species identification methods in restaurants, markets, etc.
- Methods/Technologies to efficiently monitor the U.S. market supply for product quality and safety.
- Methods/Technologies to conduct rapid and cost effective surveys to see if restaurants are substituting high-quality seafood for cheaper imported seafood.
- Methods/Technologies that support monitoring efforts of imports to prevent IUU fish from entering the U.S. market, allowing consumers to have confidence that the seafood they

purchase was harvested legally and responsibly.

9.3 Weather Service Improvement and Evolution

9.3.01 Applications for Bulk Power System Geomagnetic Storm Analysis

Space weather represents a significant risk to the U.S. electric power grid through its susceptibility to geomagnetic activity and the resulting induced electric fields. There is a need for improved understanding of the induced electric field impact on the bulk power system. NOAA has developed an operational geoelectric field nowcasting capability with longer-term plans to support short-term forecasting as well. However, this environmental specification must be coupled with analysis tools to support both static and real-time assessment of the impact of these induced electric fields on bulk power system performance and stability. This SBIR application will seek to stimulate growth in this area to ensure environmental specifications can be best applied in mitigating the space weather risk to this critical infrastructure sector.

The goal of this project is to promote the development of private-sector value-added products that address the impacts of space weather on the electric power industry. This activity will: 1) survey the bulk power industry to understand the best application of induced electric field nowcasts to support both historical and real-time system analysis 2) develop value-added test products for evaluation, utilizing currently available data and model output; 3) provide recommendations on product improvements that would facilitate the development of value-added products for the private sector to address electric power industry needs. Eventually this capability could easily be commercialized for use by local and regional power companies that could be vulnerable to the effects of the dangerous electric fields produced by the sun. It could evolve into a tool or a combination of tools that not only benefits power companies but also large companies (running computer servers, transportation systems, hospitals and HVAC) that depend on consistent power grids.

9.3.02 Understanding the Value of NOAA Mission through Public Awareness and Engagement

The weather enterprise produces a large number of products and services the value of which cannot be fully realized without increased public awareness and engagement. This SBIR subtopic seeks the development of novel outreach tools and technologies to increase public awareness of the broad mission areas of weather support in a weather ready nation. It also seeks to stimulate engagement by quantifying and communicating the benefits of the many weather products and services, and helping to transition them to the other sectors of the economy.

Activities under this SBIR subtopic might include:

- demonstrating methods communicate economic benefits of weather products and services across various sectors and over time,
- expanding social science efforts to better communicate the importance of weather forecasting and climate prediction services,
- developing outreach tools and technologies to educate and engage the public to increase awareness, understanding, and value of the oceans, and
- improving the utilization of the government-provided real-time space weather and model output data to encourage private-sector development of value-added products and services that address specific needs of the electric power industry.

9.3.03 Rain-snow Level Measurements and Hazard Avoidance System

There is a major need for accurate and timely observations and predictions of the altitude in the atmosphere of the rain-snow transition boundary (“snow level”) in the mountainous regions of the United States spanning the time period from September to May. Winter storms frequently impact major interstates and highways, including Interstate 80 through the Sierra Nevada and Tetons, Interstates 70 and I-79 through the Appalachians, and Interstate 90 through the Cascades and Bitterroots. As the snow levels change during a winter storm, so do the number of miles of highway that are impacted by snow and more miles of highway that need to be plowed and/or closed.

Adverse weather in various mountainous and remote regions is one of the major causes for delay on the roadway system which can add significant costs to shipping resulting in overall negative impacts to the economy. In regards to public safety, observation systems that monitor rain-snow level evolution in the atmosphere are very sparse throughout the western and eastern mountain ranges. High spatial and temporal resolution observations and predictions with sufficient temporal and geographic coverage to match the scale of winter storms and traffic flows will help with travel planning with the public and commerce. These high resolution observations and predictions would need to be readily available with low latency and adequate accuracy to NOAA and the public and using relatively low-cost instrumentation to permit deployment of a wide network of sensors in hazard-prone regions.

These sensors that would provide the observations and follow-on predictions could provide improved weather conditions data oriented towards forecasters, public, and freight industry and could lead to development of a hazard avoidance system for the public.

The sensor data could also provide a critical dataset for academia to help improve snow level forecasting, which is a major challenge for forecasters. This would ultimately benefit decision makers in private industry, public safety, and freight movement planning.

Improved snow level forecasts could help mitigate costs of shipping by allowing implementation of shipping models to account for adverse weather by shipping products earlier, later, or stopping in route. Having an improved handle on snow levels would avoid loss of revenue due to unexpected closures and hazardous driving conditions for trucks.

Snow level forecasts also directly affect flood forecasts and warnings and associated rivers and streams would provide an additional benefit to the public, industry, and emergency management community when planning for large scale flood events. This information would benefit planning for agriculture and avoid problems with survival of farm animals during spring months.

9.4 Next Generation NOAA Platforms

9.4.01 Unmanned Aircraft System: Rapid Response for Natural Disasters

With the technology advances in UAS systems, which includes sensors and platforms, it is of great interest to federal, state, and local governments to fully exploit the unique capabilities of UAS, which are expanding rapidly, to meet mission requirements for responding to natural disasters. These organizations will benefit from the commercialization of research and technology development in UAS capabilities to help enhance response to natural disasters.

Projects for this subtopic should include the design and execution of CONOPS utilizing UAS observing systems to enhance emergency response, crisis management and interoperable communications between organizations and agencies. This could include rapid deployment of UAS to provide critical information to the Incident Command, First Responders and PSAP (Public Safety Answering Points / 911). Products will provide appropriate response personnel situational awareness and actionable information useful during the response, damage assessment, and/or recovery phases of disaster response efforts. Fusion of information into existing communication and developing technology hardware is critical to saving lives, assessing situations and quick response disaster relief.

Utilization of UAS systems will augment government organizations response capabilities and

have a substantial impact benefiting society, the ecosystem and the environment.

Proposal submissions should include a clear set of plans and protocols for intra- and/or inter-agency communications, indicating how these technologies and interactions would be executed both in advance of disaster and hazmat events as well as during actual disaster and hazmat response efforts. An area of interest is to improve UAS real-time/near real-time data and product dissemination and communications such that it can have an impact pertaining to the evolution of disasters or events. This could include but not limited to ingress / egress routes, locating and providing aid to those in need, etc. Concepts of operations for response must provide societal benefit.

9.4.02 Beyond Visible Line of Sight Technology for UAS Meteorological Missions

With the technology advances in UAS systems, which includes sensors and platforms, it is of great interest to organizations that collect meteorological data to fully exploit the unique capabilities of UAS, which are expanding rapidly, to meet data requirements for improved weather forecasts. These organizations will benefit from the commercialization of research and technology development to enable beyond line of sight UAS flight to help enhance atmospheric measurements.

Continuous measurements of temperature, relative humidity, and turbulent winds in the lower layer of the Earth's atmosphere from the surface up to 3km (9,843 feet) above ground level (AGL) have great potential to improve hazardous and extreme weather forecasts. UAS with calibrated meteorological sensors now have the ability to make these measurements and have been approved by other non-U.S. civil aviation authorities. However, U.S. companies have not yet been successful in developing a UAS approved by the FAA for beyond visual line of sight (BVLOS) for meteorological profiles. In the U.S. BVLOS flight operation requires mitigations to meet FAA sense and avoid requirements (FAR 91.113).

Federal agencies and industry are beginning to be successful in receiving approval for UAS operations beyond visual range using a variety of mitigation strategies. It is a priority and imperative to accelerate BVLOS technology through innovative research and mitigation strategies such as air/ground based radar, aircraft detection technologies, and through safety risk analysis and airspace density studies. Development of BVLOS technology is a high priority need in the UAS industry. Successful BVLOS technologies will continue to be in demand as UAS utilization increases.

A successful project for this subtopic would provide the technological, engineering, and/or data driven solution that mitigates the risk of collision of the UAS with other aircraft for vertical flight profiles from the surface to 10,000 ft above the ground. Typical flight times are

expected to be no more than 45 minutes and be contained within a 1,500 ft radius.

The technical solution should be capable of being integrated with both Vertical Take-Off and Landing (VTOL) and fixed wing UAS that are currently being operated by industry and scientific community. The new prototype UAS will need to have the capacity for integrating atmospheric sensors or use a UAS that already has the atmospheric sensor.

This subtopic seeks a technological solution that can be proposed to the FAA to enable BVLOS flight for atmospheric profile measurements. Locations for initial test and development are not critical. The long term goal is for meteorological organizations to have the ability to deploy this new BVLOS system for atmospheric vertical profiles in locations that have the most impact for improving forecasts of extreme weather.

Note: UAS BVLOS atmospheric profile measurement flights are currently being conducted in other countries where airspace can be segregated by civil aviation authorities for UAS flights. This is not an acceptable means of obtaining BVLOS flight in the United States.

9.5 Next-Generation Observation and Modeling Systems

9.5.01 Increasing Weather Observations above Planetary Boundary Layer

The objective is to increase the spatial and temporal resolution of observations of pressure, humidity, temperature and wind direction/speed via an innovative framework of new sensors outside of normal radiosondes that pulls rawinsonde data from jets. This should expand upon the CONUS radiosonde network with data being available at multiple locations, more than twice per day and over altitudes so as to improve and vastly increase data that gets assimilated into forecast models. Project will address need for increased observations above the PBL even across oceanic regions and remote areas. The goal is to ensure reusable sensors, use of various means of communication for relaying data across vast distances (including over oceans) to receiving stations, integration of tracking methods for use in analysis schemes and weather prediction models, and ability to measure, process and transmit turbulence information to FAA and pilots.

Project leads will work large and small corporate firms to ensure commercialization of data and address new data as a supplement to current radiosonde data. Along with dramatic increase in observations above the PBL on a spatial (horizontal and vertical) and temporal scale, the new data could replace radiosonde data from balloons with substantial cost savings. Future commercialization could be provided via a service supported by a network of servers as well as with apps that enable companies to obtain and use the new data to prevent interference from winds, humidity, icing and turbulence.

This new data will be very valuable to the airline industry as it will increase the amount of observations of wind speed, turbulence, icing, temperature and the conditions that can limit aircraft flight paths, impair shipping of products, and endanger passengers. It will also help with support to industries that depend on knowledge of the humidity and wind changes in the atmosphere that can impair optical sensors, LIDAR efficiency and ducting that can impact communication. There is also the potential for this data to greatly improve the forecasting of severe weather, winter storms and tropical storms that impact so many sectors of the economy.

9.5.02 Automated High Resolution Measurement of VOCs

Volatile organic compounds (VOCs) are emitted from a wide variety of biogenic and anthropogenic sources. Photochemical oxidation of VOCs creates ozone, a criteria pollutant. In addition, lower volatility oxygenated VOCs (OVOCs) produced from photochemistry can condense into fine particulate matter (PM). Both ozone and fine PM harm human health and can influence the Earth's radiative balance. Reducing ozone and PM requires a detailed understanding of the emission and removal of VOCs at sufficient time and spatial resolution. Measurements of individual VOC and OVOC molecules are needed to confirm and validate model descriptions of ozone production and VOC fates and to validate satellite measurements. Progress in this area is limited by the lack of field-deployable and rugged monitoring instrumentation providing detailed molecular information.

Atmospheric VOCs have traditionally been measured by collecting off-line samples in canisters or on adsorbent cartridges, followed by laboratory analysis with gas chromatographic (GC)-mass spectrometry (MS), GC-flame ionization detection (FID), or GC-photoionization detection (PID). However, these methods produce low time resolution (hours to days) and poor spatial coverage, as well as being subject to artefacts due to sample storage and handling.

NOAA needs automated, high spatial and temporal resolution VOC measurements with low latency in order to improve characterization and forecasting of ozone and PM to improve public health. Automated in-situ or remote-sensing instrumentation that is compact, low-cost, and field-deployable on the ground or in aircraft would address the critical need for speciated and quantitative trace gas and VOC measurements. We anticipate that this instrument will yield significant direct commercial sales in the atmospheric science and environmental pollution monitoring and forecasting communities. Other applications could include biomedical research, pharmaceutical development, drug analysis, food and flavor industrial analysis, homeland security, and forensics.

References

Koss, A. R., et al., *Atmos. Chem. Phys.*, 18(5), 3299–3319, 2018; Krechmer, J. E., et al. (2018), *Anal. Chem.*, 90(20), 12011-12018; Lerner, B. M., et al. (2017), *Atmos. Meas. Tech.*, 291-313.

9.5.03 Machine Learning to Improve Earth System Models and Satellite Data

This subtopic directly addresses the Department of Commerce’s strategic objective to “Reduce Extreme Weather Impacts - develop and deploy next-generation observation, data assimilation/processing, and modeling for the environment in order to make informed planning, resources management and investment decisions.”

NOAA and other federal agencies have been maintaining extensive observation networks and developing a large number of integrated earth prediction system models. Computer models developed for weather prediction, coastal ocean circulation, waves, and ice, as well as satellite remote sensing data are all computationally intensive, requiring high performance computing (HPC) to perform simulations, analysis and forecasts. An attractive alternative is to apply machine learning (ML), deep learning (DL), artificial intelligence (AI), pattern- recognition or data analytic approaches to improve the accuracy of earth prediction systems and the efficiency of automated data processing, pattern recognition and feature extraction from large volumes of datasets. Using these new techniques to improve efficiency and accuracy of the forecast products will potentially lead to earlier warnings for extreme weather and water events which have the potential to save more lives and reduce property damage.

This call invites small, high-tech firms specializing in developing novel machine learning, artificial intelligence and pattern recognition algorithms to analyze and process large volumes of computer model results and satellite imagery in order to improve the efficiency and accuracy of integrated earth prediction systems (numerical weather prediction, ocean circulation, hydrological, waves, and ice modeling systems).

The ultimate goal is to develop the next-generation of commercial applications, products and services in Information Technology (IT), autonomous vehicles, medical, insurance industries by applying machine learning or artificial intelligence technologies. Federal government agencies such as NOAA, USGS, DoD and DoE will no doubt benefit from such innovative technology, the true commercialization applications has much broader potential opportunities in multiple industries and market place.

9.6 Flood Inundation

9.6.01 Unmanned Aircraft System Measurement of Erosion Processes and Snow Water for Flood Prediction

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With the technology advances in UAS systems, which includes sensors and platforms, it is of great interest to organizations that need to collect snow water data to fully exploit the unique capabilities of UAS. These organizations will benefit from the commercialization of research and technology development to enable UAS measurements of erosion processes and snow water for flood prediction and water management.

Springtime flooding caused dramatic and expensive impacts in the US in 2019 throughout the eastern Great Plains and Midwest. Management of these impacts required significant data gathering and coordination between local, regional, and federal agencies. Spring flooding can be caused by a variety of mechanisms, but information about the winter snowpack is one of the greatest uncertainties.

Erosion caused by high water, extreme events, and simply natural movement of waterways can occur during springtime as well as throughout the wet season. UAS applications have potential to provide valuable insight for this phenomenon for local, regional, and federal agencies. This project seeks to develop UAS sensors that can be used to measure snow water equivalent.

Currently, the NWS National Operational Hydrologic Remote Sensing Center (NOHRSC) provides comprehensive snow observations, analyses, data sets and map products for the Nation (<https://www.nohrsc.noaa.gov/>). The NOHRSC measures snow water equivalent and soil moisture using gamma radiation remote sensing. This unique observing system includes two low-flying aircraft to conduct surveys in 31 states, including Alaska, as well as in 8 Canadian provinces. These data are incorporated into the National Snow Analyses.

Although some UAS sensors already exist that collect data on snowpack properties, little published research has demonstrated their technological readiness level or effectiveness for operations. Erosion from natural changes in river geomorphology as well as driven by floods can also have devastating impacts on communities and infrastructure. Projects that use UAS-borne remote sensing or a combination of remote-sensing and modeling to derive information on snowpack properties such as snow water equivalent are encouraged.

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:

(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:

(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:

(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:

(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.

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- 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:

(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
