National Aeronautics and
Space Administration

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SPACE POWER AND REACTOR CAPABILITIES (SPARC) CONTRACT

INDEFINITE DELIVERY INDEFINITE QUANTITY (IDIQ) CONTRACT

STATEMENT OF WORK (SOW)

Publicly Available: Release to Public Websites Requires Approval of Chief, Office of Primary Responsibility, and approval via the Scientific and Technical Information (STI) process, if applicable

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1.0 INTRODUCTION

The National Aeronautics and Space Administration (NASA) seeks to develop nuclear systems for use in space and on the lunar surface. This Statement of Work (SOW) defines contractors' requirements to develop, deliver, operate, and sustain space nuclear systems. This competitive acquisition will result in the award of multiple Indefinite Delivery/Indefinite Quantity (IDIQ) contracts under which NASA intends to compete Task Orders (TOs).

The primary purpose of this acquisition will be to support the technology maturation, testing, and flight design for the Lunar Reactor-1 (LR-1) Program. However, TO's may be issued to support other space nuclear systems as appropriate. The LR-1 Program intends to build the first operational fission reactor for the lunar surface, advance U.S. fission power technologies, support future lunar surface activities, and enable power generation capabilities in-space and on Mars. Development of the LR-1 Program will occur in multiple phases, defined by various TOs awarded under the SPARC contract, with the first phase completing a hardware-driven Preliminary Design Review (PDR).

This SOW includes the top-level programmatic and technical requirements for work performed under the SPARC contract. It provides the baseline against which individual TO's will be tailored, executed, and managed. Specific technical requirements will be defined within the individual TO SOWs. Requirements and deliverables for each TO will be defined based on the life cycle phase of the project. The development approach will be tailored as necessary to meet the requirements of the deliverables.

2.0 SCOPE

The Multiple-Award IDIQ (MAIDIQ) scope includes the design, development, analysis, fabrication, assembly, verification, validation, test, evaluation, certification, delivery (ground and/or space), and sustaining maintenance and operations of space nuclear systems, subsystems, hardware, materials, and software. This includes any associated support systems, equipment, facilities, and services necessary to execute the scope (i.e. research and technology development; procurement of ground test assets or services) in support of space nuclear systems.

The Contractor shall provide all resources necessary to complete the scope of work (i.e. personnel, facilities, materials, services, and any other items and functions). Requests for use of Government resources in support of this contract are discussed in Section 3.1.5 of this SOW.

2.1 Acquisition Lifecycle

This IDIQ contract is intended to be an overarching vehicle awarded to the Contractor to manage the requirements identified in the subsequent TOs.

2.1.1 Key Activities

Key lifecycle activities may include TO solicitation support, proposal submission, project planning and execution, technical and programmatic reporting, configuration and data

management, contract administration, knowledge transfer, archival of required project documentation and data, and TO closeout activities, as specified in individual TOs.

The Contractor shall support all phases of the acquisition lifecycle associated with awarded TO, including task initiation, execution, performance management, deliverable submission, and administrative closeout activities.

2.1.2 TO Solicitation

Throughout the Period of Performance, individual TOs will be solicited through TO Requests for Proposal (RFPs). TO RFPs may identify NASA's intended contract type for the specific work being solicited or request that the Contractor submit a proposal reflecting its preferred contract type. The proposals received will be reviewed and awarded based on evaluation criteria detailed in the TO RFP.

2.1.3 TO Closeout

At the completion of each TO, the Contractor shall support administrative and contractual closeout activities, including final deliverable submission, disposition of any Government-furnished information and materials as directed by the Government, resolution of open actions, and archival of required contract and project documentation in accordance with applicable NASA policies and TO requirements.

2.1.4 On Ramp/Off Ramp

Throughout the life of the contract, NASA may determine that additional IDIQ contracts should be awarded, or current IDIQ contracts should end, in order to maintain a pool of vendors for adequate TO competition. To this end, On Ramp and Off Ramp activities have been provided for and are governed within the terms and conditions of this IDIQ contract.

2.1.5 Contract Closeout

At the completion of this IDIQ contract, the Contractor shall support administrative and contractual closeout activities, disposition of any Government-furnished information and materials as directed by the Government, resolution of open actions, and archival of required contract and project documentation in accordance with applicable NASA policies.

3.0 IDIQ-LEVEL REQUIREMENTS

The following requirements establish the top-level technical and programmatic objectives for work performed under the SPARC contract. They provide the baseline against which individual TO will be tailored, executed, and evaluated.

In the event of conflicting requirements, the requirements stated in the applicable TO shall take precedence.

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3.1 Contract Management Requirements

The Contractor shall maintain sufficient management personnel to meet IDIQ contract management and TO requirements.

3.1.1 Cost Reporting

If the Contractor intends to propose cost-reimbursable TOs, it shall acquire and maintain sufficient business systems in order to administer cost-reimbursable TOs which may be awarded under the SPARC contract. Cost reporting shall be required for all cost-type TOs awarded under the SPARC contract. For these TOs, the Contractor shall provide NASA with necessary information to monitor product assurance, identify significant problems, and implement corrective actions. The Contractor shall perform cost tracking and reporting in accordance with the requirements of individual TOs issued under the SPARC contract. Cost reporting information may be required to be delivered to NASA in accordance with Project Management Review Packages and other deliverables as described in the requirements of individual TOs.

3.1.2 Earned Value Management System (EVMS)

A compliant EVMS and Earned Value Management reporting may be required for certain TOs awarded under the SPARC contract. If an EVMS is utilized, the Contractor shall acquire and maintain an appropriate, compliant system to perform EVM reporting. If required, EVMS will be identified in the TO RFP.

3.1.3 Organizational Conflict of Interest (OCI)

The Contractor shall develop and comply with an OCI Plan capable of identifying and mitigating conflicts of interest that arise in the performance of TOs issued under the SPARC contract.

3.1.4 Information Technology (IT) and Security

The Contractor shall comply with NASA guidance regarding Security Requirements for Unclassified IT Resources in a manner consistent with the Federal Information Security Modernization Act (FISMA) of 2014 and NIST 800-53 Security and Privacy Controls for Federal Information Systems and Organizations Revision 5.

When the Contractor receives, processes, stores or transmits NASA non-public information, especially Controlled Unclassified Information (CUI) including Personally Identifiable Information (PII) on a non-federal system (e.g., the Contractor's corporate system) the Contractor must attest that the system meets the requirements for data protections detailed in NIST Special Publication 800-171, "Protecting Controlled Unclassified Information in Nonfederal Systems and Organizations." This attestation may take the form of an existing authorization to operate, third-party review/audit certifying that the non-federal system meets the requirements of NIST SP 800-171 or equivalent standard of information protection, such as the ISO 27001 standard, a certification from another federal agency such as the DOD Cybersecurity Maturity Model

Certification (CMMC) Level 2, or other artifacts showing that the cybersecurity controls have been tested, and the risk posture of the information system is well understood.

Certain TOs may require the Contractor to operate or provide a Federal Information System (FIS). When the Contractor is operating a FIS on behalf of NASA or is providing a FIS in the execution of this contract, that system must have an Information System Security Plan in accordance with NIST Special Publication (SP) 800-53, "Security and Privacy Controls for Information Systems and Organizations" Revision 5. The System Security Plan control baseline should be set to the appropriate data impact level as defined in FIPS 199 Standards for Security Categorization of Federal Information and Information Systems to support NASA Missons. This plan and supporting documents shall be entered into the NASA cybersecurity system of record pursuant to Authorization to Operate (ATO) requirements set forth in NASA Policy Directive 2810.1, "NASA Information Security Policy" and NASA Procedural Requirement (NPR) 2810.1, "Security of Information and Information Systems." The FIS security plan and ATO must be in place before any system may operate in the NASA environment.

3.1.5 Utilization of NASA Resources

3.1.5.1 Property Management

The Contractor shall perform inventory management and comply with reporting requirements related to Government Furnished Property and of items purchased for TOs per the Property Clauses of this contract.

3.1.5.2 Requests for Government Furnished Resources

NASA will consider requests from the Contractor for NASA to provide Government-furnished resources such as spaceflight expertise, lessons learned, technical data, facilities, and equipment. The Contractor is also permitted to seek services from NASA Centers as part of its proposed technical approach to achieve requirements of TOs placed under this contract. Cost and schedule risk associated with design and development activities that are dependent upon NASA support resides with the Contractor. The Contractor is expected to identify in its proposal any such planned Government Task Agreements (GTAs), including a brief description of scope, impacts, and workarounds if the requested GTA resources are not available.

Contractors are independently responsible for establishing agreements. NASA makes no warranty as to their availability or suitability, irrespective of the instrument or mechanism providing such resources to the Contractor and regardless of which party bears financial responsibility for them. NASA will provide any and all such resources as-is, where-is, and the Contractor agrees to use such resources at its own risk. The Contractor is fully and solely responsible for completing performance of all TO requirements and that NASA's provision of such resources shall not be construed as authorization, endorsement, or approval of milestone payments or associated reviews, or as a defense to any finding of mission failure. The Contractor shall not submit any request for equitable adjustment or claim related to or as a result of any resources that NASA agrees to provide to the Contractor in direct support of the

Contractor's performance under the respective TO that are not otherwise expressly identified in the TO scope of work.

Requirements and guidance for establishing GTAs are outlined in the terms and conditions of this contract.

3.2 Technical Practices

3.2.1 Safety and Mission Assurance

The Contractor shall plan, implement, and maintain a safety and mission assurance (SMA) program capable of complying with potential governing requirements as referenced in the applicable documents. Typical safety and mission assurance activities, processes, and products associated with such requirements include but are not limited to: requirement implementation plans, hazards analyses, non-conformance and problem resolution and reporting, reliability assessments (failure modes effects and criticality analyses, fault tree analyses, critical items lists, stress analyses, etc.), software assurance, quality engineering and assurance, and risk management and reporting. Specific TOs may have fewer or additional SMA requirements, activities, processes and products levied based upon mission needs and each order may tailor such items in accordance with task scope.

Additionally, the Contractor shall be certified to AS9100 or have an established, proven, effective, quality program that is in accordance with Federal Acquisition Regulation (FAR) 52.256-11, Higher-level Contract Quality Requirement.

3.2.2 Systems Engineering and Integration

The Contractor shall perform systems engineering when conducting and managing the required technical effort for TOs. The Contractor shall use company best practices to ensure proper procedures and processes are in place for the management of the various system engineering functions or refer to those defined in NPR 7123.1, "NASA Systems Engineering Processes and Requirements."

Under certain TOs, the Contractor may be required to develop a Systems Engineering Management Plan (SEMP) that demonstrates that proper procedures and processes are in place for the management of the various system engineering functions.

3.2.3 Configuration Management

Under certain TOs, the Contractor may be required to establish, implement, and maintain a comprehensive Configuration and Data Management (CDM) program. The CDM program will ensure the consistency of a system's performance, functional, and physical attributes with its requirements, design, and operational information. In these cases, the Contractor will develop, deliver, and maintain a Configuration and Data Management Plan (CDMP) detailing the processes, procedures, tools, and resources used to execute the CDM program. The Contractor will identify and document the functional and physical characteristics of Configuration Items

(CIs). The Contractor will implement and maintain configuration control over all established baselines and CIs. The Contractor will establish and maintain a Configuration Status Accounting (CSA) system to record and report the configuration status of all CIs. The Contractor will support and participate in formal Configuration Audits to verify that the system/product meets its specified requirements and that technical documentation accurately reflects the product. The Contractor will implement a data management process to ensure the security, integrity, and availability of all project documentation. For all software components, the Contractor will establish a Software Configuration Management (SCM) process.

3.2.4 Nuclear Launch Authorization

When Nuclear Launch Authorization is relevant to TO requirements, the Contractor will work collaboratively to obtain nuclear launch authorization, launch licensing, and plan and implement integration and radiological contingency planning activities with NASA for obtaining launch authorization of a space nuclear system. This will include collaborating on milestones, technical reviews or interchanges, providing support for payload integration for launch, and sharing data (e.g. drawings, interface documents, software, emulators) and hardware (e.g. test articles, mass simulators). The launch vehicle integration and launch are expected to occur at either Kennedy Space Center or Cape Canaveral Space Force Station.

The Contractor will work collaboratively with NASA to develop a regulatory engagement plan to show a viable regulatory/authority pathway for use of nuclear material for the entire project lifecycle. This should include descriptions of approaches for supporting lifecycle activities occurring under NASA and Department of Energy (DOE) authority and the approach to supporting NASA in NPR 8715.26 compliance including providing data inputs to the Safety Analysis Report (SAR), NASA, launch license applicant, and the federal agencies with launch authority for the nuclear launch authorization process.

3.2.5 Reviews

NASA typically utilizes a tailored approach to NPR 7120.5 and/or NPR 7120.8 as a guide to lifecycle reviews. Specific approaches to lifecycle development may be identified within the requirements of individual TOs awarded under this contract or TO RFPs may allow the Contractor to determine an alternative project management approach subject to NASA approval.

3.2.6 Applicable and Reference Documents

NASA has established a set of engineering standards for NASA Space Flight and Technology Development projects. These standards apply for spacecraft, launch vehicles, instruments developed for space flight projects, research and technology for infusion into space flight projects, critical technical facilities specifically developed or significantly modified for space flight systems, and ground systems that are in direct support of space flight operations.

See http://nodis3.gsfc.nasa.gov/ for the current versions of applicable and reference NASA policy and procedure documentation. See https://standards.nasa.gov/nasa-endorsed-standards for the current versions of the NASA Office of the Chief Engineer Endorsed Engineering Standards. See https://www.nasa.gov/glenn/policies-procedures/ for the latest GRC Policies and Procedures.

Specific standards applicable to TO's issued under the SPARC contract may be included in TO SOWs. The Contractor may propose alternative standards when such alternatives meet the intent of the listed standards and offer potential improvements in cost or performance. When proposing alternative standards, the Contractor is responsible for identifying, acquiring, and properly applying them. Use of any alternative standard is subject to approval by NASA.

4.0 PLACE OF PERFORMANCE

The location of work performed under this contract will be decided based on TO requirements and in accordance with the Contractor's proposal for each TO. In general, the primary place of performance is expected to be as follows:

- Contractor and subcontractor facilities (which may include institutions of higher learning and/or Federally Funded Research and Development Center (FFRDC) and National Laboratory facilities, when appropriate and as proposed by the Contractor)
- NASA Glenn Research Center (GRC)
- Other NASA Centers (as agreed upon by NASA and Contractor leadership)
- Other United States (US) Federal Government Department and Agency facilities (as agreed upon by appropriate Government and Contractor leadership)
- Other locations as proposed by the Contractor

5.0 COMPLIANCE WITH U.S. LAW, REGULATIONS, AND POLICIES

The Contractor must comply with all applicable U.S. laws, regulations and policies, including but not limited to those related to safety; security; cybersecurity; access control; export control; environmental; suspension and debarment; and establishing an Interconnection Security Agreement when applicable.

With respect to export control, the Contractor shall be required to comply with all U.S. export control laws including Export Administration Regulations (EAR) and International Traffic in Arms Regulations (ITAR). The Contractor shall be responsible for ensuring that all persons who will perform work under an award on export-controlled goods or services are eligible under export control laws, EAR, and ITAR.

Further, the Iran, North Korea, and Syria Nonproliferation Act (P.L. 106-178, amended by P.L. 107-228, P.L. 109-112, P.L. 109-353, P.L. 110-329, P.L. 112-273, P.L. 116-94; 50 U.S.C. 1701 note) (INKSNA) prohibits payments to organizations or entities that are now or were in the past under the jurisdiction or control of Roscosmos (the Russian Federal Space Agency), or to any other organization, entity, or element of the Government of Russia for goods or services directly related to human spaceflight, other than for work on the ISS. NASA has applied the restrictions in this Act to include NASA funding of Russian entities via U.S. entities.

The Contractor's attention is further directed to the following non-exhaustive list of potentially applicable U.S. laws, regulations, policies, standards, and handbooks:

- National Space Transportation Policy, November 2013
- U.S. National Space Policy, December 2020
- Memorandum on the National Strategy for Space Nuclear Power and Propulsion (Space Policy Directive-6)
- National Security Presidential Memorandum on the Launch of Spacecraft Containing Space Nuclear Systems (NSPM-20)
- 51 U.S.C. Chapter 501 – Space Commerce
- 51 U.S.C. Chapter 509 – Commercial Space Launch Activities
- FISMA 2014, Federal Information Security Modernization Act 2014
- 10 Code of Federal Regulations (CFR) Chapter 1 – Nuclear Regulatory Commission
- 49 CFR Chapter 1 – Transportation
- Nuclear/Radiological Incident Annex to the Response and Recovery Federal Interagency Operational Plans
- 42 U.S.C. §§ 4321 *et. seq*. (as amended by the Fiscal Responsibility Act of 2023) – The National Environmental Policy Act of 1969
- IAEA, Specific Safety Requirements No. 6 (SSR-6), Regulations for the Safe Transport of Radioactive Material
- DAFMAN 91-110, Nuclear Safety Review and Launch Approval for Space or Missile Use of Radioactive Material.
- AC 450.45-1 - Launch and Reentry of Space Nuclear Systems
- Interagency Nuclear Safety Review Board (INSRB) Playbook
- NASA-HDBK-8715.26 Information and Best Practices Related to NASA Nuclear Flight Safety for Space Flights Involving Space Nuclear Systems
- NPR 8715.26 Nuclear Flight Safety

6.0 ACRONYMS AND ABBREVIATIONS

TABLE A1-1 ACRONYMS AND ABBREVIATIONS

Acronym	Full Term
ATO	Authority to Operate

TABLE A1-1 ACRONYMS AND ABBREVIATIONS

Acronym	Full Term
CI	Configuration Items
CDM	Configuration Data Management
CDMP	Configuration and Data Management Plan
CFR	Code of Federal Regulations
CMMC	Cybersecurity Maturity Model Certification
CSA	Configuration Status Accounting
CUI	Controlled Unclassified Information
DOE	Department of Energy
EAR	Export Administration Regulation
EVMS	Earned Value Management System
FAR	Federal Acquisition Regulation
FFRDC	Federally Funded Research and Development Center
FISMA	Federal Information Security Modernization Act
GRC	Glenn Research Center
GTA	Government Task Agreement
IDIQ	Indefinite Delivery/Indefinite Quantity
INKSNA	Iran, North Korea, and Syria Nonproliferation Act
INSRB	Interagency Nuclear Safety Review Board
IT	Information Technology
ITAR	International Traffic in Arms Regulations
LR-1	Lunar Reactor 1
MAIDIQ	Multiple-Award Indefinite-Delivery, Indefinite-Quantity
NASA	National Aeronautics and Space Administration
NPR	NASA Procedural Requirement
NSPM	National Security Presidential Memorandum
OCI	Organizational Conflict of Interest
PDR	Preliminary Design Review
PII	Personally Identifiable Information
RFP	Request for Proposal
SAR	Safety Analysis Report
SCM	Software Configuration Management

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TABLE A1-1 ACRONYMS AND ABBREVIATIONS

Acronym	Full Term
SEMP	Systems Engineering Management Plan
SMA	Safety and Mission Assurance
SOW	Statement of Work
SP	Special Publication
SPARC	Space Power and Reactor Capabilities
SSR	Specific Safety Requirements
STI	Scientific and Technical Information
TO	Task Order
US	United States

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