Competition for the Management of Operation and Maintenance of the National Geophysical Facility

PROGRAM SOLICITATION

NSF 23-623

National Science Foundation
Directorate for Geosciences
Division of Earth Sciences

Letter of Intent Due Date(s) ***(required)*** (due by 5 p.m. submitter's local time):

December 01, 2023

Full Proposal Target Date(s):

June 13, 2024

IMPORTANT INFORMATION AND REVISION NOTES

The Directorate for Geosciences requires that proposers who include off-campus or off-site research as part of their project submit, as supplementary documentation, a Plan for Safe and Inclusive Working Environments. For this solicitation, this document replaces the required plan associated with the certification in Chapter II.E.9 of the Proposal and Award Policies and Procedures Guide (PAPPG). Instructions for inclusion of the Plan for Safe and Inclusive Working Environments can be found in the additional proposal preparation instructions in this solicitation.

Any proposal submitted in response to this solicitation should be submitted in accordance with the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) that is in effect for the relevant due date to which the proposal is being submitted. The NSF PAPPG is regularly revised and it is the responsibility of the proposer to ensure that the proposal meets the requirements specified in this solicitation and the applicable version of the PAPPG. Submitting a proposal prior to a specified deadline does not negate this requirement.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Competition for the Management of Operation and Maintenance of the National Geophysical Facility

Synopsis of Program:

The National Science Foundation (NSF) is soliciting proposals for managing the operation and maintenance of the **National Geophysical Facility** (hereafter referred to as NGF) an NSF-funded major facility. The NGF is designed to enable the research community to ask, and address, questions about a variety of Earth processes from local to global scales. NGF will operate global and regional networks of sensors; provide a lending library of instrumentation and support services to enable PI-led field experiments; support archiving, quality control, and delivery of geophysical data and data product development; and provide education, outreach, workforce development, and community engagement activities that serve a wide range of audiences. NGF will be a single facility, with a single operator that will succeed NSF's current geophysical facilities, the Seismological Facility for the Advancement of GEoscience (SAGE) and the Geodetic Facility for the Advancement of GEoscience (GAGE).

The award recipient will work closely with NSF and the scientific community to ensure that NGF capabilities support, and advance, Earth Sciences and related disciplines. In cooperation with NSF, and within available resources, the recipient will plan and execute a viable, coherent, and inclusive program to: (1) streamline the management and operations of existing geophysical facility capabilities into one consolidated geophysical facility; (2) enhance existing facility capabilities in instrumentation, data services and cyberinfrastructure; and (3) implement a bold vision to broaden participation and foster a culture of equity and inclusion in the Earth Sciences and related disciplines.

The NSF Division of Earth Sciences (EAR) in the Directorate for Geosciences (GEO) has primary responsibility for the programmatic oversight of NGF and activities will be coordinated with the Division of Ocean Sciences (OCE), Division of Atmospheric and

Geospace Sciences (AGS), and Office of Polar Programs (OPP).

A single award will be made as a cooperative agreement with a duration of five years. NSF may renew the award for an additional five years, subject to availability of funds, the recipient's satisfactory performance, and review of a cost proposal for the second 5-year period. NSF's decision will be informed by the National Science Board Statement on Recompetition of Major Facilities (NSB 2015-45 or its successor).

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Margaret H. Benoit, telephone: (703) 292-7233, email: mbenoit@nsf.gov
- Paul M. Cutler, telephone: (703) 292-4961, email: pcutler@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.050 --- Geosciences

Award Information

Anticipated Type of Award: Cooperative Agreement

Estimated Number of Awards: 1

Anticipated Funding Amount: $223,000,000

For planning purposes, proposers can assume a base budget of approximately $39.5 million during the first year of the award, beginning October 2025 and should plan for no more than a 6% budget increase in each of the subsequent years. All budget amounts given herein are tentative and for initial planning purposes only. Actual annual funding increments will be determined based on the detailed cost estimate required per Section VII.C below and an Annual Plan and Budget submitted by the recipient to, and approved by, NSF. Funding increments are subject annually to the availability of funds and will be contingent on the performance of the recipient. Ongoing recapitalization of instrumentation, and escalation factors used for cost estimating, should be articulated in the Cost Estimating Plan.

Transition funding of up to $1,000,000 for a duration of up to six (6) months will be available for organizations other than the incumbent organization. Relevant transition activities include interviewing and hiring personnel, establishing subcontracts, transferring data and property, and obtaining permits and licenses. Should a transition period be necessary, the incumbent will retain responsibility for management of NGF and the new recipient will have the appropriate level of access to incumbent personnel and facilities associated with NGF as determined by NSF. The funding request for a transition period should be made within the Transition Plan and should not be included in the formal cost estimate or proposed budget for the initial 5-year period but must conform to the same requirements.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research laboratories, professional societies and similar organizations located in the U.S. that are directly associated with educational or research activities.
- For-profit organizations: U.S.-based commercial organizations, including small businesses, with strong capabilities in scientific or engineering research or education and a passion for innovation.

Who May Serve as PI:

The Principal Investigator (PI) must be an employee of the proposing organization.

Limit on Number of Proposals per Organization: 1

An organization may only submit 1 proposal as the lead. There is no limit on the number of proposals on which an organization can be included as a sub-recipient.

Limit on Number of Proposals per PI or co-PI: 1

Since the PI must be an employee of the managing organization, which can only submit one proposal, an individual may serve as PI or co-PI on only one proposal.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
  - Full Proposals submitted via Research.gov: *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
  - Full Proposals submitted via Grants.gov: *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov* guidelines apply (Note: The *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:**

  Inclusion of voluntary committed cost sharing is prohibited.

- **Indirect Cost (F&A) Limitations:**

  Not Applicable

- **Other Budgetary Limitations:**

  Not Applicable

C. Due Dates

- **Letter of Intent Due Date(s) *(required)*** (due by 5 p.m. submitter's local time):

  December 01, 2023

- **Full Proposal Target Date(s)**:

  June 13, 2024

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review criteria apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions:

Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements:

Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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I. INTRODUCTION

Authorized by the NSF Act of 1950, as amended, NSF initiates and supports basic and applied research and programs to strengthen scientific research potential. To achieve these goals, NSF supports centers, major facilities, and other infrastructure that provide research capabilities in various scientific disciplines. One such facility, the **National Geophysical Facility (NGF)**, will provide services and infrastructure to support research and education in geophysics.

NSF invites proposals from eligible organizations to manage the operation and maintenance (O&M) of NGF for the five years beginning October 2025. This competition represents an evolution in NSF's approach to its geophysical facility support in terms of the structure of the facility and the breadth of science it supports.

Through this competition, NSF intends to select a single facility, with a single operator, that will continue support of capabilities provided by the current geophysical facilities and will advance cutting-edge research priorities and workforce development needs of the future. Proposals should demonstrate how facility capabilities will address recommendations from the research community, such as those articulated in workshop reports, white papers, and community consensus efforts. These documents include The SZ4D Initiative: Understanding the Processes that Underlie Subduction Zone Hazards in 4D; Defining Research and Teaching Priorities that Could be Advanced Through a Near-Surface Geophysics Center; the National Academies of Sciences, Engineering and Medicine (NASEM) Decadal Survey report A Vision for NSF Earth Sciences 2020-2030: Earth in Time, and Recommendations for Enabling Earth Science Through NSF's Geophysical Facility - A Portfolio Review of EAR Seismology and Geodesy Instrumentation. These reports articulate the consensus that continued support of geophysical facility capabilities is critical to advancing frontier science in the following areas:

- Evolution and dynamics of the geodynamo
- Plate tectonic history and evolution
- Critical element distributions and cycling in Earth materials
- Causes and consequences of topographic change
- Earthquake physics
- Volcanic processes
- Critical zone processes and climate feedbacks
- Water cycle dynamics
- Understanding geohazards risks and impacts

With recent advances in seismology and geodesy, NGF will continue support of critical existing capabilities and enable advances in priority areas highlighted in community consensus documents. Additionally, while NGF will focus primarily on observations of deep- and surface-Earth processes, the facility will also enable ground-based geophysical observations of Earth's oceans, atmosphere, and cryosphere. The primary areas of innovation to address these science drivers will be:

- **Near-surface geophysics instrumentation:** enabling the community to investigate processes associated with the critical zone, climate change, and cascading hazards;
- **Support for amphibious geophysics:** including seafloor geodetic instrumentation, to advance observations of subduction zone processes such as great earthquakes and episodic tremor and slip in partnership with GEO/OCE;
- **Next-generation instrumentation:** developing cutting-edge instrumentation for portable field deployments and streamlined, low-cost operation of sensor networks such as fiber optic sensors; rapid deployment kits for response to natural hazards; and ultra-low power, low-latency measurement capabilities;
- **Cutting-edge data services and cyberinfrastructure:** delivering cloud-based data services to enable enhanced access to high

performance and high-throughput computing, particularly for real-time data, to advance analysis of large data sets and to develop artificial intelligence solutions that improve predictability and understanding of complex Earth system processes; and
- **Structural change that enhances justice, equity, diversity, and inclusion in Geophysics:** developing a highly skilled workforce that is diverse and inclusive; education, outreach, workforce development, and community engagement programs that include effective and evidence-based activities focused on fostering a just, equitable, safe, and inclusive geoscience research community.

II. PROGRAM DESCRIPTION

A. Overview

This solicitation requests proposals for the management of the operation and maintenance of a single, unified geophysical facility that will advance Earth science research for the next decade. This Program Description provides background information on NSF's geophysical facilities; describes the baseline scope of NGF; discusses recipient responsibilities; specifies important considerations for submitting a proposal; and provides other general information about the competition.

B. Background

NSF has continuously supported geodetic, seismic, and related geophysical facility capabilities for the scientific community since the mid-1980s. NSF's current geophysical facilities, SAGE and GAGE, are both national, distributed, multi-user facilities that support basic research in the Earth sciences. Both facilities also provide mission-critical services in support of other Federal agencies, including the National Aeronautics and Space Administration (NASA), the U.S. Geological Survey (USGS), and the National Oceanic and Atmospheric Administration (NOAA). Commercial entities, employing surveyors and engineers, use data from the facilities for a wide range of purposes.

The primary capabilities of these two facilities include access to pools of portable instruments for a wide range of PI-driven studies; data collection; operation and maintenance of global and regional networks of continuously-operating geodetic and seismic instruments; quality assurance, archiving, curation, and distribution systems that provide free and open access to high-quality geophysical data products; and education and outreach activities that enable broad audiences to access and use geophysical data and train the next-generation geoscience workforce.

In January 2020, NSF announced its intention to consolidate its geophysical facilities in a future competition through a Dear Colleague Letter (NSF 20-037).The motivation for this consolidation is to capitalize on efficiencies from a more streamlined management structure and to expand existing facility capabilities to better serve the Earth sciences and related disciplines. SAGE and GAGE were originally designed to emphasize deep Earth, tectonic, and hazards-focused observatories. With recent advances in seismology and geodesy, NGF will continue to support critical existing capabilities and enable advances to support ground-based studies of Earth's oceans, atmosphere, and cryosphere.

C. Baseline Scope of the National Geophysical Facility

NSF invites proposals from qualified organizations to manage the O&M of a consolidated facility that would succeed the current SAGE and GAGE awards. Proposals must clearly articulate plans for (1) streamlining the management and operations of existing geophysical facility capabilities into one consolidated geophysical facility; (2) expanding existing facility capabilities in instrumentation, data services and cyberinfrastructure that will better serve the Earth sciences and related disciplines; and (3) implementing a bold vision to broaden participation and foster a culture of equity and inclusion in the geophysical community.

The following five sections provide a broad outline of NGF (with expected budget distributions for each element):

1) Instrumentation Services (30-45%) will include continued support for portable seismologic, geodetic, and rapid response instrumentation and capabilities including PI training and assistance; the acquisition and maintenance of new sensors for studying near-Earth surface processes; continued operation and maintenance of existing sensor networks; and new services for seafloor geodetic instrumentation.

a) Portable Instrument Pool and PI support (20-25%): This element will provide investigators with experimental planning, logistics, training, and field support; hardware; software; and engineering services. Data management needs of the user community, including support for uploading experimental data and metadata to the NGF archive will be supported, as will education and training to use the equipment. NGF will support acquisition and operations of modernized data loggers, power, telemetry, and ancillary systems. Facility staff will monitor equipment demand and utilization, and the number of available systems of each type should be sufficient to meet the needs of NSF-selected, peer-reviewed experiments without delay. NGF staff members will manage the lifecycle of the equipment, in consultation with NSF, and will stay abreast of technological development of sensors and work with manufacturers and the community to develop, acquire, and support equipment to meet evolving needs within programmatic budgets. The recipient will work with NSF to develop an equitable and fair cost-recovery model for use of portable instrumentation and PI support for projects sponsored by entities other than NSF.

- **Portable seismic** capabilities will include support for maintenance of high-fidelity broadband, short-period, and high-frequency sensors (including nodal and Distributed Acoustic Sensing (DAS) capabilities) that can sense ground motion generated by a wide range of Earth processes, from normal modes to high-frequency surficial processes.
- **Portable geodetic** capabilities include all engineering support for EAR PIs during campaign Global Position System/Global Navigation Satellite System (GPS/GNSS) deployments as well as continuously operated GPS (cGPS) installations.

Rapid response capabilities will include instruments and power systems for rapid deployments in response to significant geophysical events.
- **Other allied geophysical instrumentation**, including magnetotelluric, electrical resistivity, and other electromagnetic equipment, that support observations of processes near Earth's surface beyond those supported by core seismic or geodetic instrumentation.

b) Sensor Network Operation and Maintenance (10-20%): These networks will provide fundamental observations of the full spectrum of Earth deformation. **NSF is placing a major emphasis on streamlining support for these networks and significantly reducing operating costs.** Raw data from all continuous stations will be made freely available to any user without delay or restriction.

- **Global Seismographic Network (GSN)**, which provides a global network of continuously operating stations that record with high fidelity the full spectrum of Earth motion, from the most fundamental normal models to tens of hertz. These stations provide critical geophysical observations for Earth science research and education; earthquake, volcano, and tsunami warning; and nuclear test ban treaty verification. GSN is operated as an international collaboration with multiple countries, in partnership with the USGS. This activity also includes infrasound, atmospheric, geodetic, and related auxiliary sensors; data management and communications systems; and management activities.
- **Network of the Americas (NOTA) Arrays**, which includes all activities associated with the management of the NOTA GPS/GNSS and borehole strainmeter arrays, including field engineering; telemetry; permitting; software development and maintenance; and related costs. NOTA consists of 1250 GPS/GNSS stations and 79 Borehole Strainmeter (BSM) network sites. Borehole strainmeter sites will be operated with limited maintenance, and NSF plans to decommission any sites that experience equipment failures over the lifetime of the award.
- **Other network support**, which includes general field maintenance, engineering support, IT support, and infrastructure software development and maintenance for all network operations for NSF and other agency sponsors as needed.

c) Seafloor Geodetic Services including the next generation of geodetic measurements. NGF will include a pool of seafloor geodetic instruments as part of its services for the U.S. science community. This pool of instruments will include seafloor instrumentation (GNSS-Acoustic Transponders) and surface equipment (wave gliders) necessary to collect seafloor geodetic data, operational logistics, and associated maintenance tasks. Data produced from this instrument pool will be part of normal facility data services. NGF will also provide education and training to build a workforce and science community in this new area of geodetic research. **(Funding for this element will come from OCE, and the budget for this activity will be limited to $800,000 annually).**

2) Data Services and Cyberinfrastructure (20-25%) capabilities will include data management and access capabilities, data product development and distribution, software support, and workforce training activities. Management and governance activities will be required for each of these elements.

Data management and access capabilities will include:

- Collecting, ingesting, archiving, curating, and distributing a diverse set of geophysical data and metadata from GEO-funded PI experiments, facility-operated sensor networks, and domestic and international network partners with agreement from NSF; operated in alignment with the following characteristics:
    - Maintain existing and/or develop new data and metadata standards for geophysical data that will be supported by the facility;
    - Utilize distribution methods that will support a range of users from experts to non-specialists;
    - Adopt appropriate identity management to track utilization of the facility;
    - Maintain a robust cybersecurity program that remains consistent with current best practices;
    - Operate and maintain a cloud-based system necessary for data services, planning for changes in cloud service providers or architectures, evolving the system to reduce latency, and enabling enhanced access to high performance and high-throughput computing, particularly for real-time data, to advance analysis of large data sets and to develop artificial intelligence solutions that improve predictability and understanding of complex Earth system processes;
    - Facilitate connections between NGF data products and the broader ecosystem of advanced cyberinfrastructure resources, including high-performance and high-throughput capabilities; and
    - Align data repository capabilities with the 2022 National Science and Technology Council document entitled "Desirable Characteristics of Data Repositories for Federally Funded Research" (https://doi.org/10.5479/10088/113528).
- Advancing new approaches to data services in response to evolving user needs that the community has determined are appropriate for facility responsibility, including:
    - Developing a cost model for management of very large datasets such as those produced by DAS;
    - Developing and implementing a data management model for deposition and access services for user-contributed geophysical products resulting from NSF-funded projects; and
    - Developing approaches to enable computational- and data-intensive research workflows for users of NGF data products and services.

Data product development and distribution activities will include:

- Generating low-level data products that conform to community-developed data standards, such as GNSS position time series and velocity fields; derived strain time series and strain fields; raw and quality-controlled seismic data; and other geophysical data;

- Developing and distributing higher-level derived data products that meet the evolving needs of the community;
- Hosting community-provided geophysical data products such as tomographic models, critical zone models, earthquake finite-fault models, and earthquake catalogs resulting from NSF-funded projects;
- Facilitating access to, and interoperability with, related geophysical data products and services, such as high-resolution topography, centroid moment tensors, tomographic models, earthquake finite-fault models, earthquake catalogs, and other low-level and derived data products from NSF-funded projects that meet the evolving needs of the community;
- Enabling specialized, real-time data handling and network operations in partnership with other US Federal agencies in consultation with NSF.

Software support activities will include:

- Sustainable development and maintenance of open-source software products that enable the community to process, analyze, visualize, and model NGF data;
- Facilitating connections between NGF data products and the broader ecosystem of open-source software packages that enable processing, analysis, visualization, and modeling; these could include widely used analysis tools (e.g., Generic Mapping Tools (GMT) and Generic Mapping Tools Synthetic Aperture Radar (GMTSAR)), workflow tools (e.g., computational notebooks), and software related to specific types of observations (e.g., magnetotellurics, electrical resistivity, distributed acoustic sensing, and ground-penetrating radar).

Cyberinfrastructure training activities related to data management will include:

- Development and management of short courses, training materials, and other educational activities to better enable the research community to access and use NGF data, computing, and software services. Such efforts should be responsive to emerging technologies and computing paradigms, including but not limited to applications of artificial intelligence and machine learning (AI/ML), utilization of advanced cyberinfrastructure resources for computational- and data-intensive research, deployment of computational notebooks and reproducible workflows, implementation of open-source software practices, and adoption of open science principles;
- Broadening the use of the facility by engaging early career researchers, including students, postdocs, faculty, and researchers not previously served by SAGE/GAGE, such as those working in near-surface and offshore settings.
- Broadening use of facility data and products by engaging researchers and students from historically excluded groups in Geoscience.

3) Education, Outreach, Workforce Development, and Community Engagement (12-15%) activities will include innovative and high-impact activities that serve post-secondary students, early career researchers, and state and local governments, with an emphasis on four primary areas:

- Education and workforce development of undergraduate, graduate, and early career researchers through mentoring programs, professional development opportunities, and internships;
- Dissemination of research results enabled by the facility to a wide range of stakeholders, including federal mission agencies; state and local governments; and the public;
- Dissemination of informational products and outreach via multiple media types including print and digital communications;
- Broadening participation of the full spectrum of diverse talents that society has to offer in post-secondary Geoscience programs and careers; and
- Fostering a culture of equity and inclusion across the facility and ensuring safe and inclusive work environments.

Facility activities that address these primary areas may include but are not limited to workshops and short courses; internships across academia, industry, government, and the non-profit sector; development of educational materials and tutorials; social media, software tools, and other distribution methods; public lectures; and mentorship across all areas of the Geoscience enterprise. The operator will foster integration across the facility programs and between researchers, educators, and other experts to ensure activities are carried out in accordance with applicable national and community standards, such as the Next-Generation Science Standards. The facility will have an appropriately scaled assessment strategy with a clearly integrated set of goals, activities, and desired outcomes for the short- and long-term.

4) Management and operations (10-12%) will require professional management by highly dedicated and expert staff. The facility will have the appropriate business systems, processes, and structures to carry out clearly articulated plans for management and operations. Facility management activities include, but are not limited to, scientific and technical planning; lifecycle planning; budget, performance, personnel, and subaward management; risk management; permitting, liability, and other legal issues; property management; reporting and compliance; and community outreach and engagement. The facility will directly collaborate with the geophysical research community through a community-based governance structure. The operator will ensure a safe and inclusive work environment for all employees and users of the facility. The operator will seek and implement strategic partnerships, collaborations, or similar arrangements with other Federal or state agencies; national, state, and local government laboratories; museums; private sector entities that utilize geophysical data; instrumentation developers; and international entities that will enhance the scientific capabilities available to the entire geosciences community.

5) Facility innovation and lifecycle management (8%-10%) to maintain state-of-the-art instrumentation, cyberinfrastructure, and engagement activities to meet the evolving needs of the geoscience community. In particular, the facility will explore new technological solutions for streamlining field equipment and support across all geophysical components of the facility, including the development of low-power, low-maintenance systems that reduce the long-term cost of network operations. The facility will also prioritize continuous improvement of data services capabilities, particularly as technological advances enable new opportunities for the geoscience community. The facility will also explore

novel technologies for instrumentation and manage the lifecycle of sensor network stations and portable equipment in consultation with NSF, and taking into consideration the needs of the science, equipment condition, technological advancement, budget limitations, and the input of other stakeholders, including other Federal agencies.

D. Description of the Responsibilities of the Managing Organization

Core Responsibilities

The recipient shall be responsible for the management, operation, and maintenance of NGF in accordance with the proposal submitted in response to this solicitation and Annual Program Operating Plans approved by NSF prior to each year of work. The recipient shall ensure that NGF capabilities enable world-class research, education, and related activities in the geosciences. The managing organization will:

- Be responsible for the overall management and performance of NGF including the infrastructure, instrumentation, cyberinfrastructure, and staff. In discharging these responsibilities, the managing organization will ensure that NGF is a world-class multi-user facility with the primary goal of performing cutting-edge transformative research;
- Be responsible for fulfilling all aspects of NGF's mission with a visionary and productive program of world-class services, infrastructure, and research support in the interests of NGF stakeholder communities;
- Operate, manage, and maintain NGF programs, developing and incorporating new capabilities, planning for future new initiatives, supporting a skilled and diverse work force, sustaining innovative and inclusive research, education, and workforce development projects awarded by NSF through the merit review process, and enabling use of NGF for other critical stakeholder activities; and
- Carry out activities that leverage NGF infrastructure, including support of PI-led projects, that are funded by NSF and by other agencies and organizations. Any additional equipment funded for PI-led projects will be added to the federally-owned inventory for NGF. Any non-NSF projects managed by the recipient must be approved by NSF, be consistent with the NGF mission, and complement and enhance activities funded by NSF. The managing organization will develop appropriate and fair cost recovery methodologies for managing projects sponsored by entities other than NSF, and activities carried out in support of the mission of other US Federal agencies will be funded through an Interagency Agreement mechanism.

Specific duties

In the following areas, and within the financial resources made available under the award, the recipient will:

Management

- Define and implement a lean and efficient organizational structure for NGF that provides vision, leadership, and service to manage NGF as a vibrant, community-focused, multi-user facility that is an effective national resource and responsive to NSF;
- Hire and maintain a world-class, flexible, broadly inclusive workforce and management team with the expertise to provide the expected level of service to the user community, and ensure retention of this workforce;
- Develop a staffing plan that identifies the roles and responsibilities of lead personnel and delineates the organizational structure, including full-time equivalent estimates, position titles, and desired geographic location;
- Engage in appropriately-scaled risk management, including risk identification, analysis, planning, mitigation, and monitoring;
- Promote a culture of excellence that meets the highest standards for service and delivery to the scientific community and demonstrates a proactive and effective approach to facility management; and
- Provide a safe and inclusive work environment for all employees and users of the facility.

Business

- Maintain accounting, business controls and systems, and staffing to manage the award consistent with financial and administrative terms and conditions of the agreement, NSF's Research Infrastructure Guide, as applicable, and the requirements set forth in 2 CFR 200, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards; and
- Prepare and provide annual budgets and financial updates following both, the NSF Budget Form and the work breakdown structure for the award.

Operations

- Staff, manage, operate, maintain, and optimize NGF on a day-to-day basis;
- Provide written interim and annual progress reports and program plans for review and approval by NSF and engage in periodic management reviews;
- Carry out all proposed activities in a cost-effective and efficient manner that provides the support necessary for the conduct of research and education by the community, with highest priority given to NSF-funded investigators, and ensure alignment with the highest standards of integrity and transparency;
- Establish a framework for ongoing planning, review, performance management, and continual improvement with mechanisms to enable regular assessment of NGF activities;
- Work with NSF to develop appropriate metrics for assessing performance regarding all NGF programs and utilize the metrics to improve performance; and

- Manage the lifecycle of sensor network stations, portable equipment, and cyberinfrastructure, in consultation with NSF, and taking into consideration scientific requirements, technological advances, budget limitations, and the input of other stakeholders, including other Federal agencies.

Maintenance

- Maintain NGF equipment and infrastructure to enable facility objectives and for the safety and security of staff and visitors;
- Be responsible for developing, budgeting, scheduling, and tracking performance against a comprehensive safety, environmental compliance, and maintenance plan for equipment and infrastructure;
- Conduct regular maintenance activities, repair, and refurbishment of NGF infrastructure.

Governance and community engagement

- Establish and maintain an effective, broadly representative, community-based governance structure to guide all NGF activities. The proposed structure(s) must be grounded on direct involvement of the scientific community in all aspects of the facility and should be separate and distinct from any recipient organizational governance;
- Demonstrate a strong and ongoing commitment to broad community participation and engagement of historically excluded groups in the governance of NGF.

Partnerships

- In consultation with NSF, seek and implement strategic partnerships and collaborations, with other Federal, state, and local agencies and laboratories; museums; instrumentation developers and private sector entities; and international organizations. These partnerships and collaborations will broaden support for NGF and will enhance the scientific capabilities provided to the Geosciences community.

Diversity, Equity, and Inclusion

- Facilitate the participation of the full spectrum of diverse talents that society has to offer in the research and education missions of the facility. The recipient will demonstrate leadership in employing best practices for broadening participation in science throughout NGF staff, programs, and activities.

Data management and Cyberinfrastructure

- Serve as steward of high-quality scientific data products on behalf of the community through collection, quality assurance, curation, and distribution of products; by ensuring all NGF data products are of sufficient quality, timeliness, and continuity to support high-quality Earth science research, education, and other uses, and ensuring that all NGF data management activities are carried out in accordance with applicable NSF and GEO data policies and best practices in scientific data management;
- Facilitate access to advanced computing and open-source software to maximize the scientific and educational value of NGF data products and services, in a manner that is transparent, sustainable, and responsive to scientific community needs, and in alignment with open science principles. These include but are not limited to the FAIR Guiding Principles for scientific data management and stewardship (Findable, Accessible, Interoperable, Reusable), the CARE Principles for Indigenous Data Governance (Collective Benefit, Authority to Control, Responsibility, and Ethics), the TRUST Principles for digital repositories (Transparency, Responsibility, User focus, Sustainability, and Technology), Reproducibility and Replicability, and the principles described in 2022 National Science and Technology Council document entitled "Desirable Characteristics of Data Repositories for Federally Funded Research" (https://doi.org/10.5479/10088/113528); and
- Establish and conduct training and workforce development activities to increase use of NGF data, software and computing services, to improve literacy in and use of modern computation, analytics and software tools in geophysics, and to spread best practices in open science; build capacity across a broad range of researchers, students, and educators, inclusive of individuals and communities not previously served by NSF geophysical facilities, to utilize NGF data products and associated computing services.

E. Important Considerations in the Preparation of a Proposal

Proposals submitted pursuant to this solicitation must be based on a detailed and well-defined integrated Work Breakdown Structure (WBS). Every section of the proposal, and every element of the proposed budget, must be tied clearly and directly to the proposal WBS. Proposed management and business structures should be described fully in the proposal, including discussions of:

- The proposed organizational structure, with well-defined lines of authority and responsibility within the organization;
- Workforce management processes and plans, including applicable human resources systems and policies;
- Business systems capabilities, including accounting systems with procedures for auditing and oversight; the ability to segregate and account separately for funding from NSF and that from other sources; procurement staff and processes; a property management system capable of acquiring, tracking and controlling equipment funded by NSF and, separately, equipment funded by other sources; and
- Processes for planning future operations and initiatives approved by NSF and carried out in full collaboration with NGF stakeholder communities.

Note that all business functions must meet the requirements set forth in 2 CFR § 200, the Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards.

F. General Information

Following the submission of Letters of Intent (LOI) by eligible organizations, all pertinent information associated with this competition will be made available in the Resource Library. Password-protected access to the Resource Library will be provided by the Cognizant Program Officer, or a designee, to LOI submitting eligible organizations. The following list is representative of the materials that are likely to be made available in the Resource Library. This list is subject to change and redaction will be applied as appropriate:

- Frequently Asked Questions (FAQs);
- Example Cooperative Agreement (CA) and Cooperative Support Agreement (CSA);
- Inventories of NSF and non-NSF owned equipment associated with SAGE and GAGE that will transfer to NGF;
- Memoranda of Understanding and Similar Agreements;
- List of Special Use Permits; Land Use Agreements; User Agreements/Rights of Way
- High-level Staffing Plan; and
- Contracts Information.

To more fully describe the current scope of activities, the resource library will contain pertinent excerpts with possible redactions from documents and plans such as:

- SAGE and GAGE Operations & Maintenance Plans
- SAGE and GAGE Property Management Plans
- SAGE and GAGE Safety Plans
- SAGE and GAGE Quality Plans
- SAGE and GAGE Cybersecurity Plans
- SAGE and GAGE Cyberinfrastructure Plans

Any additional materials and information relating to this competition, including updated NSF responses to all pertinent proposed questions, will also be made available through the Resource Library or Frequently Asked Questions, as appropriate.

III. AWARD INFORMATION

For planning purposes, proposers can assume a base budget of approximately $39.5 million during the first year of the award, beginning October 2025 and should plan for no more than a 6% budget increase in each of the subsequent years. All budget amounts given herein are tentative and for initial planning purposes only. Actual annual funding increments will be determined based on the detailed cost estimate required per Section VII.C below and an Annual Plan and Budget that is submitted by the recipient to and approved by NSF. Funding increments are also subject annually to the availability of funds and will be contingent on the performance of the recipient. Ongoing recapitalization of instrumentation and escalation factors used for cost estimating should be articulated in the Cost Estimating Plan.

Transition funding of up to $1,000,000 for a duration of up to six (6) months will be available for organizations other than the incumbent organization. Relevant transition activities include interviewing and hiring personnel, establishing subcontracts, transferring data and property, and obtaining permits and licenses. Should a transition period be necessary, the incumbent will retain responsibility for management of NGF and the new recipient will have the appropriate level of access to incumbent personnel and facilities associated with NGF as determined by NSF. The funding request for a transition period should be made within the Transition Plan and should not be included in the formal cost estimate or proposed budget for the initial 5-year period but must conform to the same requirements.

This award will be subject to the NSF cooperative agreement terms and conditions and supplemental terms for major facilities, located here: https://www.nsf.gov/awards/managing/co-op_conditions.jsp.

Questions or concerns about the duration or level of funding for the transition period should be addressed to the cognizant NGF Program Officers.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Institutions of Higher Education (IHEs) - Two- and four-year IHEs (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Special Instructions for International Branch Campuses of US IHEs: If the proposal includes funding to be provided to an international branch campus of a US institution of higher education (including through use of subawards and consultant arrangements), the proposer must

explain the benefit(s) to the project of performance at the international branch campus, and justify why the project activities cannot be performed at the US campus.
- Non-profit, non-academic organizations: Independent museums, observatories, research laboratories, professional societies and similar organizations located in the U.S. that are directly associated with educational or research activities.
- For-profit organizations: U.S.-based commercial organizations, including small businesses, with strong capabilities in scientific or engineering research or education and a passion for innovation.

Who May Serve as PI:

The Principal Investigator (PI) must be an employee of the proposing organization.

Limit on Number of Proposals per Organization: 1

An organization may only submit 1 proposal as the lead. There is no limit on the number of proposals on which an organization can be included as a sub-recipient.

Limit on Number of Proposals per PI or co-PI: 1

Since the PI must be an employee of the managing organization, which can only submit one proposal, an individual may serve as PI or co-PI on only one proposal.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent *(required)*:

Each proposing organization must submit a Letter of Intent (LOI) through Research.gov. Full proposals may be submitted only by organizations that have submitted a LOI by the LOI due date. LOIs will be used by NSF to ensure that the appropriate expertise is available for participation in the review and selection process and to foresee potential conflicts of interest. No feedback will be provided to the submitters.

The LOI must be submitted through Research.gov by the due date with the following information:

Project Title: The title must begin with "National Geophysical Facility: TITLE"

Project Synopsis (up to 2500 characters including project organization structure): Provide a high-level statement of the vision for the National Geophysical Facility

OTHER COMMENTS (up to 2500 characters) section must list the name(s) and affiliation(s) of all senior personnel, including those of the Principal Investigator (PI) and Co-PIs.

PARTICIPATING ORGANIZATIONS section must list the names(s) of any other (non-lead) participating institutions or organizations, including all sub-recipients.

Submission of multiple LOIs for a single project is not allowed.

Letter of Intent Preparation Instructions:

When submitting a Letter of Intent through Research.gov in response to this Program Solicitation please note the conditions outlined below:

- Submission by an Authorized Organizational Representative (AOR) is not required when submitting Letters of Intent.
- Submission of multiple Letters of Intent is not permitted

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Research.gov or Grants.gov.

- Full Proposals submitted via Research.gov: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal and Award Policies and Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov. The Prepare New Proposal setup will prompt you for the program solicitation number.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov*. The complete text of the *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application

Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

See PAPPG Chapter II.D.2 for guidance on the required sections of a full proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation deviate from the PAPPG instructions.

This solicitation contains program-specific considerations for certain sections. Where not otherwise addressed, proposals must conform fully with the guidance contained in Chapter II.D.2 of the PAPPG.

Due to the complexity of the proposals being submitted, use of Research.gov to prepare and submit proposals is strongly encouraged. When preparing a full proposal for this competition, proposers are advised to review the Program Description and the Additional Solicitation Specific Review Criteria found in this solicitation for general information pertinent to this program.

Proposal Set-Up: Select "Prepare New Full Proposal" in Research.gov. Search for and select this solicitation title in Step 1 of the Full Proposal wizard. The information in Step 2 will be pre-populated by the system. In Step 3, choose the Center (or Research Infrastructure) type of proposals. In the proposal details section, select "Single proposal (with or without subawards)." Separately submitted collaborative proposals will be returned without review.

Project Description (up to 75 pages): The Project Description section of the proposal should address the capabilities of the proposing organization to manage the operations and maintenance of NGF with respect to the areas described in Section II D of this solicitation. Per the PAPPG, the Project Description must contain a separate section labeled Broader Impacts. The content of Project Description should address how the facility will enable the science priorities outlined in the NASEM *Earth in Time, SZ4D, and Near Surface Geophysics reports,* as well as other community documents and must demonstrate that input from the community served by NGF has been solicited and incorporated. The content of the Project Description should map to the following items a-c and should address the Additional Solicitation Specific Review Criteria in Section 6. The Project Description is limited to no more than 75 pages, not including the Budget and Supplementary Documentation described below (Collaborative Arrangements, Work Breakdown Structure Dictionary, Cost Estimating Proposal, Broadening Participation Capability, Risk Register, and Transition Plan), which should be submitted as Supplementary Documentation (see below). Please note that all information relevant to determining the quality of the proposed work must be included as part of the Project Description, unless otherwise directed in this solicitation.

The Project Description shall include the following components:

a. Management - Clearly present the management structure, capability, experience, and qualifications of the managing organization and supporting organizations necessary to carry out the proposed scope. Include an aggregated description of the internal and external resources (both physical and personnel) necessary to support the proposed scope. Clearly explain and justify the roles, responsibilities, and lines of authority for each entity (including Key Personnel), the basis for inclusion such as the competencies they provide, and how they contribute to accomplishing NGF's objectives. Describe plans for recruiting, developing, and retaining an expert scientific, engineering, technical and administrative staff and best practices for inclusion of historically underrepresented individuals in science, engineering and education at all levels within the facility's activities. Describe risk management practices. Discuss how any pending or existing partnership agreements of significance, as evidenced by formal memoranda/letters of agreement or intent, are likely to enhance the science goals and management of NGF operations and maintenance.

b. Operations - Thoroughly describe the approach to performing the proposed scope of work, including operations of Instrumentation Services, including seafloor instrumentation; Data Services and Cyberinfrastructure; and Education, Outreach, Workforce Development, and Community Engagement. The following must be summarized in the Project Description and supported by the required detailed supplementary documents: (1) key assumptions, sensitivities, risks, uncertainties, or other elements driving estimated costs, scope, and schedule, (2) the associated potential impacts to science, and (3) plans on how to routinely reassess cost drivers and actual costs and make adjustments at least annually. Discuss the approach for developing robust Annual Plan and Budget to manage NGF operations and maintenance. Describe strategies to be followed that will align with NSF's estimated annual funding threshold for NGF operations. Describe the approach to providing and overseeing safe and reliable long-term operation of NGF that will effectively respond to the needs of the associated scientific community. Discuss any special qualifications or organizational experience relevant to NGF operations and maintenance, cyberinfrastructure, and data delivery and how this will help to successfully perform the activities described in the prospective cooperative agreement.

For *Instrumentation Services and Data Services and Cyberinfrastructure*, discuss the scientific rationale for the portfolio of activities to be supported. Discuss how all NGF data assets, including hardware, software, and technical data will be tracked and maintained. Discuss the lifecycle management plan and facilities for refurbishing or upgrading active infrastructure. Outline the plan for warehousing/storing/reusing inactive infrastructure, if any, to be removed from active operations. Discuss the approach to decision making with respect to replacing infrastructure considering scientific priorities and budgetary limitations.

For *Education, Outreach, Workforce Development, and Community Engagement*, describe and justify the proposed training and outreach efforts and their intended audiences. Describe how the facility will broaden participation of historically excluded groups and create a culture of inclusion. Explain how these efforts will enhance knowledge and use of NGF data. Identify the roles of any external partners or international collaborators in

these activities.

Provide a plan and detailed description of the organizational elements and procedures for any subaward and contracting establishment and management that ensures effective and efficient performance as well as responsiveness to NSF's collaboration. Describe how the proposer will use its internal management/advisory structure to help resolve disputes and decisions within and among its proposed governing framework.

c. Measures of Performance - Describe how the proposing organization will assure success relative to measures of performance applicable to operation and maintenance of NGF and related training and other outreach activities. Include a discussion of how performance metrics and user statistics will be used to (a) assess how well NGF is achieving its science objectives and training and outreach goals, (b) improve facility performance, and (c) verify consistent completion of activities defined by Annual Program Plans within budget and schedule.

Please note that all information relevant to determining the quality of the proposed work must be included as part of the Project Description, unless otherwise directed in this solicitation.

- **Budget:** See the instructions in Section B, below.
- **Supplementary Documentation:** Except as specified below or in the NSF PAPPG (see Chapter II.D.2.i), special information relevant to determining the quality of the proposed work must be included either as part of the Project Description or as part of the budget justification.
    - **Documentation of collaborative arrangements of significance to the proposal:** Proposers should document with formal letters of collaboration any collaborative arrangements of significance in performing the proposed work. The letters should not contain endorsements or evaluations of the proposals. Letters of support are not permitted under this solicitation, and proposals containing such letters may be returned without review. Please see the NSF PAPPG Chapter II.D.2.i for further details.
    - **WBS and WBS Dictionary (text-searchable PDF up to 20 pages in length):** Proposers will develop a document that provides detailed information about each element in the WBS, such as a brief definition of the scope of work, deliverables, budget justification and schedule estimates, assessment measures, and milestones. See Section 4.2.2.7 of the NSF Research Infrastructure Guide (RIG) and Chapter 7 Step 4 of the Government Accountability Office's (GAO) Cost Estimating and Assessment Guide for more information on creating the WBS.
    - **Cost Model and Cost Estimating Plan (CEP):** See Section 4.2 of the RIG and Section B of this solicitation below.
    - **Risk Register:** Include a description of all risks that are deemed to be important to achieving project success, along with an assessment of
      risks to be prioritized for effective risk management. See Section 6.2.6.2 of the RIG for more information on preparing the Risk Register.
    - **Safe and Inclusive Work Environment Plan** All proposals submitted to this solicitation that include activities that will be conducted off-campus must submit a plan for safe and inclusive working environments as a supplemental document that will be considered under the broader impacts review criterion. This supplemental document is in lieu of the required plan associated with the certification called for in Chapter II.E.9 of the PAPPG. More information regarding review of the plan is provided under Solicitation Specific Review Criteria.

      It is NSF policy to foster safe and harassment-free environments wherever science is conducted. Work conducted off-campus should be an enriching experience for everyone and help draw researchers to use NGF. By requiring advanced planning and attention to maintaining an inclusive environment, NSF is working to ensure that off-campus research is safe and inclusive for all participants.

      Off-campus research is defined as data/information/samples being collected off-campus, such as fieldwork and research activities in the field, and on vessels and aircraft. The plan must be no longer than two pages.

      The plan for safe and inclusive working environments must include:

        - a brief description of the field settings and unique challenges for the team;
        - the steps the proposing organization will take to nurture an inclusive off-campus working environment, including processes to establish shared team definitions of roles, responsibilities, and culture, e.g., codes of conduct, trainings, mentor/mentee mechanisms and field support that might include regular check-ins, and/or developmental events;
        - communication processes within the off-campus team and to the organization(s) that minimize singular points within the communication pathway (e.g., there should not be a single person overseeing access to a single satellite phone); and
        - the organizational mechanisms that will be used for reporting, responding to, and resolving issues of harassment if they arise.
- **Broadening Participation Capability** (2 pages max): As required by the CHIPS and Science Act of 2022 (P.L. 117-167, section 10324; 42 USC 19013), organizations seeking a cooperative agreement for the management of the operations and maintenance of an NSF major facility must demonstrate prior experience and current capabilities in, or have a plan for employing best practices in broadening participation in science and engineering. In two pages or less, proposers should address this requirement, including information such as overall strategy, context of activities, intended population(s), and assessment approach and/or outcome(s).
- **Projects involving work on sovereign Native/Tribal/Indigenous lands**: Proposals that include research and/or instrumentation in Native/Tribal communities or on Tribal lands must attach a letter or email as an Other Supplementary Document that confirms

community collaboration, or at a minimum community awareness, and permission to work on associated lands from the relevant community organizations or tribal leadership (see the U.S. Department of Housing and Urban Development Tribal Directory Assessment tool or the National Congress of American Indians tribal directory) as a Supplementary Document. Collaborations should be well justified, in that they represent true intellectual collaboration and utilize the expertise and specialized skills, facilities, and/or resources of the community. Prior to making a funding decision, additional steps may be required as part of NSF's compliance with applicable federal environmental authorities such as the National Environmental Policy Act (NEPA), the National Historic Preservation Act (NHPA), and the Endangered Species Act (ESA). To support NSF's federal environmental review and compliance obligations, additional information may be requested from the PI. More information can be found in the PAPPG, and the Organization Environmental Impacts Checklist (referenced in PAPPG Chapter II.D.2.j) may be helpful in evaluating impacts.

- **Transition Plan:** Proposing organizations, other than the incumbent SAGE and GAGE operator, may be funded for an additional transition period of up to six (6) months preceding the transfer of operating authority. If a new recipient is selected to manage the operations and maintenance of NGF, the incumbent will cooperate with the successor to the extent necessary to facilitate uninterrupted support for NGF during any transition period and will provide transfer of the relevant federally funded property and equipment permits and other agreements. NSF will support appropriate transition costs incurred by the successor recipient in an amount up to $1,000,000.

  A detailed transition plan and budget, not to exceed 15 pages for a transition period of up to 6 months following the new award must be provided. The transition plan must include at a minimum:

  - A proposed duration and schedule for the transition period;
  - Estimated resource needs for the transition period;
  - Plans for personnel recruiting, orientation, and training;
  - Plans for changes to staffing, facilities, or operational modes;
  - A plan to acquire office infrastructure and manage the transfer of assets, inventory, commitments, plans, and documents;
  - Identification of assumptions that underlie the transition plan; and
  - A detailed budget for the transition period, presented in accordance with instructions given in Section V.B. This budget should be presented within this Transition Plan for information only and should not be included in the official overall proposal and cost estimate for the 5-year award period.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Budget Preparation Instructions:

Separate budgets for a transition period, as applicable, and the first five-year of the potential ten-year award must be included with the proposal. The first-year budget should total no more than $39.5 million and only if the full set of desired capabilities described herein is proposed. Research.gov will automatically provide a cumulative budget.

The budget request must be supported by cost estimates that are developed in accordance with section 4.2 of the NSF RIG, the GAO Cost Estimating and Assessment Guide (GAO-09-3SP) and 2 CFR §200 of the Uniform Guidance, Subpart E, Cost Principles. A uniformly applied Cost Estimating Plan (CEP), an activities-based Work Breakdown Structure (WBS), and a Cost Model supported by a detailed Basis of Estimate (BOE) must be provided as separate documents and submitted under supplementary documents. Deliverables-based work packages may be included for major upgrades or other significant acquisitions. Each identified WBS element of cost must be traceable to detailed BOEs and to each NSF budget category of the prime award and each proposed subaward. The escalation factors used should be described in the CEP. The CEP and BOE must articulate the assumptions made to modify the level of effort or science support capabilities, for expected efficiency gains, or for other adjustments if used to offset escalation.

The proposal must identify all staffing and budgetary information necessary to describe how the organization will fulfill the expectations in Section I, Introduction, and Section II, Program Description, of this solicitation. Requested budget amounts for each year of the proposal should reflect the level considered necessary to perform the NSF-funded activities described in the WBS Dictionary. Proposers also should be cognizant of budget constraints implied by the estimated funding levels provided under Section III, Award Information.

Enter the anticipated total level of sub-recipient. support on line G5, Subawards, of the Research.gov budget or line F5 of the R&R Budget Form in Grants.gov. Proposals require the inclusion of separate budgets for subawards, with budget justification and detailed explanation of the proposing organization's cost estimate. Examples include budgeted months and salaries for personnel, quotations to support budgeted equipment, itemized listing of material and supplies with supporting quotations. Additional information such as pre-award review may be requested, including but not limited to, verification of risk assessment performed and monitoring plans for each sub-recipient.

Organizations may include a fee in the proposed budget. The fee must be clearly identified as such in the budget justification. The fee is entered on line "K Fee" of the NSF budget form. The fee may not be burdened with indirect rate or any other costs. The fee will be evaluated by the Grants and Agreements Officer using a structured approach and negotiated as prescribed by Division of Acquisition and Cooperative Support. NSF will

provide guidelines for recipients that receive fee to encourage the utmost discretion and appropriate consideration in the use of fee, to include examples of inappropriate uses of fee (e.g., including but not limited to not using fee on alcoholic beverages or lobbying as set forth at 2 CFR § 200.450 and 48 CFR 31.205-22). NSF will reserve the authority to review a recipient's actual use of fee. Accordingly, recipients must separately track and account for uses of fee provided under NSF awards. The terms and conditions of the award will specify any fee arrangement including the basis for incremental fee payments. NSF will consider reductions in future fee if a recipient's actual use of fee is in contravention with the guidelines on inappropriate uses. Please refer to section 4.2.2.5 of the NSF RIG.

C. Due Dates

- **Letter of Intent Due Date(s)** ***(required)*** (due by 5 p.m. submitter's local time):

  December 01, 2023

- **Full Proposal Target Date(s)**:

  June 13, 2024

D. Research.gov/Grants.gov Requirements

For Proposals Submitted Via Research.gov:

To prepare and submit a proposal via Research.gov, see detailed technical instructions available at: https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationandSubmission.html. For Research.gov user support, call the Research.gov Help Desk at 1-800-381-1532 or e-mail rgov@nsf.gov. The Research.gov Help Desk answers general technical questions related to the use of the Research.gov system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: https://www.grants.gov/web/grants/applicants.html. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to Research.gov for further processing.

The NSF Grants.gov Proposal Processing in Research.gov informational page provides submission guidance to applicants and links to helpful resources including the NSF Grants.gov Application Guide, Grants.gov Proposal Processing in Research.gov how-to guide, and Grants.gov Submitted Proposals Frequently Asked Questions. Grants.gov proposals must pass all NSF pre-check and post-check validations in order to be accepted by Research.gov at NSF.

When submitting via Grants.gov, NSF strongly recommends applicants initiate proposal submission at least five business days in advance of a deadline to allow adequate time to address NSF compliance errors and resubmissions by 5:00 p.m. submitting organization's local time on the deadline. Please note that some errors cannot be corrected in Grants.gov. Once a proposal passes pre-checks but fails any post-check, an applicant can only correct and submit the in-progress proposal in Research.gov.

Proposers that submitted via Research.gov may use Research.gov to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All

proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Leading the World in Discovery and Innovation, STEM Talent Development and the Delivery of Benefits from Research - NSF Strategic Plan for Fiscal Years (FY) 2022 - 2026*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter II.D.2.d(i). contains additional information for use by proposers in development of the Project Description section of the proposal). Reviewers are strongly encouraged to review the criteria, including PAPPG Chapter II.D.2.d(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
    a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
    b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and other underrepresented groups in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

Review criteria will also include assessment of the quality and extent to which the proposal addresses the following:

1. Scientific capability

- How well will the proposed facility capabilities advance the community priorities articulated in community reports, like the NASEM *Earth in Time, SZ4D, and Near Surface Geophysics community reports*?
- How clearly has the proposer demonstrated input from the broader Earth Science community and other research communities that would utilize the facility?
- How have the proposers engaged other federal agencies that would utilize the facility?
- To what extent does the proposal balance innovation with the support of existing capabilities to best meet the needs of the research community?

2. Management capability

- How well does the proposal demonstrate a streamlined, efficient, responsive, and cost-effective management strategy for the consolidated geophysical facility?
- Is there a coherent and effective leadership, management, and organizational structure and how appropriate are staffing levels?
- Are the duties of each staff position clear and is the need for each position justified? Are the salaries and time commitments appropriate and well justified?
- Does the proposal outline sufficient financial and audit controls?
- What is the quality of the plan for risk management for the proposed activities? Does the risk management plan adequately address

budget and other project risks?
- What is the quality of the plan for performance management and self-assessment?
- Is there a coherent and effective plan for recruiting, sustaining, and retaining a well-qualified and diverse workforce?
- How well does the proposal demonstrate a vision for developing or sustaining partnerships that enhance the scientific benefit and cost-effectiveness of NGF?

3. Operational capability

General

- Are the planned activities justified and adequate for the operations of the proposed facility?
- How strong is the lifecycle management plan for instrumentation and data services infrastructure, cyberinfrastructure, and software?
- How well does the proposal demonstrate an understanding of essential Operations Management activities such as those related to subaward and subcontract formation and administration, asset tracking and management, environmental, safety and health issues, reporting, budgeting, and project controls?
- How well justified are any proposed subaward and subcontract arrangements for managing NGF operations and maintenance?

Additional criteria for Instrumentation Services Operations

- How efficient and achievable is the vision for streamlined operations of regional and global networks of sensors?
- Does the proposal include a plan for reducing long-term operations costs of these networks leveraging new, lower-power technological solutions?
- How well justified are any proposed changes to existing sensor networks?
- How well will the portfolio of instrumentation proposed for the portable instrument program address a wide cross section of scientific priorities?
- Are there adequate descriptions of the hardware and software to be maintained and operated, and how this would be accomplished?
- How well does the proposal demonstrate a vision for recapitalizing and refurbishing instrumentation and hardware within existing budget limitations, including incorporating community input and engaging necessary suppliers, to ensure that the facility can facilitate cutting-edge science?
- How qualified is the proposing organization to appropriately staff and execute the scope required by OCE?

Additional criteria for Data Services Operations

- How strong is the vision for streamlined operations of a consolidated, unified geophysical Data Services and Cyberinfrastructure program?
- How likely is the proposed portfolio of Data Services and Cyberinfrastructure activities to enable the research community to address *current and future* goals?
- How well is the facility Data Services and Cyberinfrastructure program aligned with the portfolio of instrumentation proposed?
- How well does the proposal demonstrate an understanding of the current effective practices for data management, identity management, and cybersecurity, as well as implementation of those practices?
- How well does the proposal facilitate access to advanced computing and open-source software capabilities to maximize the value of NGF data products?
- How well does the proposal facilitate interoperability with other community data resources?
- How well does the proposal indicate alignment with open science best practices?
- How effectively do proposed training and workforce development activities build capacity for a broad range of individuals and communities to utilize NGF data products and associated computing services?

Additional criteria for Education, Outreach, Workforce Development, and Community Engagement

- How well justified is the portfolio of proposed activities for education, outreach, workforce development, and community engagement, and how well aligned are the activities to the priority areas stated in this solicitation?
- How likely are the proposed education, outreach, workforce development, and community engagement activities to advance broadening participation of the full spectrum of diverse talents that society has to offer?
- How well does the proposal demonstrate that the recipient will take specific actions to develop a culture of inclusion across the facility's proposed activities?

4. Proposed Budget

- Is the proposed budget appropriate, clear, detailed, well justified, and developed in accordance with section 4.2 of the NSF RIG, the GAO Cost Estimating and Assessment Guide (GAO-09-3SP) and 2 CFR §200 of the Uniform Guidance, Subpart E, Cost Principles?
- Does the proposal include specific activities associated with the work to be performed and the activity-based resource descriptions?
- Are project resources effectively allocated to all personnel tasks, activities, equipment and material and supply costs?
- Are the assumptions that have been used to develop the budget clearly identified and defined? Have all uncertainties in the project scope and budget been identified?
- How reasonable and sufficient are the estimated costs and justification for each WBS element of NGF operations and maintenance during

the performance period?
- Is the proposed WBS Dictionary aligned with NGF operations and maintenance activities?
- How well does the proposed budget account for cost drivers such as operational risks and inflation?

5. Broadening Participation Capability and Safe and Inclusive Work Environment Plan

- How well does the Broadening Participation Capability statement address the proposing organization's experience and capabilities in broadening participation in science and engineering, considering the organization's strategies, activities, population(s) on which those activities focus and assessment approach and/or outcomes.
- Is there a compelling plan (including the procedures, training, and communication processes) to establish, nurture, and maintain inclusive off-site working environments?
- Does the proposed plan identify and adequately address the unique challenges for the team and the specific off-campus or off-site settings?
- Are the organizational mechanisms to be used for reporting, responding to, and resolving issues of harassment, bullying, and physical and emotional safety, should they occur, clearly outlined?

6. Transition Plan

Reviewers will evaluate the Transition Plan to assess the proposing organization's ability to assume full responsibility for the management and operation of NGF upon completion of the transition period, without degradation of facility capabilities. The proposal should address applicable elements of the transition of management and operations of NGF, taking into consideration personnel resources, physical and intellectual property, and subaward/contractual commitments.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review, or Reverse Site Review.

Additional merit review criteria apply. Please see the full text of this solicitation for further information.

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review and may be subject to a reverse site visit with specialist reviewers, as a prerequisite to the awarding of funds.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each reviewer and/or panel. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell proposers whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new recipients may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements or the Division of Acquisition and Cooperative Support for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by an NSF Grants and Agreements Officer. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-8134 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

Administrative and National Policy Requirements

Build America, Buy America

As expressed in Executive Order 14005, Ensuring the Future is Made in All of America by All of America's Workers (86 FR 7475), it is the policy of the executive branch to use terms and conditions of Federal financial assistance awards to maximize, consistent with law, the use of goods, products, and materials produced in, and services offered in, the United States.

Consistent with the requirements of the Build America, Buy America Act (Pub. L. 117-58, Division G, Title IX, Subtitle A, November 15, 2021), no funding made available through this funding opportunity may be obligated for an award unless all iron, steel, manufactured products, and construction materials used in the project are produced in the United States. For additional information, visit NSF's Build America, Buy America webpage.

Special Award Conditions:

The award associated with this solicitation will be a cooperative agreement, not a standard grant, continuing grant or a contract. Individual cooperative support agreements may be issued under the terms and conditions of the overall governing cooperative agreement. Any special requirements not stated herein will be negotiated at time of award.

News releases and other similar items prepared by the recipient and/or its subcontractors/employees that describe NGF activities or research results will be submitted for NSF review at least five days prior to proposed publication and will acknowledge the sponsorship of the NSF. Public information brochures, and other similar NGF-related material prepared by the recipient, will be sent to the NSF before being made available to the public.

The recipient will follow NSF LOGO AND VISUAL IDENTITY GUIDELINES: STANDARDS, INFORMATION AND USAGE including but not limited to acknowledgement of the support of the NSF on any signs identifying NGF at its various locations. An acknowledgement of NSF support and disclaimer must appear in any publication of any material based upon or developed under this award in substantially the following terms:

"NGF is sponsored by the National Science Foundation. Any opinions, findings and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the National Science Foundation." (The preceding sentence may be omitted from scientific articles or papers published in scientific journals.) Also, support of other agencies or international contributors shall be acknowledged as appropriate.

TBD - Programmatic Terms and Conditions:

The cooperative agreement(s) awarded as a result of this competition will be administered by the cognizant NSF Program in cooperation with the submitting organization. The following measures will be employed in providing oversight for the cooperative agreement:

- Review of annual reports, program plans, and performance metrics;
- Review of research and education activities and management performance annually throughout the five-year award;
- Site visits annually, or as necessary;
- Such other NSF substantial involvement as determined appropriate.

TBD - Financial and Administrative Terms and Conditions:

Costs incurred are to be in accordance with Subpart E of 2 CFR 200 – Uniform Administrative Requirements, Cost Principles and Audit Requirements for Federal Awards, or Federal Acquisition Regulation (FAR) Part 31, as applicable to the award recipient type.

The recipient will be required to submit to a Business Systems Review at least once during the five-year award period. Further information may be obtained here: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13100.

Standard cooperative agreement terms and conditions, including Modifications and Supplemental terms for Major Multi-User Research Facilities and FFRDC's are available at: https://www.nsf.gov/awards/managing/co-op_conditions.jsp?org=NSF. Specific terms and conditions will be negotiated at time of award.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

A Draft Annual Plan and Budget (APB) for the coming project year a minimum of 90 days prior to the end of the current fiscal year that establishes the technical approach to fulfilling NSF goals and requirements and cost targets for expenditures for the next program operational year. The APB will cover the upcoming operational year and will address, but not be limited to, Programmatic Goals, Metrics and Milestones, Field Activities, Staffing and Organization Plans, Project Budgets, Major Planning Activities, and Insurance, Permitting and Environmental Considerations. APB contents will reflect the schedules, funding levels, guidelines and formats approved by the NSF Program Officer, with detailed budgets for each Work Breakdown Structure Element. The draft approved Annual Plan and Budget will serve to guide management of NGF operations and maintenance or each respective year during the cooperative agreement period of performance. The draft APB will be refined and submitted to the NSF Program Officer for approval a minimum of 90 days prior to the start of the new program operational year. Significant changes, apparent to the recipient or identified by the NSF Program Officer, in objectives or activities described in the Annual Plan and Budget, must be approved by the NSF Grants and Agreements Officer prior to implementation. The impacts and reasons for the proposed changes must be explained. The changes may or may not require modification of the approved budget. The recipient shall provide NSF Program Officials with copies of all significant revisions to documentation, upon request, substantiating all changes to the APB, whether or not NSF approval is required.

Quarterly Report linked to Annual Plan and Budget including:

- Budget report summarizing expenditures during the current reporting period; and
- Milestone schedule status report including a list and description of milestones and activities completed, replanned via change control or missed.

Regular Informal Reports including communication with the Cognizant NSF Program Officers and Grants and Agreements Officer.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Margaret H. Benoit, telephone: (703) 292-7233, email: mbenoit@nsf.gov
- Paul M. Cutler, telephone: (703) 292-4961, email: pcutler@nsf.gov

For questions related to the use of NSF systems contact:

- NSF Help Desk: 1-800-381-1532
- Research.gov Help Desk e-mail: rgov@nsf.gov

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on NSF's website.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this mechanism. Further information on Grants.gov may be obtained at https://www.grants.gov.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.F.7 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at https://www.nsf.gov

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **For General Information** (NSF Information Center)**:** (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

  Send an e-mail to: nsfpubs@nsf.gov

  or telephone: (703) 292-8134
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by proposers will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding proposers or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See System of Record Notices, NSF-50, "Principal Investigator/Proposal File and Associated Records," and NSF-51, "Reviewer/Proposal File and Associated Records." Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

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Policy Office, Division of Institution and Award Support
Office of Budget, Finance, and Award Management
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