Research and Technology Development Services

Statement of Work

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National Aeronautics and Space Administration
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1.0 BACKGROUND

The Science Directorate at the National Aeronautics and Space Administration (NASA) Ames Research Center (ARC) conducts research and technology development, manages programs and projects, develops missions, and serves the Science Community in Astrobiology and related areas of Earth, Space, and Life Sciences.

The Science and Astrobiology Division is dedicated to research in astrophysics, exobiology, planetary science, and advanced life support. These research programs are structured around the study of origins and evolution of stars, planets, planetary atmospheres, and life, and address some of the most fundamental questions pursued by science, questions that examine the origin of life and of our place in the universe.

The Ames Earth Science Division is dedicated to the objectives of the Agency's Earth Science Enterprise. Focusing on the science issues associated with global change, the division conducts investigations in global and regional atmospheric and ecosystems science with particular emphasis on biosphere/atmosphere interactions. The research is focused on the development and use of NASA’s technology to increase our understanding of critical environmental science and astrobiology topics. Investigations address some of the most fundamental questions of concern to the global community: what is the current state of our planet's environment; what natural and human caused processes are directing our planet's environmental future; and what can the record of past planetary environmental change tell us.

The Biosciences Division is dedicated to studying the role and influence of gravity on living systems, from cells in culture to physiological studies in animals and humans. Knowledge that is useful for both, the maintenance of human health on Earth, and the development of countermeasures to the effects of weightlessness in space, will arrive through a better understanding of fundamental physiology.

The Space Science and Astrobiology Division is dedicated to accomplishing projects and missions in collaboration with the three research divisions in the Science Directorate: Science and Astrobiology, Ames Earth Science, and Biosciences. The Division is responsible for defining, developing and either advocating or implementing space projects and activities relevant to the strategic plans of the Directorate, the Center and the Agency. Such activities may be conceived within the Space Science and Astrobiology Division, other divisions, or outside sources.

2.0 SCOPE

This Statement of Work (SOW) describes the requirements for providing scientific, engineering, technical, and documentation support for the various areas of research and technology development work within, but not limited to, the Science Directorate at NASA ARC. Examples are Regenerative Life Support Research, Gravitational Biology Research, Infrared Detector Technology Development, Cryogenics Research, etc.

This contract requires the contractor to provide management, personnel, equipment, materials, and facilities (not otherwise provided by the Government) to meet the requirements described in this SOW. This contract requires the contractor to provide management for the work to be performed, to assure the availability of qualified personnel for timely response to requirements, and to manage all requirements according to the Contractor-provided and Government-approved management plan.

The contractor shall be responsible for providing flexible, responsive, coordinated, and comprehensive services that are adjustable within the framework of a series of individual Contract Task Orders (CTOs). The Government will use a task completion oriented CTO as the vehicle to acquire services from the contractor. Task orders will contain defined requirements (such as deliverables, significant milestone dates), negotiated cost and maximum fee, and established performance measurement criteria. Contract tasks may be added, deleted, or modified as agency, directorate, and/or division goals change.

This contract requires the contractor to provide scientific and technical support for research, including scientific investigations, development of research plans, development of ground-based experiments, fieldwork at remote sites, laboratory data acquisition and analysis, and development and flight of instruments, experiments, and small missions.

This contract requires the contractor to provide technical laboratory services, documentation of research and technology activities and results, and resource analysis functions. This contract requires the contractor to perform mission, system, and subsystem studies; scientific and technical analyses; systems engineering; preparation and control of technical data and documentation for databases and acquisition documents such as specifications and Statements of Work. This contract requires the contractor to provide support for the coordination of development efforts by internal and external participants and the planning and performance of hardware and software design development, integration, and testing.

3.0 REQUIREMENTS

3.1 INTRODUCTION

The contractor shall develop experiment designs, prepare schedules, estimate resource requirements, write protocols, develop specialized software, collect data and samples, participate in experiment meetings, and develop related documentation. Experiments shall be performed using the facilities and laboratories at ARC including the centrifuges, sleds, Cell Tissue Culture Facility, Center for Bioinformatics, infrared laboratory, the cryogenics laboratory, bed rest facility, advanced life support laboratories, and other specialized laboratories as required.

The contractor shall perform tasks in the following major areas, including, but not limited to research, technology development, hardware development, mission operations, and proposal support

The contractor shall provide support for:

(a) Development of technologies supporting research, including but not limited to, mechanical systems, electronics, control systems, cryogenic systems, infrared systems, and biological experimental systems.

(b) Concept definition, requirements definition, design, systems engineering, fabrication, assembly, integration, testing, delivery, field operation, quality analysis, maintenance, and repair for hardware and associated software.

(c) Development of and conduct laboratory experiments and preparation of scientific and technical publications and presentations.

(d) Data processing and analysis, including pre-processing of data, library and database searches, quality control, data archiving, and systems administration.

(e) Fieldwork data collection and logistical support, including processing, transferring, and analyzing data from field or airborne missions.

(f) Adaptation and development of software and analysis techniques for use with models, development and modification of programs to produce data sets and statistics, developing software with a graphical user interface to display data in a variety of ways, and development of a real-time user interfaces.

(g) Preparation of the following: reports, plots for analysis, presentation materials, camera-ready manuscripts, information packages, and spreadsheets.

(h) Web page development and updates.

(i) Domestic and international workshops, educational and training workshops, conferences, and other professional meetings.

(j) Proposal writing.

3.2 RESEARCH AND DEVELOPMENT

The contractor shall:

(a) Provide the management, scientific, engineering, and technical support work for research and development; including scientific investigations, development of research plans, development of ground based experiments and test beds, fieldwork at remote sites, laboratory data acquisition and analysis, and development of flight instruments and experiments.

(b) Provide technical laboratory services, documentation of research and development activities and results, and resource analysis functions.

3.2.1 RESEARCH MANAGEMENT

The contractor shall:

(a) Develop, prepare, and maintain research work plans, procedures, associated activity charts and schedules, reports, studies, correspondence, and other documents required for effective research, technical, and administrative management of program activities.

(b) Develop and monitor technical plans and schedules for the definition of engineering design and development requirements.

3.2.2 RESEARCH FACILITY PLANNING AND SCHEDULING

The contractor shall develop and monitor plans and schedules for the definition of engineering design and development of research facilities, as necessary.

3.2.3 RESEARCH SUPPORT

The contractor shall:

(a) Provide engineering and technical expertise for defining, designing, developing, integrating, testing, verifying and operating ground and flight hardware and software, mission support equipment, and research laboratories and facilities.

(b) Plan, design, fabricate, conduct, analyze, and evaluate prototype engineering and scientific experiments to demonstrate the feasibility of various experimental and developmental concepts and recommend novel approaches for such work.

(c) Provide support for all laboratory analyses required in the research and development work, including design, development, fabrication, integration and checkout, maintenance, and update of laboratory equipment and general laboratory instrumentation.

(d) Set up laboratory experiments, obtain test measurements, perform processing and analysis of the acquired data, and present results in technical papers and conference presentations. This work includes developing and utilizing computer-based interfaces to laboratory equipment and developing appropriate data acquisition and control software.

(e) Assemble, checkout and, provide logistics, and other services for off-site operation of equipment for field tests of systems.

(f) Perform data collection, reduction, analysis, and transfer in support of fieldwork or airborne missions.

(g) Keep abreast of, and follow, applicable safety and laboratory regulations and procedures in handling laboratory equipment and hazardous materials. Participate in the development of new procedures when required.

(h) Perform data acquisition, processing, and report preparation.

3.3 HARDWARE DEVELOPMENT

Hardware will be developed as part of research and technology development activities. The contractor shall support concept definition, requirement definition, design, systems engineering, fabrication, assembly, integration, testing, delivery, maintenance, repair, and refurbishment of hardware and associated software.

The contractor shall:

(a) Prepare and maintain schedules for design, development, fabrication, procurement, testing, and installation of hardware.

(b) Provide cost estimates for design, development, fabrication, and testing of hardware.

(c) Develop test requirements, plans, protocols, procedures, and schedules for hardware.

(d) Estimate resource requirements.

(e) Provide services for defining, performing, and tracking hardware integration and testing (including functional, operations, and interface testing) at ARC and at other hardware integration sites, write procedures, develop pass/fail criteria, train personnel, and implement the tests.

(f) Develop test schedules and ensure that the test equipment is in place for testing and evaluation of such hardware at ARC and other sites.

(g) Implement, track, and analyze hardware tests and resulting data.

(h) Provide all required hardware test documentation, including test results and analyses; analyze and document the resulting data; and develop and document conclusions and recommendations.

(i) Define and perform studies and tests necessary to substantiate science and engineering requirements and to evaluate the ability of hardware to meet designed use and scientific objectives.

3.4 OPERATIONS AND MAINTENANCE OF RESEARCH FACILITIES

The contractor shall provide engineering and technical support for operation, routine maintenance, modification and upgrades to the Ground Acceleration Facilities and other laboratories.

3.5 INSTRUMENT AND SHOP MAINTENANCE

The contractor shall perform routine shop and instrument servicing and maintenance in association with the performance of the contract tasks. Anticipated instruments requiring maintenance include, but not limited to liquid chromatographs, mass spectrometers, microscopes, electron microscopes, vacuum systems, environmental chambers, sampling modules, aerosol sensors, spectrometers, and other common laboratory instruments. The contractor shall coordinate the regular calibration, through ARC calibration service, of laboratory instrumentation. If required, the contractor shall perform calibration service on specialized equipment.

3.6 COMPUTER PROGRAMMING, DATA ACQUISITION, AND DATA ANALYSIS

The contractor shall provide technical expertise in the selection and use of scientific codes and application programs for specific research areas. The contractor shall acquire data from government, university, and commercial sources as appropriate. Acquisition shall involve advanced modes of data transmission such as real-time communications and computer networking as well as more established methods such as shipment of data in digital or hard copy format. The contractor shall prepare input and run scientific application programs and translate; manipulate and interpret data outputs; and maintain, modify, and debug routine programs. The contractor shall prepare test data, conduct tests, and prepare output in tabular, film, print, or graphical form. The contractor shall support the reporting of results of data analysis in technical report papers, in peer reviewed technical publications, and at technical meetings as appropriate. The contractor shall maintain records of program changes including runs and

modified programs and associated job control language, catalog, file, and maintain data storage and microfilm libraries for laboratory, aircraft, and spacecraft data.

3.7 SYSTEM SAFETY, RELIABILITY, AND QUALITY ASSURANCE

The contractor shall interface and coordinate with the NASA ARC Safety, Environmental and Mission Assurance Directorate for defining and implementing safety, reliability, and quality assurance requirements.

In support of CTOs issued, the Contractor shall comply with, and be an integral part of the Ames Management System. This includes following applicable Ames' procedures that are subject to audit. The Contractor shall attend relevant training, provided by the Government, as required for all on-site employees. Specific procedures will be indicated on each task order response. These procedures include, but are not limited to, the following AMS documents:

NPD 1280.1	NASA Management Systems
APR 1280.1	Ames Management System (AMS)
NPD 8730.5	NASA Quality Assurance Program Policy

The Ames' Quality System documents can be found at: http://ams.arc.nasa.gov

3.8 TECHNICAL TASK SUPPORT

It is anticipated that the Contractor staff shall perform the following functions as required on a per task order basis:

(1) Collaborate and exchange technical information with the Government research staff in order to meet the requirements of each CTO.
(2) Provide research support on a task-by-task basis, including direct research functions and indirect support such as technical and programmatic reviews.
(3) Provide short turn-around deliverables for specific project milestones as needed and within the time frame outlined in the approved CTO.
(4) Support technology infusion/deployment efforts with NASA customers.
(5) Attend and participate in group and project meetings.
(6) Present research, work in progress, and results to civil service management and at local and international conferences.
(7) Support (occasionally short-notice) preparations for demonstrations and presentations of research, work in progress, and results to visitors and technical delegates, including supporting and/or hosting of technical workshops as needed.
(8) Travel as needed to conferences, field sites, universities, and other agencies in the performance of research, integration of products, technology infusion, and other important demonstration of results. All

foreign travel by contractors supporting NASA requirements must be documented in country clearance cables to the U.S. State Department. The ARC International Services Office (also known as the International Travel Office, under the auspices of Code JP, *Protective Services*) will draft and submit the cables to the Statement Department. Contractors will be required to complete an Advance Notice Form (ANF) at least three weeks prior to start of foreign travel.

(9) Acquire resources (equipment, furnishings, supplies) needed to support the successful completion of all CTO and related work.

(10) Provide technical writing and editing for the preparation of technical papers, reports, proposals, and newsletters. The technical expertise shall include word processing, illustrating, and preparation of new text and graphics; editing function for revising and updating documents and coordinating the physical production and distribution of documents.

(11) Establish and maintain project operational and documentation databases, including requirement traceability.

(12) Provide web site content development and maintenance, outreach materials, and technology group interface (for developing project requirements and acquiring data).

3.9 MEETINGS, CONFERENCES, ADVOCACY, AND EDUCATIONAL OUTREACH

The contractor shall provide logistical and administrative support for organizing and coordinating project meetings, activities, conferences, workshops, symposia, science working group meetings, and review committee meetings.

The contractor shall develop and disseminate science information and provide public information services and products for the science and education communities and the general public. The contractor shall develop web sites and outreach materials such as brochures, videotapes, compact disks, and displays. The contractor shall coordinate and participate in outreach events.

The contractor shall provide support for local and national science education programs including preparation of K-12 classroom materials.

3.10 CONTRACT MANAGEMENT AND ADMINISTRATION

The Contractor shall provide overall management and administrative functions to ensure that the proper resources are available and allocated, that required reports and documentation are prepared, and that the overall environment supports the requirements in this SOW. The contractor shall plan, manage, control, and coordinate all work under this contract, including that of subcontracts, in accordance with the CTOs approved by the government.

The Contractor shall perform the following:

(1) Manage the contract in a fiscally responsible manner, fulfilling all requirements of negotiated CTOs.
(2) Provide a well-defined, stable organizational structure with clear lines of authority and clearly identified interfaces to the Government.
(3) Provide financial services for their employees.
(4) Provide staff with previous training in state-of-the-art information technologies.
(5) Comply with Government policies and regulations including the Ames Management System (AMS) and relevant AMS policies.
(6) Manage the resources allocated by NASA for specific tasks in a manner to ensure research goals are reached in accordance with agreed upon milestones.
(7) Provide a monthly report of the state of all tasks, identifying accomplishments, publications, and major milestones reached as well as problems and concerns over issues that may affect contract performance along with the recommended solutions.
(8) Provide property management to ensure accountability for installation-provided equipment and facilities and shall be responsible for annual inventory surveys and accountability verification forms.
(9) Provide the risk management activities that will be used to ensure that the Government has adequate insight into the risks associated with the Contractor's ability to accomplish tasks outlined in any CTO.

4.0 DOCUMENTATION

The documentation requirements for each task will be included in the Contract Task Order.

4.1 ACRONYMS

AMS	Ames Management System
ARC	Ames Research Center
ASQC	Ames Safety and Quality Control
COTR	Contracting Officer's Technical Representative
CTO	Contract Task Order
JSC	Johnson Space Center
NASA	National Aeronautics and Space Administration
SOW	Statement of Work

5.0 PHASE-IN AND PHASE-OUT

Phase-In: The phase-in process shall be accomplished as expeditiously as possible, with a maximum phase-in period of 30 days. The phase-in process shall not adversely impact the work being done by the outgoing contractor. It shall be conducted in a manner consistent with safe operation requirements. The incoming contractor is responsible for providing a qualified contractor staff by the end of the phase-in period.

Phase-Out: Upon completion of this contract, the outgoing contractor is responsible for the orderly transfer of duties and records to the incoming contractor. This should be accomplished in an expeditious manner, consistent with any contract phase-in schedule, while minimally impacting ongoing task orders. The contractor shall submit a phase-out plan no later than 60 days before the end of the contract for Government review and approval.