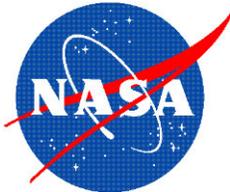


# RANGE OPERATIONS CONTRACT II

## STATEMENT OF WORK



Provided by  
NASA Wallops Flight Facility  
Range and Mission Management Office  
Wallops Island, Virginia 23337

April 9, 2015



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## Abbreviations, Acronyms, and Initializations

AIS	Automated Information System
AMG	Advanced Mission Graphics
AOM	Aircraft Operations Manual
ASOS	Automated Surface Observation System
ASR	Air Surveillance Radar
ASRF	Atmospheric Scientific Research Facility
ATRR	Acceptance Test Readiness Review
CATV	Cable Television
CCB	Configuration Control Board
CDR	Critical Design Review
CFR	Code of Federal Regulations
CM	Configuration Management
CMMI	Capability Maturity Model Integration
CO	Contracting Officer
COR	Contracting Officer's Representative
CTO	Control Tower Operator
CSLA	Commercial Space Launch Act
DIDS	Digital Imaging Database System
DLM	Depot Level Maintenance
DMSP	Defense Meteorological Satellite Program
DPI	Dots Per Inch
DQC	Data Quality Computer
DR	Discrepancy Report
EAR	Export Administration Regulations
ELV	Expendable Launch Vehicle
EMCON	Emission Control
EPA	Environmental Protection Agency
ESD	Electrostatic Discharge
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FCLP	Fleet Carrier Landing Practice
FISMA	Federal Information Security Management Act
FRR	Flight Readiness Review
FTS	Flight Termination System
FY	Fiscal Year
GFP	Government Furnished Property
GMM	General Maintenance Manual
GMT	Greenwich Mean Time
GOR	Ground Operations Review
GPS	Global Positioning System
GSE	Ground Support Equipment
GSFC	Goddard Space Flight Center
HF	High Frequency
HIF	Horizontal Integration Facility

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IAGP	Installation Accountable Government Property
IDIQ	Indefinite Delivery Indefinite Quantity
INS	Inertial Navigation System
IRIG	Inter-Range Instrumentation Group
IRSP	Instrumentation Radar Support Program
IT	Information Technology
ITAR	International Traffic in Arms Regulations
IV&V	Independent Verification and Validation
LEADS	Leading Environmental Analysis Display System
LMR	Land Mobile Radio
LN2	Liquid Nitrogen
LRR	Launch Readiness Review
LSSP	Launch Site Support Plan
LTAS	Launch Trajectory Acquisition System
MDDF	Minimum Delay Data Format
MOA	Memorandum of Agreement
MRR	Mission Readiness Review
MSR	Monthly Status Review
NASA	National Aeronautics and Space Administration
NDC	NASA Data Center
NISN	NASA Integrated Services Network
NOTAM	Notice to Airmen
NPOL	NASA S-Band Dual-Polarimetric Radar
NPR	NASA Procedural Requirements
NSEP	National Security Emergency Preparedness
NTSC	National Television Standard Committee
NWS	National Weather Service
OD	Operations Directive
ORR	Operational Readiness Review
OSHA	Occupational Safety and Health Administration
PDR	Preliminary Design Review
PFRR	Poker Flat Research Range
PG	Procedures and Guidelines
PM	Project Manager
PMP	Program Management Plan
PMSR	Post Mission Services Report
POC	Point of Contact
PPF	Payload Processing Facility
PPR	Permit/Prior
QAP	Quality Assurance Plan
RADAC	Range Data Acquisition Computer
RADCAL	Radar Calibration
RCC	Range Control Center
RF	Radio Frequency
RFDF	Radio Frequency Direction Finding
RIDR	Range Instrumentation Design Review

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RISM	Range Instrumentation Services Manager
RMMO	Range and Mission Management Office
ROMS	Range Operations Management System
RRR	Range Readiness Review
RRS	Research Range Services
RYG	Red/Yellow/Green
SC	Surveillance Coordinator
SCAPE	Self Contained Atmospheric Protective Ensemble
SCR	Systems Concept Review
SFF	Spacecraft Fueling Facility
SHARES	Shared Resources Program
SMD	Science Mission Directorate
SOW	Statement of Work
SRR	Systems Requirement Review
SSOPD	Suborbital and Special Orbital Projects Directorate
STD	Standard
TDRSS	Tracking and Data Relay Satellite System
T&M	Time and Materials
TO	Task Order
TOGA	Tropical Ocean/Global Atmosphere
TOY	Time-of-Year
TV	Television
U.S.	United States
UAS	Unmanned Aircraft Systems
UHF	Ultra High Frequency
UPS	Uninterruptible Power Supply
USDA	U.S. Department of Agriculture
UTC	Universal Time Code
VHF	Very High Frequency
VIP	Very Important Person
WAR	Weekly Activity Report
WFF	Wallops Flight Facility
WICC	Wallops Institutional Consolidated Contract

## Section 1: Introduction

### 1.1 BACKGROUND

The National Aeronautics and Space Administration (NASA) Research Range Services (RRS) Program is executed at Goddard Space Flight Center (GSFC), Wallops Flight Facility (WFF) which will be referred to as Wallops in this document. NASA's Heliophysics Division within the Science Mission Directorate (SMD) at NASA Headquarters provides programmatic direction to the RRS Program. The Wallops Range located at Wallops is the only NASA-owned and operated launch range. The Wallops Range is managed by the Range and Mission Management Office (RMMO) in the Suborbital and Special Orbital Projects Directorate (SSOPD). The services defined in this Statement of Work (SOW) provide the core range instrumentation operations, airfield operations, and ground operations capabilities required by the Wallops Range to support a diverse customer portfolio.

The NASA RRS Program supports NASA's mission objectives by providing tracking, telemetry, meteorological, optical, and command and control services for flight vehicles including orbital and suborbital rockets, aircraft, satellites, balloons and Unmanned Aircraft System (UASs), providing real-time display and capture of mission-specific flight, payload and science data.

RRS Program staff also provides sustaining engineering and project management services. Sustaining engineering services include verifying and validating instrumentation performance, providing support in determining and correcting root causes to system failures, implementing minor to moderate system upgrades and enhancements, and performing link analysis calculations to ensure required radar, telemetry, and command support of missions.

RRS Program engineers are also responsible for helping establish operational sites at remote locations, which routinely include an off-axis site at Coquina, North Carolina and the NASA Sounding Rocket Program launch site at Poker Flat Research Range (PFRR), but also at locations in Florida, Bermuda, Kwajalein, Australia, and Norway, where range services are implemented to support various special projects.

RRS Program systems and capabilities include:

- Fixed and temporary/mobile and mobile radar systems for tracking launch vehicles, satellites and aircraft; ground-based and airborne radars for area surveillance to ensure safe flight operations; and ground-based scientific radars to provide atmospheric and weather measurements.
- Fixed and temporary/mobile telemetry systems to collect and distribute state-of-health and science data from flight vehicles and payload instrumentation during pre-mission checkouts and flight operations.
- Voice video and data communications systems to provide coordinated execution of operational missions.

- Data systems to acquire, record, and process radar and telemetered information for real-time display, facilitating monitoring of vehicle performance and controlling of flight events.
- Fixed and temporary/mobile optical and television systems providing vehicle tracking capabilities, ground-based and aerial video and photography, still photography archiving and printing, and post-production services.
- Fixed and temporary/mobile command systems to control flight vehicles and provide flight termination capabilities for Range Safety purposes.
- Radio Frequency (RF) spectrum allocation management and coordination, and monitoring equipment to detect and locate sources of RF interference.
- Master station time equipment to synchronize range activities and data.
- Range Control Center (RCC) systems to monitor coordinated mission operations and provide critical information to enable effective safety and customer commitment decision-making.
- Meteorological instrumentation systems and services to measure current atmospheric and weather conditions to provide accurate forecasts for safe range operations.

## 1.2 DEFINITION OF TERMS

Terms used in this document are defined below:

**LAUNCH AREA:** The location from which a launch is conducted. Theoretically, this can be anywhere on the land, sea or air that a launch vehicle can be set up successfully and launched to complete an experimental or operational mission. For this SOW, the focus is on existing:

- Existing: An “existing” launch area is any location that already provides the necessary infrastructure to accomplish a mission as well as exhibiting a history of successful missions. Existing areas may range from rudimentary in their capability to having very advanced infrastructures and features.

**RANGE:** The many support elements required to effect a launch, including human and other resources needed to prepare for the launch, ensure safety, process the vehicle, monitor weather, provide ancillary services (fire protection, environmental, construction, range clearances, legal requirements, etc.), record/track launch operations and flight, receive/archive flight and mission data, provide recovery operations, etc. There are two categories of ranges covered in this document as follows:

- Fixed: A range that is established in a permanent location and provides all the necessary aspects of range and mission operations. Like existing launch areas, fixed ranges have long histories and established infrastructure to support many different types of missions without requiring significant capital investment. They may also deploy temporary elements to remote locations to carry out mission-specific requirements.
- Temporary/Mobile: Temporary or mobile ranges are “portable” in nature in that they accomplish the provisioning of range and mission operations

through the introduction to an area of mobile/portable assets complete with associated subsystems and personnel. They generally provide most of the capabilities of a fixed range but in a smaller package without some of the enhanced features of a fixed location.

**RANGE SAFETY:** The application of safety policies, principles, and techniques to protect the public, workforce, and property from hazards associated with range operations.

**MISSION:** The “mission” for the purpose of this effort is all the programmatic details, processes and operations required to prepare for and launch an experimental or operational vehicle. A mission can range from very early prototypical projects to near-routine follow-on efforts.

**RANGE USER:** A range user is considered a NASA (or NASA contractor) developed flight test or launch and/or entry vehicle program that conducts range operations on a range.

**NASA LAUNCH:** A launch conducted by or for NASA, where NASA is so substantially involved that it effectively directs or controls the activity.

**COMMERCIAL LAUNCH:** For purposes of the Commercial Space Launch Act (CSLA), commercial launches are launches under Federal Aviation Act (FAA) license. Such launches include FAA licensed launch carrying a NASA payload pursuant to a contract between NASA and the commercial launch provider.

### 1.3 SCOPE

Sections 1-6.5.3 of this SOW describe functional requirements which are required to successfully perform all Core and IDIQ missions and projects associated with ROC II. Core Missions are identified in Enclosure 1. Core Projects are identified in Enclosure 2. Other additional mission and project support will be acquired by issuance of individual task orders, and will require the contractor to perform all or portions of the functional requirements in accomplishing each individual task.

This SOW is for the Wallops Range Operations Contract II and requires the contractor to provide Wallops Range instrumentation operations and maintenance; support services; training; command, control, communications, information and computer systems services; testing, modifying, installing, and operating communications and electronic systems, ground support systems, and spacecraft and launch vehicle processing systems at launch facilities, spacecraft processing facilities, launch vehicle processing facilities, launch control centers and test facilities; operating and maintaining suborbital launch systems; and flight and ground systems technology development engineering services.

The contractor shall provide qualified personnel, equipment, tools, commodities, materials, vehicles, specialized test equipment, supervision, and other services to support the Wallops Range and its customers.

The Wallops Range requires an innovative, integrated, extremely flexible and effective management approach to ensure comprehensive technical support in a planned and coordinated manner which ensures essential Wallops Range services readiness to support user requirements. This innovative and effective management approach shall not impact Wallops Range operations schedules due to equipment degradation, failure, obsolescence, or requirements reprioritization. The wide variety of customer requirements shall be managed utilizing comprehensive workload planning, cost management, and flexible and responsive scheduling of proper resources to identify and resolve technical problems to meet diverse customer needs.

Instrumentation systems are permanently located at Wallops and at PFRR. In addition, temporary/mobile instrumentation shall be deployed to locations worldwide to meet Range customer requirements. This mobile instrumentation equipment may be deployed to these worldwide locations for long periods of time.

The Wallops Range receives and provides range services to and from various agencies. The Wallops Range constantly strives to ensure it is prepared to accommodate the current and future needs of its customers. To that end, the contractor shall implement effective ongoing preventive and corrective maintenance and engineering upgrade tasks to ensure readiness and avoid obsolescence of range instrumentation equipment and systems. The contractor shall also work with the Wallops Range in cooperation with other NASA Centers and government agencies to conduct range technology development projects to enable the evolution of the Range architecture to include space-based metric tracking, telemetry, and command relay, and mission planning and operations systems.

The aging instrumentation systems that make up the Wallops Range shall operate continuously in highly corrosive environments and successfully support missions subject to schedule and requirements variability common on operational and test ranges. These systems are located at Wallops, PFRR, and deployed to sites around the world. The contractor shall implement simultaneous operations management and staffing at Wallops, PFRR, and these additional remote sites in support of customer requirements.

The contractor shall provide timely and reliable systems operations and maintenance while achieving systems performance excellence, continuously improve customer support, and proactively pursue overall cost reductions.

The contractor shall ensure system configuration integrity and reliability, mission readiness, and service excellence.

The contractor shall provide qualified personnel, equipment, tools, materials, supervision, training, certifications and other items and services necessary to manage

range services requirements and perform tests, spacecraft and launch vehicle processing, launch operations and systems maintenance.

The Contractor shall comply with the following four Section 508 standards:

- 1194.21 Software applications and operating systems
- 1194.22 Web-based intranet and internet information and applications
- 1109.23 Telecommunications products
- 1194.24 Video and multimedia products

The contractor shall comply with requirements from NPR 7150.2 NASA Software Engineering Requirements, STD 8739.8 NASA Software Assurance Standard, and STD 8719.13 NASA Software Safety Standard. The contractor is responsible for provider requirements associated with life cycle phases (typically operation and maintenance) for Class B to E software. The contractor shall provide support to NASA in meeting acquirer software assurance and safety requirements by complying with 800-PG-7150.4.1, Software Safety and Mission Assurance Process Interface, which serves as a software assurance and safety plan.”

The contractor is not responsible for the maintenance of buildings that house the majority of the range instrumentation support systems at Wallops or PFRR. The Wallops Institutional Consolidated Contract (WICC) provides typical institutional services for Wallops. The Sounding Rockets Program Office provides these same services at the PFRR. However, the contractor provides maintenance to the mobile trailers and containers that are utilized as part of the mobile range instrumentation services area.

Other traditional institutional services such as physical security, shipping/transportation, etc., are provided by other Wallops contractors unless otherwise stated in this SOW. Performing range safety operations is not the responsibility of the contractor; however, there are some systems utilized and operated by the Wallops Safety Office that shall be maintained and sustained by the contractor.

## **Section 2: Program Management**

The contractor shall provide all technical, business, and program management functions necessary to plan, organize, implement, control, track, report, and deliver all requirements within the scope of the ROC II as described in this SOW, as well as any other functions determined by the contractor to be necessary based on their technical and business approach to contract performance.

### **2.1 PROGRAM CONTROLS**

The contractor shall plan for, conduct, and administer a comprehensive integrated management program.

The contractor shall appoint a Program Manager who shall have the authority to make any necessary responsive decisions related to the performance of this contract and shall be the contractor's primary point-of-contact with NASA.

The contractor shall administer functions which include: program management; contractor ethics; project management; continuous risk management; contract management; materiel management; cost control management; operations and strategic planning; contract administration; performance measurement; configuration management; quality control; data management; integrated logistics support; property management; employee and operations safety; and employee training programs.

The contractor shall review and develop draft directives, monitor work in progress and coordinate with designated Government interfaces and other vendors and contractors. The contractor shall develop and implement a management philosophy to meet evolving mission requirements for the Wallops Range and its customers.

Customers include NASA as well as reimbursable customers with range requirements. The NASA and reimbursable requirements are defined and provided by the COR and NASA Project Managers.

The contractor shall use Government-furnished Maximo® software to perform work control management and if they choose to use Maximo® for any other services, they shall use the same version of Maximo®. The Government will retain ownership of all data in Maximo® upon contract completion.

The contractor shall adhere to NPR 7120.5, NASA Space Flight Program and Project Management Requirements or NPR 7120.8, NASA Research and Technology Program and Project Management Requirements, for all Wallops Range missions as defined in mission specific requirement documents. Additional management standards required to be followed will be defined in mission specific requirements documents and NASA project plans.

The contractor shall develop and maintain a Program Management Plan (PMP) for tracking programs and projects supported, range services customer requirements,

services provided, maintenance activities, actual labor hours, material costs, special projects, work requests, configuration management, and other areas requiring insight and visibility.

The PMP shall define the tools and processes to be utilized by the contractor to perform the program management functions required for this contract.

## **2.2 CONTRACTOR TRANSITION PHASE-OUT PLAN**

The contractor shall provide a phase-out plan in accordance with the contract schedule. The plan shall address: requirements for transition of personnel and equipment, completion or transition of engineering projects, accommodations for incoming personnel, completion or handover of campaign or operations, and other ongoing functions or tasks in order to insure seamless transition of the contract. The contractor shall make available to the successor all written and electronic operating and maintenance instructions, documentation, vendor information, hardware/software utilities and all other policies and procedures developed in the performance of this contract.

## **2.3 TASK ORDER AND WORK MANAGEMENT**

The contractor shall use the Range Operations Management System (ROMS) as a means of documenting and tracking task order and work order requirements of this contract.

The contractor shall provide an operable data interface between the contractor's accounting system and ROMS within 3 months of the contract effective date that shall be demonstrated by production of accurate reporting products as defined in the SOW. The ROMS provides Government insight into contractor technical progress/schedule and cost accruals for each task order and work order for each customer.

The cost data shall be input monthly aligning with NASA Form 533 submittal schedules.

Technical and schedule data inputs shall be done on a bi-weekly basis or unless otherwise required by the Government due to mission unique reporting requirements.

The ROMS shall support planning, budgeting, performance measurement, resource obligations, Range mission and operational requirements, and Range system improvement efforts.

The Government will provide ROMS system operation training as needed.

## **2.4 PROGRAM MANAGEMENT REPORTING**

The contractor shall provide a single point of contact, namely the Range Instrumentation Services Manager (RISM) defined in Section 3, for all assigned projects.

The contractor shall provide a short verbal status of high priority items or items of interest during the weekly NASA Range and Mission Management Office staff meeting.

The contractor shall participate in meetings and reviews as requested by the Government to ensure adequate communication to Wallops Range operations personnel, NASA and Wallops Range customers.

#### **2.4.1 Weekly Activity Report**

The contractor shall provide a Weekly Activity Report (WAR) summarizing all technical operations and maintenance activities, and engineering activities accomplished during the previous work week period.

The WAR shall include a forecast of the technical operations, maintenance and engineering work that will be accomplished during the following week.

The WAR shall provide updates on major operations and engineering risks and issues that are appropriate for weekly communication.

The WAR shall be delivered no later than Noon every Tuesday by uploading to ROMS unless otherwise defined by the COR.

#### **2.4.2 Monthly Status Report**

The overall program management status shall be provided to the COR as a Monthly Status Report (MSR), in the format defined by the COR, by the 2nd of each month unless otherwise defined by the COR.

The COR will provide the format of the MSR during the contract Phase In period. If a task order is awarded beyond the 15th of a month, the following MSR does not have to status that work, unless otherwise defined in the task order.

The MSR package shall provide detailed range support operations and systems upgrade activities, financial status, and risk and issue status.

In summary, the MSR content shall contain the following information:

- Covers ALL contract activities;
- Consolidated report of engineering, operations and maintenance accomplishments and upcoming projected work activities with specific Red/Yellow/Green (RYG) issue and/or risk status for each mission defined and specific RYG issue and/or risk status for each engineering upgrade effort using the NASA/GSFC Problem/Issue/Risk RYG definitions and presentation process defined by the COR;
- Contract performance metrics;
- Discrepancy Report (DR) status;
  - Average open time for DRs assigned to Operations;
  - Average open time for DRs assigned to Engineering;
  - Worst case open time for DRs assigned to Operations;
  - Worst case open time for DRs assigned to Engineering;
- Status of Deliverables;

- Plan for large (over \$50K) material purchases (including purchase date, invoice date, and cost);
- Development schedule for each project with key milestones;
- Major accomplishments for each project;
- Project priorities;
- Staffing changes with justifications/reasoning;
- New Projects as a Result of Government Request or contractor initiated effort;
- Cancellation or Postponement of Projects with Justification/Reasoning;
- Outdated systems recommended for logical upgrade based on lack of vendor support, low reliability (high failure rate), high maintenance costs, etc.;
- Proposed designs, personnel resources applied to each sustaining engineering activity, sustaining engineering materials, implementation schedule and estimated costs;
- Current and projected period of performance end cost and obligation variance; and
- Monthly Range Summary Schedule defining additions or deletions since the last report as well as completed projects and activities.

## **2.5 PERFORMANCE METRICS AND REPORTING**

The contractor will receive mission-specific performance metrics in requirements documents provided by the Government or task orders.

The contractor shall report mission performance results in the Post Mission Services Report.

### **2.5.1 Instrumentation Systems Availability**

The contractor shall collect and provide real-time systems availability metrics. In addition, the contractor shall provide the last six months availability metrics, and cumulative systems availability to date in the MSR.

***Availability shall be defined by the following formula:***

*Availability = 100% \* (Service Hours Required – Service Hours Not Scheduled)/Service Hours Required.*

Service Hours Not Scheduled shall not include planned system downtime when impacting customer support requirements. Service Hours Not Scheduled shall include unplanned system downtime when impacting customer support requirements.

The contractor shall collect and present planned and unplanned system downtime and include in the MSR, mission specific readiness reviews and associated reports.

The availability requirement across all systems defined below shall be 98% and in no case impact safety.

The availability shall be met across any 6-month sliding window with the window able to move in one month increments.

All instrumentation systems/trailers shall be reported for availability metrics.

### **2.5.2 Discrepancy Report**

To maintain continual quality of services improvement, the contractor shall implement an electronic Discrepancy Report (DR) entry and tracking system as part of the ROMS within three months after contract effective date.

DRs shall be tracked manually, at contract effective date prior to the system being in operation.

Quarterly, the contractor shall conduct a detailed review of all outstanding DR's defining resolution plans during the MSR.

DRs shall be able to be generated by the contractor or NASA, under the CM process, in the event of a process ineffectiveness declaration or failure, system malfunction or operator error.

A DR shall also be written by the contractor to document desired systems/process enhancements.

A DR shall be written whenever it is noticed that equipment or personnel have not performed as expected. This may occur during simulations, preventive maintenance or during a mission.

The DR's shall be tracked and resolved by the contractor or the contractor recommended team (could include civil servant subject matter experts as required) to minimize or negate future occurrence.

### **2.5.3 Data Systems Performance and Reliability**

Assurance (quality, safety, reliability, verification and validation) requirements apply to all system life cycle phases including design, implementation, test, operations, and maintenance. Assurance activities include reviews, audits, and tests. Engineering and assurance activities are tailored based on the classification and criticality of software systems. NASA directives list requirements for both the software acquirer (e.g., NASA) and the software provider (e.g., the contractor).

The contractor shall comply with requirements from NPR 7150.2 NASA Software Engineering Requirements, STD 8739.8 NASA Software Assurance Standard, and STD 8719.13 NASA Software Safety Standard. The contractor is responsible for provider requirements associated with life cycle phases (typically operation and maintenance) for Class B to E software. (Classifications are defined in NPR 7150.2.) The contractor shall provide support to NASA in meeting acquirer software assurance and safety

requirements by complying with 800-PG-7150.4.1 Software Safety and Mission Assurance Process Interface, which serves as a software assurance and safety plan.

To meet NASA directives, the contractor shall document software management plans, configuration management plans, test plans, test procedures, maintenance plans, operation plans, users manuals and retirement plans. The contractor shall create one management plan to cover multiple similar systems. The contractor shall either comply with the provider software assurance and safety process requirements defined by 800-PG-7150.4.1 or document an alternate process to meet STD 8739.8 and STD 8719.13 provider requirements.

Following approved processes, the contractor shall maintain code and associated files and document, as needed, requirements, metric reports, peer review/inspection reports, software/data/interface descriptions, version descriptions, change requests, problem reports, and test reports as applicable to each system's classification and lifecycle phase. Safety-critical software systems shall also require the documentation and maintenance of a hazard analysis (e.g., fault tree or failure modes and effects analysis).

Activities associated with safety-critical software systems require coordination with the Wallops Safety Office. Safety-critical reliability requirements will be specified by the Wallops Safety Office for each safety-critical system. The Range and Mission Management Office may also specify mission-critical reliability requirements. Test plans for safety-critical software systems shall cover functional requirements, potential failure modes (identified by the hazard analysis), and multiple (typically 30 to 100) operation scenario tests designed to provide evidence of system reliability.

To allow NASA insight, the contractor shall participate in twice yearly process audits for mission-critical and safety-critical software systems. To allow NASA oversight, the contractor shall include the Wallops Safety Office in reviews and tests for safety-critical software systems.

## **2.6 STRATEGIC PLANNING**

The contractor shall provide support in developing strategic plans for the Wallops Range. This support may be in the form of presentations or printed publications.

The potential recipient of these plans may include program executives at NASA Headquarters and NASA senior management at Wallops and GSFC as well as potential Wallops customers.

## **2.7 SAFETY AND HEALTH MANAGEMENT**

A comprehensive and proactive safety and health program is required. The contractor shall perform the requirements of this contract using the safety and health guidelines provided within the Occupational Safety and Health Act, NASA Safety Manual, NPR 8715.3, the GSFC Environmental Policy and Program Management, GPD 8500.1, and any other directives contained in this contract.

The contractor shall ensure that employees are aware of and trained relative to safety and health requirements associated with their jobs and positions.

The contractor shall reimburse the Government for any civil or criminal fines or penalties resulting from any safety and health or environmental infractions caused by the contractor's negligence.

Smoking and tobacco use policies, while on duty, shall conform to NASA and OSHA standards.

## **2.8 QUALITY MANAGEMENT**

The contractor shall develop, implement, and maintain a Quality Management System (QMS) compliant to International Organization for Standardization (ISO) 9001. The system shall be in accordance with NASA Policy Directive (NPD) 8730.5. The Research Range Services Program operations include critical and sometimes complex systems. Should support of a specific project be defined in mission specific project requirements documents as critical and/or complex, the contractor shall be compliant with Aerospace Standard (AS) 9100 for that project. The Government may choose to audit, or have a third-party audit at the Government's convenience, the contractor's quality management system to ensure compliance with the applicable standard. The proposed QMS shall be compatible and consistent with the risk posture defined by NASA Procedural Requirements (NPR) 7120.8, NASA Research and Technology Program and Project Management Requirements, and the Suborbital Research Program Plan. The QMS shall not create unnecessary requirements that fail to produce benefits commensurate with the resources required for their implementation.

The QMS shall include the development and maintenance of a Quality Manual which shall be submitted by the contractor within 60 days after contract effective date and approved by NASA COR in accordance with the contract schedule. The contractor shall review the Quality Manual annually and any updates or affirmation as to "no change" shall be submitted to NASA COR. The manual shall include how the contractor will implement a process to maintain written fabrication, inspection, maintenance, refurbishment, assembly, test, and operating procedures for all critical systems and processes. The contractor shall identify safety and mission critical systems and processes for concurrence by NASA COR. The manual shall address how the contractor will implement the requirement to maintain a monitoring, inspection, test, and quality control program that documents compliance of fabricated and procured items with design drawings and specifications. The manual shall also include a risk management plan that identifies, controls, and monitors critical processes, products, and performance characteristics.

### **2.8.1 Reliability and Quality Management**

The contractor shall develop, implement and maintain a Reliability and Quality Assurance (R&QA) Plan and shall be included in the submitted Quality Manual. The contractor shall annually review the R&QA Plan and any updates or affirmation as to "no change" shall be submitted to NASA COR. The R&QA Plan shall define how the

contractor will track and record quality performance, maintain results, implement changes, and provide continuous improvement. The R&QA Plan shall cover, at a minimum, the following:

- a. Mission/Safety critical flight and ground support hardware and software;
- b. Mission/Safety critical hardware and software qualification/certification requirements;
- c. Mission/Safety critical operational procedures; and
- d. Mission/Safety critical system fabrication and test procedures.

The contractor shall be responsible for identification and notification of Range instrumentation systems' parts and materials subject to Government-Industry Data Exchange Program (GIDEP) and NASA advisories (NPR 8735.1). The contractor shall identify inspection points with concurrence by NASA in the fabrication and refurbishment processes of flight and ground support systems and track quality progress.

## **2.9 CONFIGURATION MANAGEMENT**

A regimented Configuration Management (CM) process shall be implemented and followed for all aspects of the Wallops Range instrumentation services including engineering, operations, and development.

The contractor shall abide by the governing Goddard Procedural Requirements (GPR) GPR-1410.2, for Configuration Management.

The contractor shall provide their approach to configuration identification, change control, status and accounting, and configuration audits.

The contractor shall provide configuration management of all documentation, software, hardware, mission configurations, and test scenarios.

The contractor shall utilize the existing Government owned CM system integrated into ROMS.

The CM system including all CM managed data shall be made available using NASA Data Center (NDC) user name and password protected access using the ROMS.

To allow the contractor to take maximum benefit of the existing CM data environment, the contractor shall have any proposed new data integrated into with legacy CM data fully functional and made available within 3 months of contract effective date.

Prior to this date, the contractor shall have a process in place to allow efficient access and control of CM systems by the contractor and the Government to maintain overall CM effectiveness.

The Government will maintain Chairmanship of the Configuration Control Board (CCB) and majority on the board but the contractor shall support the balance of the CCB with individuals proposed by the contractor to be appropriate CCB members.

The contractor shall hold a biweekly CCB meeting.

The contractor shall provide Independent Verification and Validation (IV&V) services as required in task orders or detailed mission requirements documents.

## **2.10 BUSINESS AND FINANCIAL MANAGEMENT**

As a minimum, the resource management system shall track and report (in accordance with the financial reporting requirements of Section J.1, Attachment H) individual project costs. Projects will be defined in the Core Mission Model.

The contractor shall participate in a monthly Financial Status Review to provide financial status and planning required supporting the Government budget planning process. The contractor and Government shall jointly discuss planned material purchases and projected work force resource requirements and evaluate against the mission schedule. At each monthly Financial Status Review the contractor shall provide the financial status of planned versus actual spending, review materials budget by discipline and the status of procurements in each area, discuss any vendor or supply chain issues, summarize costing of major acquisitions if funds extend through multiple fiscal years, and review the projected cost and work force requirements for the next reporting period. The format and content of the contractor's inputs and supporting rationale shall be in accordance with the budget or and reporting format specified by NASA.

## **2.11 HUMAN CAPITAL MANAGEMENT**

The contractor shall provide qualified personnel with the necessary training, secret-level security clearances, and technical expertise in the functional support areas required. Personnel requiring certification on specialized equipment, or systems, shall be certified by the vendor, a vendor approved organization, Government organization, or as otherwise required.

The Wallops Range supports a diverse set of customer mission requirements and therefore the operational hours shall vary as individual mission requirements dictate. Normal duty hours of operation shall be 08:00 – 16:30 local time, Monday – Friday. The contractor shall be prepared to change work schedules to preserve a normal 40-hour/week workload while meeting mission requirements outside of the normal duty hours.

The contractor shall be prepared to shift work schedules and provide overtime services necessary to meet individual mission requirements.

The contractor shall abide by all work-hour limitation rules in accordance with NASA Procedures and Guidelines (PG), Code 800 Work-Hour Policies, 800-PG-8715.0.1C, for their own employees and manage within these bounds to maintain service availability.

Contractor personnel shall be required to travel to support the range. The contractor shall perform associated travel to and from site locations for equipment and systems requiring contractor actions. Cost associated with this travel shall be defined under the travel line item on Government cost reports and on work orders. All travel shall be in accordance with Joint Travel Regulations. All contractor personnel travel requirements shall be performed by the contractor including but not limited to medical certifications, passports, ticketing and transportation, and lodging.

## **2.12 TRAINING**

The contractor shall provide a training program for all employees to keep them current with all aspects of their responsibilities (technical or otherwise) for implementation of the RRS Program including any qualification, certification, and licensing required for the work being performed. The overall program shall be documented in a Training Plan. The Training Plan is due ninety (90) calendar days after contract effective date. This program shall identify, maintain, schedule, conduct, and document training and certification in support of the RRS Program for all personnel at all levels.

The contractor shall determine and provide for adequate training and certification to all personnel resulting in the understanding and qualifications necessary to perform position responsibilities. Specific aspects of the Training Plan (relating to safety, security, etc.) will be reviewed and approved by NASA where applicable. Training to be provided shall include (but not be limited to) relevant technical topics, project management, engineering management, property management, Information Technology (IT), security, workmanship and inspection, forklift operation, and personnel safety and health.

The contractor shall obtain all licenses and permits required for the performance of work under this contract. Records of all training, licenses, and permits shall be maintained by the contractor. Completed training activities shall be documented on a monthly basis and maintained.

## **2.13 LOGISTICS MANAGEMENT**

The contractor shall provide Government property management and logistics services for all areas of the Wallops Range activity.

The logistics function shall consist of materials shipping, handling, research, procurement, equipment calibration, and property and inventory support.

The contractor shall establish, maintain, and implement a Logistics Management Plan to ensure compliance with service requirements in this SOW and/or established by the contractor. This plan will be an attachment to the contract and delivered 30 days after contract effective date.

### **2.13.1 Shipping Services**

Shipments shall be managed by the contractor and made to destinations both domestic and foreign.

Specialized sensitive electronics equipment packing for property controlled by the contractor shall be performed by the contractor to ensure proper protection and operational reliability upon arrival at the destination and its return to Wallops.

It shall be the responsibility of the contractor to initiate all required shipping documentation for all Installation Accountable Government Property (IAGP) and Government Furnished Property (GFP) and obtain required approvals/signatures, and coordinate with the Government provided onsite shipping agent to ensure proper and timely delivery as required meeting range operations schedules and requirements and with sufficient lead time and risk reduction.

Special handling/shipping considerations (mobile instrumentation, sensitive electronics, etc.) are often required and it shall be the contractor's responsibility to ensure these special shipment requirements are communicated properly to the onsite shipping agent and confirmed prior to shipment.

The contractor shall be responsible for the timely completion of all relevant requirements of International Traffic in Arms Regulations (ITAR) 22 C.F.R. Chapter I, Subchapter M Parts 120-130. This includes developing and obtaining all required approvals for any Technical Assistance Agreements that may be necessary as a result of foreign national involvement in assigned tasks.

The contractor shall be responsible for the timely completion of all relevant requirements of Export Administration Regulations (EAR); Department of Commerce, Bureau of Industry and Security, 15 CFR 730-774.

The Government will obtain all export licenses required for the shipment of any range systems, ground support equipment, materials or supplies that are being shipped by the Government to foreign countries.

### **2.13.2 Procurement Services**

The contractor shall provide spare parts and maintenance services for Wallops Range instrumentation at a level which assures availability meeting or exceeding the systems performance metrics.

On average there are approximately 1,500 procurement actions per year comprised of approximately 3,500 total line items.

### **2.13.3 Property Management Services**

The contractor shall support the Government's maintenance of an accurate inventory of all equipment as well as receipt and distribution of excess equipment.

In order to provide accountability and ensure accurate records, the contractor shall verify purchase records and present physical audits of the assets upon Government request of all Installation Accountable Government Property.

Upon CO approval, the contractor shall provide access to and use of Installation Accountable Government Property by NASA civil servants or other contractors on a temporary basis provided that such use of the property does not interfere with the contractor's ability to meet contractual requirements and performance metrics. The contractor shall manage and store equipment and supplies in locations at Wallops that maximize instrumentation availability and security.

The contractor shall manage all equipment stores to ensure supply inventory meeting operations requirements and operations performance metrics.

There are approximately 8,000 pieces of equipment in inventory that require depot services.

#### **2.13.4 Test Equipment and Calibration Services**

Calibration laboratory services for test and operational equipment will be provided by the Government on-site. The contractor shall be responsible for ensuring all equipment is calibrated per contractor and manufacturer defined directives and shall maintain calibration certifications current. The contractor shall be responsible for delivering equipment to/from the on-site calibration laboratory at Wallops. For those calibration services not obtainable from the on-site Government provided service due to technical or responsiveness requirements, the contractor shall obtain alternative calibrations services for those items, with approval from the Contracting Officer Representative (COR).

#### **2.14 RANGE SCHEDULING SERVICES**

The contractor shall provide uninterrupted scheduling services during normal working hours and operations periods for Suborbital Research Program missions that are conducted at Wallops and at other locations that are established or exist worldwide. The contractor shall use the existing schedule system accessible through ROMS.

The Government shall retain conflict resolution authority for the operations schedule. Any conflicts shall be identified by the contractor to the Government for resolution to ensure mission operations commitments.

As part of the contractor's proposed quality management system, the contractor shall maintain the ROMS that enables accurate, timely, and coordinated project planning and insight, and is accessible by authorized personnel.

The contractor shall integrate mission operations and Wallops Range resource requirements (facilities, runways, launch pads, laboratories, instrumentation systems,

frequencies, etc.) that are defined in various requirements documents or communicated in various mission planning and scheduling forums into the ROMS system.

The Government shall retain all ownership rights of the software developed under this contract, except for commercial software elements that may be utilized to implement additional system capabilities during the contract period of performance.

The contractor shall provide all source code with full documentation for all software developed by the contractor under this contract.

## **Section 3: Project Management**

To ensure thorough and effective operations planning and systems integration, the contractor shall provide project management services with the assignment of contractor Range Instrumentation Services Managers (RISM's). The RISM shall support the NASA Project Manager in identifying Wallops Range customer requirements, providing required documentation, reviews, and approvals.

### **3.1 PROJECT REQUIREMENTS MANAGEMENT**

The NASA Project Managers, in coordination with the COR, will dictate range support requirements to the RISM and the RISM shall manage the range contract services specific to the mission from requirements identification phase through post-flight support phase.

The contractor's RISM's shall implement project management skills including requirements integration and test programs that demonstrate requirements verification and validation and overall readiness of the range instrumentation elements.

The contractor shall formally document the project's requirements via a requirements verification matrix which provides a traceability path to verify that the design solution satisfies all of the end user's needs. The RISM shall issue a requirements freeze after the requirements verification matrix is approved by NASA. The RISM shall verify that requirements are met utilizing one or more of the following requirements verification methods:

- a. Inspection
- b. Analysis
- c. Demonstration
- d. Test

### **3.2 PROJECT TASK PLANS**

The contractor shall submit timely and complete IDIQ Task Plans in accordance with the Task Ordering Procedure and Supplemental Task Ordering Procedures clauses of the contract.

### **3.3 PROJECT DOCUMENTATION**

The contractor shall support the NASA Project Managers as a member of the project team and support the NASA Project Managers in the technical development and establishment of NASA project support documents.

The contractor shall develop and maintain various project documents. The documents shall be controlled, and as such, shall be maintained with a baseline version and revisions reviewed and approved according to configuration control requirements for the life of the project.

### **3.3.1 Operations Directive**

The contractor shall support the NASA Project Manager in the development of an Operations Directive (OD) for each major customer/project that documents project requirements, services implementation solutions, applicable maintenance activities, special work requests, anticipated configuration management actions, mission planning for other aspects of the Wallops Range that may impact the project-specific OD, risks and issues that may impact safety or mission success, critical milestones that demonstrate mission readiness, and other areas as defined in project specific mission requirements documents.

The due date for the OD is defined by the NASA Project Manager based on mission support requirements.

The OD shall include at least the following information:

- Approval Authority
- Distribution List
- Introduction
- Description/Objectives
- Roles And Responsibilities
- Requirements
- Schedule
- Flight Vehicle Description
- Trajectory Information
  - Radar
  - Telemetry
  - Timing
  - Command
  - Communications
  - Meteorology
  - Optical And Television
  - Range Control
  - Other Systems - Instrumentation
  - Surveillance
  - Services – Security, Crash, Fire & Rescue, Medical, Public Affairs, Utilities
  - Special Operational Procedures
  - Go/No Go Criteria
  - Acronyms And Definitions

### **3.3.2 Post Mission Services Report**

The contractor shall upload an approved Post Mission Services Report (PMSR) to ROMS within 15 business days of the completion of each local mission and within 30 business days for remote and complex missions. The mission completion date will be defined in mission specific requirements documents or by the COR. Critical components of the PMSR shall be at least the following:

- Metrics for performance of all required range instrumentation systems including formal post-mission services reports of any performance issues;
- Summary reports of all operational elements/activities;
- Lessons Learned;
- Results obtained; and
- Recommendations.

### **3.4 PROJECT REVIEWS**

Under the leadership of the assigned RISM, the contractor shall conduct or support the following paneled reviews for each project in accordance with project specific requirements documents.

#### **3.4.1 Operations Project Reviews**

##### **3.4.1.1 Range Instrumentation Design Review**

The Range Instrumentation Design Review (RIDR) shall demonstrate that the preliminary design meets all operations requirements with acceptable risk and within the cost and schedule constraints and establishes the basis for proceeding with detailed design. It shall show that the correct design option has been selected, interfaces have been identified, and verification methods have been described.

The contractor shall receive scheduling approval of the RIDR from the NASA Project Manager. The RIDR shall be a boarded briefing with panel members approved by the NASA Project Manager.

The contractor shall track formal actions and recommendations issued by the RIDR and report status to the NASA Project Manager using ROMS and other electronic methods as defined by the NASA Project Manager.

The RIDR shall contain at least the following information:

- Mission Overview;
- Trajectory and Link Analysis;
- Requirements Overview;
- Pertinent Lessons Learned;
- First Use Items;
- Range Instrumentation Architecture;
- Operations Support Descriptions;
- Deployment Plan;
- Tracking Plans;
- Contingency Plans;
- Pre-Mission Testing;
- Deliverable Schedule;
- High-Level Milestones;

- Schedule;
- Risk Matrix; and
- Risk Definitions.

#### **3.4.1.2 Ground Operations Review**

In support of the NASA Project Manager, the contractor shall present at a boarded NASA Ground Operations Review (GOR) for each mission. The GOR is to certify that planning activities are complete and that resources and facilities are ready to support receipt and processing of mission hardware to include payload, launch vehicles and GSE.

Successful completion of the GOR ensures readiness of the mission team, payloads, launch vehicle, ground support equipment, documentation, launch pad, processing and storage facilities will be ready and available to support the start of launch site ground operations.

The review ensures that the current configuration of the spacecraft and processing activities planned by the range user are consistent with the support plans prepared by the contractor in order to certify that documentation is complete and/or approved to support receipt of the mission systems.

The review identifies and documents any constraints which may exist to preclude shipment to, or processing of the launch vehicle or payload systems to Wallops to begin ground operations.

The contractor shall track formal actions and recommendations issued at the GOR and report status to the NASA Project Manager using ROMS and other electronic methods as defined by the NASA Project Manager.

#### **3.4.1.3 Range Readiness Review**

In support of the NASA Project Manager, the contractor shall present at a boarded NASA Range Readiness Review (RRR) for each mission.

The range operations contractor portion of the RRR shall clearly define the contractor's understanding of pertinent mission requirements, the implementation plan, and how the systems and personnel were verified as being ready to support the mission's operational requirements.

The RRR shall include a presented summary perspective providing a brief overview of mission, applicable issues identified, issues closed, issues open, remaining risk items, status of actions being worked, and recently closed or recently opened applicable discrepancy reports.

At the RRR the contractor shall present the results of element level simulation and testing, and results of the contractor's operational performance (systems and personnel)

evaluated against mission support requirements resulting from integrated simulations and tests.

#### **3.4.1.4 Launch Readiness Review**

In support of the NASA Project Manager, the contractor shall present at a boarded NASA Launch Readiness Review (LRR) for each mission. The LRR is a required review held to update status, close out actions from the previously held Range Readiness Review (RRR), Mission Readiness Review (MRR) or Flight Readiness Review (FRR), and to achieve authorization to proceed into launch countdown.

At the LRR, the contractor shall present a high level summary of range instrumentation systems, their configuration and operational status, risks, issues, any pertinent operating and contingency plans as well as planned mitigations. The contractor's presentation shall indicate status of range systems as deemed "mandatory" or "required" in accordance with the mission constraints as specified for each mission.

### **3.4.2 Engineering Project Reviews**

#### **3.4.2.1 Systems Concept Review**

The contractor shall conduct a Systems Concept Review (SCR) to evaluate the scope, cost benefit analysis, and the recommended solution/concept for the product or service to be utilized in support of the requirements defined in the SOW.

#### **3.4.2.2 Systems Requirements Review**

The contractor shall conduct a Systems Requirement Review (SRR) to document the functional performance requirements defined for the system to ensure the requirements and the selected concept will satisfy the performance requirements.

#### **3.4.2.3 Preliminary Design Review**

The contractor shall conduct a Preliminary Design Review (PDR) to demonstrate that the preliminary design meets all system requirements with acceptable risk and within the cost and schedule constraints and establishes the basis for proceeding with detailed design. It shall show that the correct design option has been selected, interfaces have been identified, and verification methods have been described.

#### **3.4.2.4 Critical Design Review**

The contractor shall conduct a Critical Design Review (CDR) to demonstrate that the maturity of the design is appropriate to support proceeding with full-scale fabrication, assembly, integration, and test, and that the technical effort is on track to complete the system development and mission operations in order to meet mission performance requirements within the identified cost and schedule constraints.

#### **3.4.2.5 Acceptance Test Readiness Review**

The contractor shall conduct an Acceptance Test Readiness Review (ATTR) that ensures hardware/software, test facility, support personnel, and test procedures are ready for testing and data acquisition, reduction, and control.

**3.4.2.6 Operational Readiness Review**

The contractor shall conduct an Operations Readiness Review (ORR) to document, demonstrate, and clearly justify that the upgrade is ready for transition to Operations. The review shall include a statement of certification from the Wallops Safety Office for safety systems upgrades.

## **Section 4: Sustaining Engineering**

To ensure thorough and effective range operations services capability, the contractor shall provide sustaining engineering services.

### **4.1 SUSTAINING ENGINEERING MANAGEMENT**

The contractor shall provide all aspects of engineering to maintain the availability of existing systems, lower maintenance and operations costs, and enable the next-generation of range systems by identifying and implementing applicable engineering solutions.

Engineering services shall include Discrepancy Report (DR) analysis, hardware and software maintenance support, hardware and software engineering change development, engineering test support, system maintenance plan generation and analysis, Information Technology (IT) network security compliance, IT systems administration, configuration management, and new project/requirement assessment, Radio Frequency spectrum management support, including Radio Frequency link analysis.

The contractor shall provide mechanical systems sustaining engineering services unique to the systems utilized in support of Wallops Range operations.

The contractor shall provide full life cycle engineering services that continually strive to ensure Range systems are able to meet NASA and customer requirements, evolve new requirements and improve the Range operational support process, solve system problems, and identify and reduce system risks.

The contractor shall utilize streamlined engineering change processes and procedures appropriately tailored for quick response actions that occur at the Wallops Range while also adhering to the CM processes implemented.

The contractor shall establish a routine equipment preventative maintenance and readiness program that follows manufactures recommended procedures or the applicable sections of the Inter-Range Instrumentation Group (IRIG) Standards. Reference <http://www.irig.org> to obtain IRIG standards.

The contractor shall define, document, and implement this program and recommend applicable standards to be utilized in support of the program.

The contractor shall perform continuous systems engineering assessments necessary to provide effective sustaining engineering and reporting at various reviews defined in Section 3.

Consistent with GSFC's goals, the contractor shall ensure that Capability Maturity Model Integration (CMMI®) maturity level two or equivalent is achieved for mission software, though CMMI® certification is not required.

The Government may ensure CMMI® compliance by random Government or external audits and adherence to the processes and procedures mutually agreed upon by the contractor and the Government.

Wallops currently utilizes the United States Air Force Instrumentation Radar Support Program (IRSP), which can be referenced at <https://irsp.com/>, to perform varying Depot Level Maintenance (DLM) activities for Wallops Range radars and provide critical spares for radar systems. The contractor shall define how they propose to perform DLM activities for all instrumentation systems.

The contractor shall provide controlled access to the contractor's established preventative maintenance and readiness procedures and the associated data collected during performance of the procedures. Non-contract employees requiring access will be approved by the COR.

As systems age, the need and opportunity for incorporating state-of-the-art system upgrades increases. In addition, as the nationally recognized Wallops leadership in range technology development continues, the contractor shall identify, propose, and support the next generation of range technologies that push Wallops to the forefront of low cost access to space.

The contractor shall achieve and sustain IT security compliance in accordance with Federal Information Security Management Act (FISMA) policies and policies as mandated and implemented by the Agency through full lifecycle management.

The contractor shall be responsible for updating existing and developing new Range IT Security Plans as required, completing all monthly and annual Continuous Monitoring and recertification activities, evaluating information system risk, and supporting external audits during the contract in accordance with NPR 2810.1, Security of Information Technology.

#### **4.2 SUSTAINING ENGINEERING PROJECTS**

The contractor shall provide engineering services for engineering projects during the contract's period of performance. The Sustaining Engineering Mission Model provided in Enclosure 2 – Sustaining Engineering Projects Model represents the scope of engineering services typically required for sustaining engineering of range capabilities as defined in this SOW.

The contractor shall support the Monthly Engineering Status Review (MESR) conducted by the Applied Engineering and Technology Directorate (AETD) on behalf of the Range and Mission Management Office. The contractor shall present concise technical, budget, and schedule status to a group of engineering peers to ensure critical

sustaining engineering projects are progressing as planned and resources are applied from all sources to enable success.

#### **4.3 NEW SYSTEMS TRANSITION TO OPERATIONS**

The contractor shall accept new (transitioned) systems into the Wallops Range instrumentation suite in a process-managed, timely and organized manner and not impact ability to meet mission requirements so as not to cause undue delay to Government's ability to provide services.

The contractor shall support transition of systems from NASA or contractor engineering into operations by providing appropriate services and processes that enable seamless accomplishment.

The contractor shall be responsible for surge support to accommodate transitioning of up to 6 systems per year.

Transitioned systems shall be fully documented and configuration controlled upon transition and during development using the CM processes implemented under this contract.

In some cases, for more complex, more expensive, and highly critical systems, these new systems will be implemented and/or transitioned under a stand-alone task order. However, most systems transitioned are routine operations instrumentation or range management systems that shall be transitioned into operations by the contractor as a standard service to maintain service capability and operations performance metrics.

## **Section 5: Operations and Maintenance**

This section includes operations and maintenance of all fixed and mobile systems and subsystems that handle tracking and data flow to and from the vehicle during a mission. These services include space and ground communications, range safety and vehicle command, range control, timing, power provisioning, photo, optical, spectrum monitoring and meteorological services.

Instrumentation Systems (both fixed and mobile) that shall be operated, maintained, and sustained by the contractor along with details and specifications on each system can be found in the Wallops Range User's Handbook at <http://sites.Wallops.nasa.gov/code840/>

### **5.1 PRECISION TRACKING RADAR**

Tracking radar systems provide vehicle-independent, accurate velocity and positional data of launch vehicles, satellites, and aircraft. Radar provides continuous, accurate, spherical-coordinate information of vehicles being tracked. The tracking radar follows the skin of the vehicle or homes in on a radar beacon installed on the vehicle, providing real-time trajectory data to operators on the ground. These data are then processed for real-time display and evaluation; they are also stored and archived for later reference.

Typical data formats used for vehicle tracking systems include Minimum Delay Data Format (MDDF) and Launch Trajectory Acquisition System (LTAS). The former is comprised of raw radar data showing range azimuth and elevation against time-of-day with reference datum point being the radar pedestal. The latter is filtered/smoothed radar data with a normalized reference to the center of the Earth. Inertial Navigation System (INS) and Global Positioning System (GPS) generated by on-board flight processors can also be received but usually through telemetry links. Once received, these formats can be converted to LTAS for examination and processing on the ground.

#### **5.1.1 Precision Tracking Radar Requirements**

The contractor shall provide radar operations, maintenance, and sustaining engineering staff to install, ready for shipment, unpack, assemble, configure, operate, verify, sustain, and maintain all radar systems and subsystems.

The contractor shall provide Radar Operations Services at Wallops and at other ranges that are established or exist worldwide.

Radar services may be required simultaneously for various missions based on mission schedules.

The contractor shall provide, install and qualify commercially available replacement parts for the radar systems.

Fixed and mobile radar systems include Precision Tracking Radars, Air and Surface Surveillance Radars, Specialized Science and Weather Radars, and Radar Transponder Flight Systems.

Radar operations services mission reporting shall be incorporated into the Post Mission Services Report. However, quick look reporting shall be provided to the NASA Project Manager and RISM within a 4 hour time period defined by the COR.

The contractor shall provide radar operations services for a Wallops Range local mission requiring both fixed and down range mobile radar services, simultaneously with a remote mission (not the Wallops Range local mission) utilizing deployed mobile radar services requiring no more than two complete mobile radar antennas and associated instrumentation systems.

The contractor shall respond to simultaneous mission Radar Services requirements with a support augmentation services proposal as required.

### **5.1.2 Precision Tracking Radar Systems Performance**

The precision tracking radars shall acquire the intended target in auto-track mode within 10 seconds of presentation of intended target unless defined otherwise in mission specific requirements documents.

The precision tracking radars shall track the Radar Calibration (RADCAL) and Defense Meteorological Satellite Program (DMSP) satellites and report monthly or as required by mission specific requirements documents and meet the following RMS tracking error performance standards:

- $\pm 0.10$  milli-radian for Radar 5;
- $\pm 0.15$  milli-radian for Radar 18;
- $\pm 0.20$  milli-radian for Radar 3, Radar 10, Radar 11; and
- $\pm 0.25$  milli-radian for Radar 2, Radar 8.

The range error shall be less than 40 meters.

The precision tracking radars shall track 6-inch spheres monthly to maximum range and report monthly or as required by mission specific requirements documents.

The results shall meet minimum loop gain specifications for each system.

Mission-specific metrics shall be reported for each sensor and shall include:

- Target assignment(s) per radar aperture;
- Acquisition success and time of acquisition;
- Quality of track;
- Quality of data supplied to the end customer and Wallops RCC;
- Quality of recorded data;

- Surveillance Systems; and
- Downrange.

Radar operations services shall be included in the PMSR.

### **5.1.3 Surveillance Radar Requirements**

In support of launches at Wallops and at locations worldwide, both fixed and mobile Surveillance Radar and Target Display Systems, including air and surface surveillance systems, shall be operated, maintained, and sustained by the contractor.

Air and sea surveillance radars shall be able to accurately identify confidence targets as defined by NASA Range Safety and mission specific requirements documents.

### **5.1.4 Research Weather and Science Radar Requirements**

Research weather and science radar services shall be provided at the Atmospheric Scientific Research Facility (ASRF) located on the Wallops Mainland in Buildings U-30 and U-25.

Specialized/Science radars shall meet the performance measures defined by mission specific requirements documents.

In addition to the ASRF systems located on the Wallops Mainland, two mobile research radars shall be supported by the contractor on a non-interference basis. These two radars, Tropical Ocean/Global Atmosphere (TOGA) and NASA S-Band Dual-Polarimetric Radar (NPOL), are occasionally deployed to locations around the world. The contractor shall provide minimal system assembly services for these two systems at Wallops ONLY on a non-interference basis with other duties required in support of the Wallops Range.

## **5.2 TELEMETRY**

Telemetry systems perform the general function of acquiring and recording data from instruments on the vehicle. The data are transmitted from the vehicle using RF to antennas on the ground (usually S- or L-Band) or to satellites, e.g., Tracking and Data Relay Satellite System (TDRSS) that send the data to the operators on the ground through terrestrial networks.

The type of data sent can vary from vehicle health and housekeeping information to payload science data. For data of immediate importance, the telemetry system allows for real-time monitoring or quick playback. Other data shall be stored as they arrive for playback and examination at a later time. Data and communications formats are flexible and can be provided to the user in a variety of ways from basic raw data to a variety of standard line codes and protocols. Data rates can range from 2400 baud to upwards of multi-10s of megabits per second depending upon requirements.

### **5.2.1 Telemetry Requirements**

The contractor shall provide telemetry services and maintain telemetry service capabilities in support of Wallops Range mission requirements.

The contractor shall provide telemetry operations, maintenance, and sustaining engineering staff to install, ready for shipment, unpack, assemble, configure, operate, verify, sustain, and maintain all telemetry systems and subsystems.

Telemetry services shall include receiving, decoding, recording, relay and display of telemetered data from aircraft, UAVs, sounding rockets, ELV's, balloon payloads, ground test articles, and satellites.

Each fixed or mobile telemetry system (single receiving aperture) shall be capable of supporting requirements of one to four downlinks.

These ground systems shall be capable, by contractor augmentation with existing subsystems within their property management responsibility under this contract, of supporting requirements that total up to 12 separate telemetry downlinks from a single receiving aperture. This is not a system upgrade effort. This is simply a system configuration augmentation using additional hardware within the contractor's suite of support equipment under this contract.

The contractor shall provide telemetry services to enable Wallops receipt of data forwarded by remote downrange telemetry receiving sites supporting missions launching from Wallops.

The contractor shall distribute received signal products from the Fixed Telemetry Receiving Facility in Building N-162 to the Telemetry Readout Facility in Building N-162.

The contractor shall provide data recording, telemetry best source selection, decommutation, decoding and processing, and display of data products at the Telemetry Readout Facility.

Instrumentation components shall include signal amplifiers and conditioners, bit synchronizers, frame synchronizers and telemetry processors. Relay of data, processed/formatted data, and display video shall be provided by the Telemetry Readout Facility.

Implementation and operation of customer provided data processing and display instrumentation systems, including data communications interfaces, shall be supported in the Telemetry Readout Facility by the contractor.

Existing copper, coaxial, and fiber optic interfaces shall be utilized in this area for internal and external data communications.

### **5.2.2 Telemetry Systems Performance**

For all telemetry systems, mission-specific performance metrics shall be reported for each antenna system and shall include:

- Target assignment(s) per telemetry aperture;
- Acquisition success and time of acquisition;
- Quality of track;
- Quality of data supplied to the end customer and Wallops RCC; and
- Quality of recorded data.

### **5.2.3 Mobile Telemetry Requirements**

Each Mobile Instrumentation Trailer shall support one or more Mobile Antenna Systems with antenna control auto-tracking capability and associated digital and analog recording, multiple telemetry downlink receiving and combining, digital and analog slaving systems, signal distribution instrumentation, decoding and display systems, and data communications interfaces.

Mobile Telemetry Systems shall support Wallops or at deployed locations worldwide.

Mobile operations shall include personnel travel and services in remote locations worldwide up to five times per year with varying lengths of deployment time.

PFRR Telemetry Systems shall be operated and maintained by the contractor on a project or campaign required basis.

The PFRR is a range frequently utilized by the NASA Sounding Rocket Program and consists of fixed systems that reside at PFRR year-round and on some missions, require deployment of mobile systems from Wallops for support augmentation. This location shall be staffed by the contractor only during Sounding Rocket campaigns, other approved projects, or maintenance periods.

The contractor shall support PFRR campaigns and associated mobile range operations annually and shall support these remote operations at PFRR for a period up to twelve (12) continuous weeks.

Major remote campaigns to locations other than PFRR shall also be supported as defined in the Core Mission Model. A Major remote campaign is defined by an operations deployment requirement of at least two mobile range systems (includes mobile radar, telemetry, command, or control center) for an off-site mission or the operation of a combination of at least three mobile systems or fixed systems at the PFRR.

Maintenance trips shall be performed at least once per year during the milder weather conditions of the summer season or as defined by the contractor in their approved sustaining engineering plans.

Mobile Telemetry Instrumentation semi-permanently located at PFRR shall remain at that site unless otherwise directed by the Government.

### **5.3 COMMAND SYSTEM**

The command system provides ground operators with control of user vehicle and payload functions for flight safety (command destruct) and other purposes. The user may also use the command system to control payload instrument functions within range and safety limitations.

Given the importance of the command destruct capability to flight safety, the command system shall have full redundancy, minimizing the opportunity for failure. Typically, transmitters equipped with helical antennas comprise the ground portion of the command system. The vehicle is equipped with receive antenna(s) connected to the Flight Termination System (FTS) and other payload/vehicle systems as required. The capability to send a command destruct signal is by far the most important requirement of this system in order to ensure safety.

#### **5.3.1 Command Systems Requirements**

The contractor shall provide command systems operations, maintenance, and sustaining engineering staff to install, ready for shipment, unpack, assemble, configure, operate, verify, sustain, and maintain all command systems and subsystems.

The contractor shall provide services enabling mission controller uplink of control signals to flight targets.

UHF uplink systems shall provide the capability to control or terminate flight experiments and vehicles.

Flight Termination System (FTS) communications instrumentation shall support the Wallops Range Safety function.

Command systems operated and maintained by the contractor shall generate the 20 discrete tones defined in Inter-Range Instrumentation Group (IRIG) standard.

Existing antennas shall be utilized that range from omni-directional to directional helix and quad helix configurations.

The contractor shall operate and maintain slaving, archiving, and status systems that augment the command system.

Remote control communications systems shall serve to relay Range Safety Command Panel actions to a remotely located command transmitter and to return status information.

Range Safety Command Panels shall be maintained and sustained by the contractor.

The contractor shall maintain all command antenna systems that includes Omni-directional, single helix, and quad helix arrays.

The Tone Keying System shall be maintained and sustained by the contractor.

Time division multi-plex systems shall be supported to provide more secure coded transmission/reception of data for remote control as utilized for FTS command operations.

#### **5.4 RANGE CONTROL**

The primary capability for all range operations is the ability to effectively conduct range control activities. At Wallops, this occurs in Range Control Center (RCC). Data from the range support instrumentation are acquired, processed, and made available for display processing in the RCC. Such data assimilation, in conjunction with communications and command links, enables the coordination, control and safe conduct of launch missions.

Systems supporting the RCC offer redundant, real-time data support, including impact prediction, for range safety and other critical range requirements. The systems provide for a rapid and flexible selection of data sources and displays (typically via a video switching network or networked displays) by personnel responsible for various portions of the mission. Critical instrumentation and systems, in addition to being redundant, are protected using Uninterruptible Power Supplies (UPS) and backup power generators.

The RCC is multi-functional, addressing all aspects of missions of varying levels of complexity. To support such a broad spectrum of need, Wallops RCC is typically comprised of collocated but separate work areas devoted to the various range control functions including the following:

- Mission Control Area: The “nerve center” of the RCC containing large screen video displays, mission controller consoles, Launch Director area, Very Important Person (VIP) area, etc. Often these areas are multiple stories high to facilitate video displays and visibility to operators and spectators.
- User Space: Area where the user can set up its team for flight operations.
- Data Acquisition and Processing: Area containing all the equipment necessary to acquire and process mission data. It contains the instrumentation to provide the primary interface with internal and external RCC communications, as well as the control for data distribution within the RCC. Support instrumentation includes communications, telephone, range intercom, remote radio circuits, command remote, tone keying, timing data, radar data, video, and high-speed data. It also contains all the computer power associated with the RCC. It supports redundant, real-time applications to process user data and provide post-mission data analysis, general data reduction, and range operations support, such as real-time processing, local and remote multi-batch processing, interactive communications, and time-sharing.

- Range Safety Area: The focal point for ground and flight safety operations. The functions performed in the range safety area are wind weighting, monitoring of preflight and flight parameters, and control of the Flight Termination System.
- Surveillance and Downrange Communications Area: Place where surveillance consoles provide communications, computation, and displays for range surveillance and clearance functions.

A separate and secure area may be available for use when tactical or military security measures are required. This can include RF-shielded walls, encrypted communications systems, etc.

#### **5.4.1 Range Data Processing and Display Operations Requirements**

The contractor shall provide RCC Services at Wallops and at other ranges that are established or exist worldwide.

The contractor shall maintain and sustain all Wallops Range Control Center systems. The contractor shall operate this system as part of Range Surveillance and Recovery Operations and identify systems maintenance needs.

RCC services shall be provided at Wallops and simultaneously for missions requiring support at remote locations.

The contractor shall provide necessary technical support services required to maintain permanent RCC, mobile RCC, and those RCC subsystems embedded in other instrumentation areas within current specifications.

The contractor shall provide standard mission-specific post mission data products limited to raw data, engineering unit conversion data, and 'quick-look' data outputs from control center systems.

Listings or files on electronic media of quick look data shall be available to the NASA Wallops project manager within one (1) hour of completion of operation.

Specific post mission data products, including formats and delivery requirements, will be defined by the NASA Project Manager in mission specific requirements documents. Comprehensive data analysis services shall be provided as defined in various mission requirements documents provided by NASA Project Managers.

Contractor personnel providing RCC services shall possess a Radar Data Acquisition Computer (RADAC) Data Quality Operator's Certificate using a process that is developed by the contractor and approved by NASA. The process shall be implemented within three (3) months of the contract effective date.

The existing RADAC ingests positional data and processes it in real time.

Custom software applications provide parameters necessary to determine present position, predicted impact prediction, state vectors, and occasionally orbital elements. Radar slaving data is also provided. In certain circumstances, plug-in type modules are used to enable special functions such as vehicle guidance, vectoring payload recovery vehicles, or tracking balloons.

Processed data is archived on the system's hard drive and may be further reduced per customer specifications.

The RADAC system hardware consists of two nearly identical workstations, named Data Quality Computer A (DQCA) and Data Quality Computer B (DQCB), which shall be operated redundantly unless otherwise defined in mission specific requirements documents.

These contractor-operated and maintained systems shall perform data ingestion, conversion, display, and reduction of various types of positional data.

These processes shall be accomplished through use of various computer and display systems with varying required levels of service.

Development and lab computers exist that are functionally equivalent to the operational DQCA and DQCB computers. Software modifications shall be performed on the development DQ computer and testing shall be performed on the DQ lab computers.

The operational systems (DQCA and DQCB), including both hardware and software, shall not to be used for engineering testing without explicit approval from the COR and NASA oversight.

#### **5.4.2 Air and Surface Surveillance Requirements**

The contractor shall provide planning, management, oversight, implementation, and reporting on range air and sea surveillance and recovery activities.

The contractor shall provide a Surveillance Coordinator (SC) services and Recovery Coordinator (RC) services to perform these operations in the Range Control Center and utilize existing range surveillance data, display systems, and communications systems to perform this function. The contractor shall attend all post-mission meetings and present results and performance for SC and RC provided services.

The contractor shall arrange, coordinate, present solutions, and document range surveillance/recovery services, including aircraft and boats, recovery vessels, crew, and operational services in accordance with OD defined in Section 3.3.1 Operations Directive.

Except in cases where other Government agencies such as the US Coast Guard are providing services, the contractor shall provide all air and sea surveillance/recovery services.

To ensure successful recovery operations, the contractor shall provide the boat captain with following:

- Recovery support request at least 24 hours before scheduled launch activity;
- Updates as schedule and/or requirements change;
- Pre-launch latitude and longitude position for surface vessels;
- Predicted as well as actual payload impact latitude and longitude;
- Recovery coordination during operation; and
- Guidance to payload recovery to surface vessels based on control center data and displays.

In order to successfully retrieve Sounding Rocket and other payloads from the water after launch, the recovery vessel employed by the contractor shall be capable of the following:

- Speed of at least 12 knots;
- Recovery ranges out to 60 nautical miles;
- Onboard Global Positioning System;
- Onboard Automated Information Systems (AIS);
- Marine band or more capable radio communications;
- Iridium Satellite Phone; and
- Carrying recovered payloads up to 600 pounds.

The contractor shall support systems engineering and management in development and delivery of range surveillance and/or recovery tools for the Wallops Range.

The contractor shall support customization and integration of surveillance tools into Wallops Range infrastructure by developing Project Plans for surveillance/recovery tool development, acquisition, and implementation.

The contractor shall support interfacing with other ranges, organizations, and corporations in identifying and assessing options and range surveillance technologies and tools.

On an ongoing basis, the contractor shall provide RCC Ship Surveillance System (S3) system administration and configuration management as required to support Range Surveillance Operations.

The S3 shall interface with video data communication interfaces for distribution of displays throughout the control center.

The contractor shall assume system administration of the APS-143 ground station computers located in the RCC.

Contractor personnel shall have operational responsibility of the Wallops SureTrak system located in the RCC.

Operations shall include pre-mission setup.

Pre-mission setup shall include entering launch trajectory and impact points into the system, which will be used to perform impact probability calculations.

The contractor shall enter reference locations, enable mission archiving, and create and upload hazard patterns for display.

The contractor shall use the Wallops SureTrak system that enables the Wallops Safety and Operations team to determine a safe to launch condition with this information communicated to appropriate NASA personnel managing the mission in the Wallops RCC.

If an anomaly is not fixed by a reboot of the system, the contractor shall inform defined US Navy Patuxent River personnel of the issue and work with them to resolve it appropriately to ensure mission operations commitments. As this system is not currently a safety critical system, the requirement to meet the Instrumentation Systems is not applicable.

System unavailability shall be reported to the COR and tracked within the overall operations reporting processes established by the contractor and/or defined in this SOW.

## **5.5 COMMUNICATIONS AND TIMING**

Wallops Range provides time synchronization and coordination of range activities. Typically, these systems provide for the distribution of time codes, reference signals, and program time (e.g., countdown) information to all required locations for launch. Time-of-Year (TOY) systems shall be synchronized to GPS timing elements and in turn used to synchronize the primary timing source and remote sites.

Timing codes can be received and amplified at the various remote user sites for a variety of functions, including use with recorders, oscillographs, cameras, and for driving remote timing displays. Program time provides a visual count status and programmable function control for events. Synchronous generators and translators at the ranges provide for fail-safe operations, correction of propagation delay, and translation of receive-time codes to other codes, as required, and reference signals.

The contractor shall supply supporting communications systems to include telephone, television/video, intercom, and data transfer to specifically support times of operations. The communications systems shall be flexible to be easily adapted to fit user requirements. These systems provide a means for managing operations at the range and for communicating and coordinating with associated operations in other geographic areas. Communications are supported by frequency monitoring equipment and frequency spectrum allocation management and coordination capabilities. A frequency monitoring system is used to monitor the frequency spectrum and for the detection and location of RFI sources.

### **5.5.1 Range Communication and Timing Requirements**

The contractor shall provide services enabling synchronization and coordination of range activities and events to coordinated Universal Time Code (UTC) and mission countdown time.

This system shall be operated, maintained, and sustained to distribute this information where accuracy is maintained to a high level at critical site locations.

The contractor shall provide these timing services at the Wallops as well as in mobile instrumentation systems routinely deployed to locations worldwide.

The contractor shall provide Program Time (countdown) controlled and generated at the Master Timing System for distribution throughout Wallops.

Program Time shall be supported by the contractor for interactive operations control as defined by mission requirements and/or coordinated by the Launch Director.

The contractor shall maintain terminal end equipment that generates display and provides preprogrammed function control events via relay interface.

Simultaneous Program Time operations shall be supported, including routine maintenance, to enable several simultaneous countdown activities.

Timing system components that shall be maintained and operated by the contractor include GPS Synchronized Time Code Generators, Precision Frequency Standards, Time of Year and Countdown Time Generators, Time of Year and Countdown Time Displays, Time Code Translators, Function Control Units, distribution amplifiers and networking equipment, and associated test and calibration equipment.

### **5.5.2 Radio Frequency Communication and Monitoring Requirements**

The Range communications and monitoring services shall include those services required for the multi-channel intercom system distributed throughout the Wallops Range for use by both fixed and mobile instrumentation and range data processing and control facilities.

The contractor shall provide services and maintain capabilities enabling voice communications in support of mission operations.

Radio transceivers, transmitters, and receivers shall interface with the intercom system.

Various radio bands including High Frequency (HF), Very High Frequency (VHF), and Ultra High Frequency (UHF) are utilized by radio equipment at the range transmitting, receiving, and airport tower facilities. These radio bands shall support ground-to-ground, air-to-ground and ship-to-shore voice communications.

Other existing instrumentation elements shall support voice communications including digital voice switches, analog patch panels, analog and digital voice recorders, analog line drivers and bridging amplifiers, keysets, headsets and handsets, antennas, and associated cabling.

The contractor shall operate, maintain, and sustain subsets of these capabilities that exist in mobile instrumentation.

The contractor shall provide services and maintain capabilities enabling inter- and intra-site interface to communications end equipment in all instrumentation operations sites at Wallops, in mobile instrumentation systems, and off-site locations as needed.

The contractor shall support pre-mission planning and requirements development, test planning and verification, and real-time operations.

Inter-site cable plant and circuits are provided by other organizations and the contractor shall support these organizations in establishing and maintaining communications for mission requirements.

The contractor shall provide services associated with operating and maintaining the Land Mobile Radio (LMR) system.

The LMR system shall provide trunked analog, narrow-band VHF voice communications between mobile users and base stations.

The contractor shall provide day-to-day operations including trouble call and maintenance coordination, programming of radios, loaner pool management, and overall system monitoring for the LMR system.

The contractor shall operate and maintain the contingency Fire/Security Repeaters #1 and #2 and the Sky Screen Base Station.

Frequency monitoring shall be performed to survey the RF spectrum environment.

The contractor shall provide frequency monitoring and control services defined by mission requirements documents, or requested by the Spectrum Manager and/or the Launch Director.

Existing antennas, receivers and direction finders shall be utilized to determine spectrum usages and locate sources of RF interference and unauthorized users.

The contractor shall monitor the RF spectrum during times of controlled emissions for protection of sensitive and critical systems such as experiment payloads and Flight Termination Systems.

The contractor shall support the policy of the Shared Resources (SHARES) Program by maintaining NASA's participation as a Federal supporting entity. The purpose of the SHARES program is to provide a backup capability to exchange critical information among Federal entities to support National Security Emergency Preparedness (NSEP). Federally controlled HF radio resources will be shared to establish a robust NSEP HF radio communications infrastructure. The program involves a collection of existing federally controlled HF radio stations that inter-operate to transmit NSEP messages when normal means of communication are not available. The SHARES System is the last avenue for emergency communications in the event of a local/regional/national emergency event.

The contractor shall operate and maintain the SHARES communications equipment and antenna systems to support this effort.

### **5.5.3 Air-to-Ground Voice Communication Requirements**

The contractor shall provide Air-to-Ground voice communications services with pointed antenna assets for low earth orbiting vehicles in support of human space flight.

Systems located at Wallops Command Facility (Building U-55) and the Wallops Range Control Center (Building E-106/E-107) shall be operated, maintained, and sustained to enable communications between mission operations personnel and participating and non-participating aircraft crew.

The existing UHF-Band voice system shall be maintained and operated at Wallops Command Facility (Building U-55) on the Wallops Mainland per documented mission requirements.

Air-to-Ground Communications Services shall additionally support Range Surveillance and Recovery Services.

UHF transceivers shall be interfaced with existing quad-helix antenna systems.

These communications systems shall interface with Government-provided voice/data circuits as required.

### **5.5.4 Network Communication Requirements**

The contractor shall provide network engineering support and cabling infrastructure support at Wallops, including the following requirements:

1. Provide network engineering support to provide functional Subject Matter Expert (SME) support for the Wallops Range assets at Wallops and other Wallops Range managed launch support sites as required.
2. Provide mission unique (non-Center supported) infrastructure and cabling support for the Wallops Range assets at Wallops and other Wallops managed launch support sites as required.

3. The contractor will maintain configuration management as directed by the Government.

The contractor shall provide engineering support to maintain Wallops Range connectivity to Wallops network systems and provide hands-on support of all aspects of the networking and communications activities, including troubleshooting and resolution of network issues, day-to-day maintenance and operation, and configuration management. Planning and deployment of network improvements and upgrades driven by either systems obsolescence or mission unique requirements shall also be supported. All systems obsolescence or mission unique requirements shall be approved by the Government prior to any expenditure of funds. The contractor shall provide services including, but not limited to, installing, maintaining, and supporting computer communication networks for Wallops Range operations.

The contractor shall provide cable plant infrastructure engineering support, to include short term and long term planning to support the needs of Wallops and the Wallops Range. The contractor shall provide technical support and troubleshooting of fiber optic and copper cable plant systems, such as splicing and terminating. The contractor shall coordinate the installation, operation, and maintenance of telecommunications equipment supporting both Wallops and the Wallops Range.

The contractor shall operate and maintain the Wallops cable plant infrastructure including terminating and splicing single-mode and multi-mode fiber optic, and copper cabling for use in telecommunications and mission support environments. The contractor shall install, operate, and maintain electronic equipment to transport voice, data and video services across the three geographical areas across WFF. The contractor shall provide customer support for Wallops and the Wallops Range for fiber optic circuit pathways between buildings and equipment.

The contractor shall provide a customer interface for provisioning cable plant voice, video, and IT services required to meet customer requirements. The contractor shall coordinate with Wallops customers the details of orders and approvers. The contractor shall certify funding to support each respective customer requirement. The contractor shall request, track and close service requests utilizing the specified government system for service fulfillment.

## **5.6 METEOROLOGY**

Wallops has a Weather Forecast Office that collects detailed meteorological information in support of all launch area and range activities, and provides daily and special forecast support as required. Especially important is the range's ability to detect and predict lightning. Several lightning detection systems are utilized to measure lightning potential (e.g., field mills).

To support launch operations, which can exceed 48 continuous hours, meteorological services are required to predict future and ascertain current localized conditions in

preparation for flight. Typically, a mix of fixed, balloon-borne, and optical sensors are available for obtaining the various required atmospheric data, including the ionosphere. These sensors may be attached to weather balloons, meteorological rockets, sondes, etc., all equipment that is considered expendable.

### **5.6.1 Weather Office Requirements**

The contractor shall provide Meteorological Services at Wallops and at other ranges and mobile deployments worldwide.

Meteorological services shall be provided at Wallops and simultaneously for missions requiring support at remote locations.

Meteorological services shall include weather forecasting, collection of upper air and surface weather data, collection of ozone data and pre-launch collection of data for blast and toxic dispersion required for orbital launches.

Local weather forecasts shall include daily (Monday through Friday) forecasts presented via the local Wallops closed circuit television system and via daily email distribution list to be provided by Wallops.

Local weather forecasts shall be generated using local weather data systems and other resources as needed.

Special weather forecasts shall be provided as required for various project requirements and/or special weather events.

The contractor shall provide meteorological forecasting services to meet mission requirements and Personnel shall possess a bachelor's degree in meteorology or have a demonstrated minimum of five years certified experience within the last ten years providing meteorological forecasting services.

Contractor personnel making upper air and surface observations shall possess a National Weather Service (NWS) "Certification of Observers". The certification shall be completed by the contract effective date.

The contractor shall provide all support services such as sustaining engineering, systems engineering, IT services, simulation and testing, logistics, documentation, and training at the appropriate level necessary to support a continuing and successful meteorological services function at the Wallops Range.

### **5.6.2 Meteorological Requirements**

The contractor shall provide twice daily balloon soundings of the upper atmosphere and associated surface observations at midnight and noon Greenwich Mean Time (GMT), seven days per week, in compliance with the National Weather Service (NWS), Memorandum of Agreement (MOA) for Routine Upper-Air and Associated Surface Observations at Wallops Island and the Department of Commerce. The data shall be

transmitted to the National Weather Service Wakefield, VA Forecast Office via an existing direct station modem.

Special balloon soundings shall be provided as required for various projects and weather events.

The contractor shall operate four dual-channel and 2 single-channel GPS radiosonde stations.

The contractor shall be responsible for spare parts, maintenance, and sustaining engineering support for these systems.

The contractor shall access and input data into the Automated Surface Observation System (ASOS) as needed for proper weather data analysis and collection.

The contractor shall provide data collection of ozonesonde data at Wallops and remote project locations worldwide.

Weather data shall be collected from existing sensors located on the Wallops Main Base and Wallops Island and Wallops Mainland and shall be archived and displayed continuously on the Wallops closed circuit TV system.

The contractor shall operate, maintain, and sustain the following primary fixed and mobile meteorological systems:

- 8-foot L/S-Band Receive Antenna System;
- GPS Radiosonde Receiving Stations;
- Leading Environmental Analysis and Display System (LEADS);
- Automated Service Observation System (ASOS);
- Wallops Surface Observation System;
- Low Altitude Wind Measurement Systems (located on 300-foot tower on Wallops Island);
- Ceilometers;
- Lightning Detection Systems;
- E-field Measurement Systems;
- Tethered Aerostats; and
- Associated Meteorological Systems at the Atmospheric Science Research Facility.

The maintenance actions required to keep the systems operational and able to meet mission requirements and performance metrics shall be defined by the contractor in their range sustaining engineering plans.

In some cases, such as ASOS, the contractor shall notify appropriate responsible maintenance organizations such as NASA or the National Weather Service, when systems operations issues occur.

## **5.7 VIDEO/PHOTOGRAPHY (OPTICAL)**

Video and photographic coverage are very important to missions in order to log and archive events. Additionally, video and photography are used to log mission progress and processes during build-up. With advanced launch vehicles, it is important that launch areas and ranges provide the following video/photo capabilities at a minimum:

- Still photography;
- Aerial photography;
- Tracking and instrumentation operation;
- High speed and high resolution imaging;
- Printing laboratory; and
- Image Archiving.

### **5.7.1 Video/Photography Requirements**

The contractor shall provide Photography, Optical Tracking, Television, and Production Lab Services at Wallops and at other ranges that are established or exist worldwide.

All photographic services shall be digitally based.

Processing of video/film shall be the responsibility of the contractor to meet the product delivery requirement.

The contractor shall provide sustaining engineering, systems engineering, IT services, simulation and testing, logistics, documentation, and training and other related support services to support a continuing and successful photography and video services function.

### **5.7.2 Digital Photography and Video Services Requirements**

Digital still photography, digital high-speed motion photography, and digital video services shall be provided for various mission requirements including range safety, Sounding Rocket, UAV, target, drone, ELV, and aircraft missions.

These services shall be provided for administrative functions including training, and documentation.

### **5.7.3 Optical Tracking Requirements**

Optical Tracking Systems shall be operated in their current location or deployed to support Sounding Rocket, target, UAV, drone, ELV, and balloon launches.

All mobile and fixed tracking equipment shall be operated, maintained, and sustained to support local and remote site tracking requirements.

### **5.7.4 Video Surveillance Requirements**

Video surveillance services shall be provided to the Wallops Range Control Center to enable surveillance of Wallops Airfield runways and Wallops launch areas and launch

danger areas during range operations or as requested by the Wallops Test Director or Range Safety Officer.

Existing cameras and controllers in at least 15 locations shall be operated, maintained, and sustained.

All cameras shall be remotely controllable at the Wallops Test Director console in the Wallops Range Control Center.

Long range camera systems are installed on a number of radar and telemetry antenna systems and shall be maintained and sustained by the contractor.

#### **5.7.5 Video, Television, and Cable Distribution Requirements**

The contractor shall operate, maintain, and sustain Wallops Range video distribution equipment including Cable Television (CATV) distribution and video switching systems.

The CATV system shall distribute video surveillance data and additional video sources including satellite TV receiving channels.

The contractor shall maintain and sustain all video RF modulator and demodulator systems, distribution amplifiers, and RF splitters.

The contractor shall operate, maintain, and sustain both National Television Standard Committee (NTSC) and Red/Green/Blue (RGB) video handling switches that provide source selection for distribution to discrete display and recorder destinations.

The contractor shall operate, maintain, and sustain all recording and video switching systems located in the Wallops Range Control Center and other locations.

The contractor shall operate, maintain, and sustain all video monitors that reside in the Wallops Range Control Center and other locations.

#### **5.7.6 Graphic Services Requirements**

The contractor shall provide professional photographic and video products and graphics services for various mission, administrative and documentation requirements.

The contractor shall provide graphic arts services for photography and video formatting and image editing for documentation, printing and publication and provide Wallops Range and Mission Management Office web page design and publication services.

The contractor shall maintain and operate the existing Digital Image Database System (DIDS) that allows Wallops personnel to search based on a number of query entries such as date, mission number, mission name, and mission type. The system shall support entry of production lab product request information such as photo number, size, quality, paper type, delivery date, requestor name, and justification.

Existing archived records (non-digital) include but are not limited to, negatives and photograph proof prints.

Historical photograph negatives shall be scanned and entered into the digital image database throughout the contract and performed on a non-interference basis with other Wallops Range support requirements.

The digital image database archive shall include, where the image is a scanned image of an old film negative, a reference so that the negative can be pulled for additional scanning actions as needed.

The resolution of the scanned negatives shall be at least 2400 Dots Per Inch (dpi) with capability to scan at 6400 dpi upon request.

The contractor shall maintain the old photograph negatives and not the prints, once scanned into the DIDS.

Once scanned, the old negatives shall be stored in a Government provided secure and environmentally controlled area.

## **5.8 MOBILE ELECTRIC POWER AND HYDROMECHANICAL SERVICES**

The contractor shall provide Mobile Electric Power Services at Wallops and at other ranges that are established or exist worldwide.

Mobile electric power services shall be provided at Wallops and simultaneously for missions requiring support at remote locations.

As with all contract maintenance functions, the Depot Level Maintenance and other related maintenance actions required to keep the systems operational and able to meet mission requirements and performance metrics shall be defined by the contractor in their range sustaining engineering plans.

In conjunction with operations, the contractor shall define commercial electric power services requirements required at remote sites. The contractor will not be required to provide the services. The Government will utilize the contractor developed requirements to obtain these services and have these services interfaced to a demarcation point that includes contractor operated and maintained power stands that are currently part of the mobile electric power systems.

Further, the contractor shall provide services for design and installation of the overall remote site power distribution to all deployed assets.

The contractor shall provide sustaining engineering, systems engineering, IT services, simulation and testing, logistics, documentation, training, and related support services to support a continuing and successful mobile electric power services function.

The contractor shall maintain and sustain diesel generators and rotary frequency converters that are part of the electric power generating equipment, small gasoline and diesel generators used for power systems, mobile antenna transportation trailers containing hydraulic or electro mechanical mechanisms for erecting antenna pedestals, and numerous electro mechanical or hydraulic operated antenna pedestals installed at permanent and remote sites.

In addition to providing mobile electric power to the tracking, data acquisition and communications systems at remote locations, utility electric power shall be provided for assembly buildings, rocket launchers and other remote site users as required.

The electric power systems currently in use shall maintain single and three phase designs.

The mobile electric power systems are installed in ISO portable containers and shall be able to be transported over the road on flat bed trailers.

The contractor shall operate, maintain, and sustain Frequency Converter Systems #1 and #2.

The contractor shall also operate, maintain, and sustain the supporting power distribution equipment consisting of power stands, transformers, switchgear, circuit breakers and fuses, load banks, etc.

## **Section 6: Ground Operations**

Range facilities include all infrastructures associated with a launch area and range that are required to support a mission. Facilities include the following elements:

- Launch Pad;
- Vehicle Processing;
- Payload Processing;
- Blockhouse; and
- Airfield.

### **6.1 LAUNCH SITE SUPPORT PLAN**

The contractor shall support the NASA Ground Operations Manager in the development of a Launch Site Support Plan (LSSP). The due date for the LSSP is defined by the NASA Ground Operations Manager based on mission support requirements.

The LSSP shall include at least the following information:

- Approval Authority
- Distribution List
- Reference Documentation and Processing Guidelines
- Project Description
- Roles and Responsibilities
- Requirements
- Launch Site Processing Activities
  - Spacecraft Processing
  - Launch Vehicle Processing
- Contingency Planning
- Special Agreements
- Deliverables
- Acronyms And Definitions

### **6.2 LAUNCH PAD AND BLOCKHOUSE**

The “launch pad” for the purpose of this document includes everything required to secure the vehicle prior to launch and provide the capability to launch. This includes at least the following items:

- Blockhouse;
- Concrete Pad;
- Gantry, rail, milk stool, etc., to support the vehicle;
- Power, data/network, communication connections; and
- Other associated structure (flame deflector).

### 6.2.1 Launch Pad and Blockhouse Requirements

The contractor shall track, maintain, and provide sustaining engineering for government owned sounding rocket launchers permanently installed at Wallops. This includes preventative maintenance, launcher modifications and reconfiguration, functional tests, load tests, spare parts inventory, documentation, and engineering analysis as required to support sounding rocket missions. Other major launcher maintenance and refurbishment efforts outside the scope of routine maintenance and configuration will be provided under Task Orders. A list of Government owned sounding rocket launchers is included in Table 1.

LAUNCH SITE	LAUNCHER DESCRIPTION	LAUNCHER CONDITION
Wallops Island, Virginia	50k, Pad 1	Installed and functional
	ARC, Pad 2	Installed and functional
	MRL, Pad 2 (MOBILE)	Installed and functional

Table 1. Sounding Rocket Launchers at Wallops

The blockhouse is a blast-protected safety structure that houses personnel and launch area control equipment. Blockhouse size is dependent upon space requirements for equipment and personnel. This, in turn, is driven by the class of rocket being launched – a larger vehicle requiring more personnel and more sophisticated control equipment. Besides the important task of protecting personnel during a launch, the blockhouse is typically equipped with the following functional capabilities:

- Test and check-out systems for the vehicle;
- Countdown/timing systems(s);
- Firing systems;
- Launcher/launch pad/tower controls; and
- Other supporting systems as required for launch.

### 6.3 VEHICLE PROCESSING

Vehicle processing addresses requirements relative to preparing both the launch vehicle and payload for flight.

Launch vehicle processing is generally performed by the launch vehicle provider's team with the launch site/range provider supplying space, generalized equipment and materials as needed. Processing facilities include a range of capabilities from just a basic shelter and nominal materials to a full-blown processing building with blast walls, high-bays, heavy-lift cranes, computer services, etc. Launch vehicle processing also includes detailed integrated vehicle testing with the range in preparation for launch.

Payloads to be launched can either be suborbital spacecraft or orbital spacecraft.

### **6.3.1 Vehicle Processing Requirements**

The contractor shall provide qualified personnel, equipment, tools, materials, supervision, and other services to meet the ground operations, spacecraft, and launch vehicle processing requirements as specified in the SOW and mission specific requirements documents.

To meet these requirements, the contractor shall provide systems, materials, and personnel to maintain and sustain the facilities and systems required to process ELVs and their associated payloads at Wallops. Efforts shall also include documenting the current configuration of Wallops Range systems, corrective maintenance support, and proposing and pursuing facility upgrades and sustainment efforts.

Specifically, the services provided shall support the Wallops Range's Horizontal Integration Facility (HIF), Payload Processing Facility (PPF), and Spacecraft Fueling Facility (SFF). Each of these facilities has pneumatic, safety, and monitoring systems which shall be maintained and operated by the contractor. In addition to the facilities listed, scope shall include mobile assets associated with support of these and other facilities. These mobile assets include nitrogen rechargers, Liquid Nitrogen (LN2) Dewar's, fueling waste tankers, box trucks, and scape vans. For the operation of these mobile assets, the contractor shall provide personnel possessing Commercial Driver's Licenses and hazardous materials stamps for vehicles operating on public roads.

The contractor shall provide system operability maintenance including clean room operation and maintenance in addition to consumables, sample analysis for commodities and pneumatic systems; and gauge calibration and critical spare maintenance.

Sustaining, calibration and maintenance of equipment to support operations in processing and fueling facilities including oxygen sensors, hydrazine and oxidizer monitors, particle counters, and extensive Ground Support Equipment (GSE) dedicated to these facilities shall be provided by the contractor.

Commodities for spacecraft processing and launch vehicle processing in NASA facilities; HIF, PPF, and SFF shall be provided by the contractor. The commodities include Helium, Liquid Nitrogen, Gaseous Nitrogen, and air. The scope of work shall also include managing commodity supply, and maintaining system cleanliness integrity and operability.

The contractor personnel performing ground operations shall be NASA-certified on critical lift bridge cranes, fork lifts, lifting devices (i.e. scissor lifts), pressure systems, cryogenic storage and supply systems, and hazardous materials storage systems.

### **6.4 PAYLOAD PROCESSING**

Payload processing is similar to launch vehicle processing except it focuses strictly on the payload. The payload may be processed as part of the vehicle but is typically

separate due to special needs (testing, clean environment, ESD, etc.) until such time it is actually integrated on to the launch vehicle.

Payload processing is generally performed by the payload provider's team (with their own test equipment) with Wallops supplying facilities, generalized equipment and materials as needed. Processing facilities for the payload are usually more sophisticated than that for the launch vehicle and include requirements for lab space, work benches, ESD areas, tightly controlled environment (humidity, temperature), clean areas or rooms, lifting equipment, personnel workspace, conference room, ground support equipment rooms, storage, visitor area, staging pad, and other support amenities as required.

#### **6.4.1 Payload Processing Requirements**

The contractor shall support spacecraft fueling (if required) and shall consist of managing the spacecraft fueling configuration and support systems including: vacuum systems, nominal and high rate exhaust vans, breathing air systems, Self-Contained Atmospheric Protective Ensemble (SCAPE) operations coordination, SCAPE valet support, Level B valet support, Level B facility decontamination operations, hypergolic fuel transport, and transport and storage of contaminated equipment to be decontaminated. Level B refers to OSHA level B Personal Protective Equipment (PPE) or splash protection with Self Contained Breathing Apparatus (SCBA).

#### **6.5 AIRFIELD**

Wallops Airfield is in the vicinity of the launch site and its convenience allows flights for surveillance, recovery, weather, and chase aircraft and can provide a convenient means for shipping equipment and personnel in/out of the launch area. Additionally, if an air launch rocket is being operated, Wallops airfield allows for take-off.

##### **6.5.1 Airfield Requirements.**

The contractor shall monitor all airfield day to day activities.

The contractor shall attend all mission briefings on behalf of airport operations to include air traffic control services.

The contractor shall establish and maintain effective working relationships directly with pilots, air traffic control tower personnel, security/emergency crews and project managers to enforce NASA as well as Federal Aviation Administration (FAA) regulations to maintain a smooth running facility.

The contractor shall manage the airport's Notice To Air Men (NOTAM) program to ensure the safe and expeditious flow of air traffic in accordance with FAA Joint Order 7930.2P.

The contractor shall track and oversee the keeping of detailed logs of all operations and relay operational needs to include tower manning for range project support.

The contractor shall enforce airfield driver safety regulations and maintain training records for all personnel driving on the airfield.

The contractor shall provide support in planning, organizing, managing, and directing airport operations and maintenance activities.

The contractor shall coordinate and direct all airfield operations including air traffic management services and visiting/project aircraft ground operational services.

The contractor shall provide support to the NASA Airfield Manager as liaison to airfield tenants during projects to plan, coordinate and resolve issues with NASA Project Managers for facility operational concerns related to range mission airfield requirements.

The contractor shall provide support in coordinating and monitoring scheduled/unscheduled airfield maintenance and repairs ensuring Wallops airfield assets remain safe, operational and in compliance with NPR 7900, Aircraft Operations Management Manual, as well as FAA Advisory Circulars.

The contractor shall oversee and track quality assurance for the Wallops Airfield arresting gear as well as all airfield ground support equipment.

The contractor shall coordinate with U.S. Department of Agriculture (USDA) biologists located at Wallops to manage the Wallops Wildlife Management Plan.

The contractor shall act as Alternate FOM for building A-1 tower to provide support in the maintenance of building to ensure it meets or exceeds all NASA and range mission requirements.

The contractor shall provide support to the airport manager in coordinating with Wallops Facilities Operations Group, Wallops Airborne Science Program, and the FAA for long range planning, airspace analysis, airfield operations, aviation safety, construction and needs for growth and expansion.

The contractor shall provide support in the preparation and development of policies and procedures.

The contractor shall oversee policies, procedures and schedules to ensure the airport is operated and maintained in accordance with NASA and FAA regulations.

### **6.5.2 Air Traffic Management Requirements**

The contractor shall operate the Wallops Airfield Control Tower for the control of air and ground traffic in accordance with the following conditions and standards.

The tower shall be staffed Monday through Friday with Control Tower Operators (CTO's) between 0600 and 1800 local (excluding Federal holidays and weekends) and at other times, as required, to support special projects.

While operating the Wallops Airfield Control Tower, the CTO's shall comply with Federal Aviation Administration (FAA) regulations at 14 CFR Part 65, Subpart B pertaining to Air Traffic Control Tower Operations; FAA Air Traffic Control Procedures FAA Order 7110.65; and NASA Procedural Requirements (NPR) 7900.3 - Aircraft Operations Management.

The CTO's shall possess an FAA Air Traffic Control Tower Operator's Certificate and a second-class medical certificate.

A weather observer certification and a Wallops Airfield qualification by the FAA shall be required for operation of the Wallops Airfield Control Tower.

All required FAA certifications shall be obtained by the contractor staff operating the Wallops Airfield Control Tower by the contract effective date.

The CTO's shall be fully trained and demonstrate capability to operate all equipment, currently installed in the Wallops Airfield Control Tower.

The CTO's shall maintain efficiencies in their processes and operational requirements and present a Quarterly Improvements Report to the COR on any recommended service improvements and/or training needs, including systems enhancements for overall increased safety or proficiency.

The contractor shall keep a record of all IT related support systems and define any new or related products that will be required to meet mission needs of the Wallops Airfield and to ensure high quality service and safety assurance.

CTO's shall work with NASA Project Managers and the Wallops Airfield Manager in the conduct of Wallops Range projects which may require a temporary or partial closure of the airport to accommodate research project requirements.

Attendance at all range reviews requiring Wallops Airfield services shall be required and shall include readiness state and preparedness status for the CTO activities required to meet specific requirements as defined by the Government in formal mission requirements documents and reviews.

In addition, the contractor shall provide air traffic management subject matter expert services for all mission planning needs that support Wallops Range operations.

Air Traffic Management support services shall also include analysis of project requirements, goals, and objectives and presented in appropriate mission reviews/meetings.

The analysis shall include guidance and analyses for both operational and business improvement efforts in addition to formal analyses, white papers, and/or reports. For systems enhancements supporting the operation of the control tower, the contractor shall participate in the implementation of components and facilities, required for the enhancement initiative.

The contractor shall perform and support functions while on duty in the Wallops Airfield Control Tower related to, and in accordance with, airport emergency plans, wildlife control plans, runway safety inspections, airport security procedures, the permit/prior (PPR) submission process, and air traffic management.

The contractor shall provide a Monthly Control Tower Report delineating the traffic count, identification of aircraft, call sign and dates to the COR and Wallops Airfield Manager on the 10th day of the following month (or on the Monday following a weekend).

All communications and other operational equipment currently installed in the Wallops Airfield Control Tower required for control tower operations shall be maintained and sustained by the contractor.

Maintenance of airfield infrastructure is NOT in the scope of this contract. The contractor shall however identify and propose airfield infrastructure maintenance and/or upgrades to the Wallops Airfield Manager to ensure airfield safety and services are maintained.

### **6.5.3 Airfield Fuel Farm and Fuel Delivery Management Requirements**

The Defense Logistics Agency (DLA) is designated as the mandatory source of supply for petroleum products per Federal Acquisition Regulation 8.002 and 41 CFR 101-26.6. The petroleum products included are gasoline, diesel, heating fuel, marine fuel, ethanol, biodiesel, kerosene, and jet fuels.

The contractor shall acquire fuel directly through DLA. A fuel purchase agreement (FPA) shall be established with DLA by the contractor upon contract effective date to ensure uninterrupted Airfield fueling services.

The DLA process for ordering, billing and payment for petroleum shall be developed and proposed by the contractor to ensure electronic order and payment capability for the above petroleum products through DLA and Intra-Governmental Payment and Collection System (IPAC).

NASA will provide the Jet A bulk storage facility and be responsible to keep all equipment in good working order including any U.S. Environmental Protection Agency (EPA) compliance regulations.

The contractor shall inspect the Jet A fuel tanks daily in accordance with Federal Aviation Administration (FAA) standards. A written recorded record of the inspections

shall be kept on file and available for inspection. All employees operating the Jet A fuel farm will be trained and certified by Federal Aviation Regulations (FARs) to include, inspection, operations, receiving and dispensing of Jet A fuels.

NASA will provide two Jet A trucks and be responsible for maintenance. The contractor shall be responsible to perform daily inspections on the trucks and report any deficiencies to NASA for repair.

The contractor shall be required to keep a daily inspection and inventory log. The contractor shall record and keep a log of all fuel received, transferred and delivered. The log shall be available to NASA for inspection.

A call out fee shall be established for fueling outside normal working hours.

The contractor shall comply with all applicable agency and center-specific NASA regulations including, but not limited to, the current versions of the following: NPR 7900.3; NPR 7900.4; GSFC General Maintenance Manual (GMM), and; GSFC Aircraft Operations Manual (AOM).

## **Section 7: Indefinite Delivery Indefinite Quantity (IDIQ) Task Order Effort**

Under this Contract, the Government may issue IDIQ tasks to address supplemental requirements not specifically addressed in the Core Requirements portion of the contract, as defined in SOW Sections 2-6. IDIQ tasks will define a specific set of requirements, a specific duration, and specific deliverables. The potential scope of effort for these tasks will be the same as the scope defined for the Core Requirements, but will represent work that cannot be specifically included in the Core Requirements because it is not currently defined or sufficiently delineated to allow it to be described/estimated with the Core.

## Enclosure 1: Core Mission Model

CORE MISSION MODEL																					
Fiscal Year (1) (2)	FY17				FY18				FY19				FY20				FY21				
	Q1	Q2	Q3	Q4																	
NASA Sounding Rockets (3)																					
Wallops	1	1	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	1	1	
Alaska	0	2	0	0	0	3	0	0	0	2	0	0	0	3	0	0	0	0	2	2	
Norway	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	
Kwajalein	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	
Australia	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
NASA Unmanned Aerial Vehicles (4)																					
Wallops	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Cube Satellite Tracking (5)																					
Wallops	120	120	120	120	360	360	360	360	360	360	360	360	480	480	480	480	480	480	480	480	
Daily Weather Balloons (6)																					
Wallops	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	
U.S. Navy Aerial Platforms Support (7)																					
Missile Exercise	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
F-18 Tracking	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	
F-35 Tracking	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	
Towed Target Tracking	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
P-8 Tracking	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	
X-47 Tracking	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

1. The Fiscal Year (FY) is the accounting period for the federal government which begins on October 1 and ends on September 30.
2. Missions planned for a given FY may actually extend into the following Fiscal Year.
3. Temporary/Mobile campaigns will have on-site support duration of 2-months and two (2) Remote Temporary/Mobile Range deployments per year. One of the two deployments will always be Alaska.
4. Assume all missions supported during Wallops Airfield operating hours of 0700 to 1700 local Monday through Friday.
5. Small Satellite tracking assumes 24 x 7 support.
6. Daily Weather balloons are launched twice daily 0700 and 1900 local in support of the National Weather Service.
7. Assume all missions supported during Wallops Airfield operating hours of 0700 to 1700 local Monday through Friday.

## Enclosure 2: Core Sustaining Engineering Projects Model

### I. **Project Title:** Range Data Acquisition And Computation (RADAC) System Replacement Project

- **Project Purpose:** This obsolescence engineering project is to replace the existing Silicon Graphics Incorporated (SGI) RADAC system due to sustainability issues. The requirements of this project are to port the existing RADAC software from the existing SGI Operating System (OS) to a more sustainable Linux OS. In addition, there are new computational requirements to implement such as Ethernet data processing capabilities. The system must meet all NASA software safety standards as defined in Section 2.5.3 Data Systems Performance and Reliability of the SOW.
- **Schedule Breakout:** The duration of this project shall be 36 months, which will include two phases. The first phase shall commence on the contract effective date for a period of 24-months. The second phase shall commence on the effective date of the Option Period I, if authorized, of the contract for a period of 12-months.
- **Delivery Requirements Breakout:** The Contractor shall provide development and requirements testing prior to completion of Phase I. If Phase II is authorized, the Contractor shall provide Safety Certification and Draft and shall provide a transition to operations within 12 months after the start date Option Period I schedule.

### II. **Project Title:** Range Telemetry Antenna Replacement Project

- **Project Purpose:** This project is to replace one existing 7.3-meter fixed telemetry antenna system while maintaining at least the current G/T figure of merit capability. The requirements of this project include replacement one of the obsolete 7.3-meter telemetry antenna systems that is an element of the Wallops Range launch head capability. The old system components shall then be utilized as a spares for the remaining 7.3-meter telemetry antenna system.
- **Schedule Breakout:** The duration of this project shall be 14 months from contract effective date.
- **Delivery Requirement:** The Contractor shall provide a transition to operations within the project schedule.

### III. **Title:** Radio Frequency Direction Finding and Emission Control System Implementation Project

- **Project Purpose:** The purpose of this project is to design, implement, test and transition into operations an upgraded Radio Frequency Direction Finding (RFDF) System and Emission Control (EMCON) System to enhance the Wallops Range's ability to more safely manage and control frequency usage. High level requirements shall be to provide a relevant and automated level of RF monitoring and surveillance capability to detect potentially harmful levels of RF energy from 100MHz to 18GHz and from 20MHz to 3GHz, respectively. The implemented systems shall provide automated and continuous RF monitoring, remote network-based notification and operation, precision profile threshold monitoring and notification, configurable field strength measurement units, optimization capability for enhancement of probability of intercept, and fixed and mobile configuration for flexible multi position use.
- **Schedule Breakout:** The duration of this project shall be 24 months from contract effective date.
- **Delivery Requirement:** The Contractor shall provide a transition to operations within the project schedule.

#### IV. Project Title: Optical Tracking System Enhancement Project

- **Project Purpose:** The scope of this project shall be to identify detailed requirements, design and develop a slave-track solution utilizing as much existing hardware as possible to reduce overall project cost. In addition, the project scope shall include implementation and testing the resulting system on a mobile platform with remote control operating capabilities. The objective of the project shall be to develop a mobile optical tracking system (using existing optics systems) capable of providing stable imagery of in-flight vehicles (UAVs, sounding rockets, ELVs, etc.) from ground to optical LOS that meets current NASA data recording requirements as defined in mission specific requirements documents and in this SOW. High level requirement for the system shall be to track sounding rockets and ELVs by ingesting and processing remotely provided pointing data from an on-track source such as radar or GPS metric tracking. The system shall be mobile, shall interface with existing range infrastructure.
- **Schedule Breakout:** The duration of this project shall be 12 months from contract effective date.
- **Delivery Requirement:** The Contractor shall provide a transition to operations within the project schedule.

#### V. Project Title: Advanced Mission Graphics Project

- **Project Purpose:** The contractor shall support the development and testing of the Advanced Mission Graphics (AMG) Project. The engineering project is led by the NASA Wallops Applied Engineering and Technology Directorate under the

overall management of the Wallops Range and Mission Management Office. The purpose of the AMG Project is to develop a replacement system for the current mission graphics system used by the Wallops Safety Office for flight safety operations. As part of the development, the AMG project shall incorporate added capabilities over the existing system and improvements based on lessons learned. The contractor shall provide engineering services in support of this effort as defined in project specific requirements documents and, as with all transitioned systems, the contractor shall be responsible for maintaining and sustaining the AMG system once operational. The contractor shall provide input from an operational/maintenance point-of-view into the development of the AMG system. The contractor shall provide engineering project management assistance, create a Concept of Operations document for the system, and provide procurement services for system hardware.

- **Schedule Breakout:** The duration of this project shall be 36 months, which will include two phases. The first phase shall commence on the contract effective date for a period of 24-months. The second phase shall commence on the effective date of the Option Period I, if authorized, of the contract for a period of 12-months.
- **Delivery Requirements Breakout:** The Contractor shall provide development and requirements testing prior to completion of Phase I. If Phase II is authorized, the Contractor shall provide Safety Certification and shall provide a transition to operations within the Option Period I schedule.

**VI. Project Title:** Suborbital Launcher Systems Video Surveillance Project

- **Project Purpose:** The scope of this project shall be to identify detailed requirements, design and develop a surveillance camera system which will give various personnel the ability to monitor activities during sounding rocket launch pad operations conducted inside existing launcher shelters. The objective of the project shall be to develop a surveillance camera system for the three existing launch rail shelters at Wallops enabling range operations personnel to monitor the activities of vehicle crews during critical operations. The high-level requirements shall include Pan-Tilt-Zoom control over surveillance cameras in each launcher shelter which will provide full coverage of vehicle integration activities. This video data shall be routed directly to the appropriate blockhouse with the option to broadcast on the existing Wallops digital closed circuit television system. Detailed requirements shall be developed as a project deliverable within 60 days of contract award.
- **Schedule Breakout:** The duration of this project shall be 8 months from contract effective date.
- **Delivery Requirement:** The Contractor shall transition the systems to operations within the project schedule.

**VII. Project Title:** Ultra High Frequency RADAR Antenna Control Unit Sustainment Project

- **Project Purpose:** The scope of this project shall be to design, procure, install and test a replacement Antenna Control Unit (ACU) and associated components for the existing Ultra High Frequency (UHF) RADAR at Wallops. The new ACU shall be installed in Building U-25, the control facility for the UHF RADAR. The currently installed ACU is obsolete. The RADAR is currently being used to support daily CubeSat tracking. The ACU upgrade shall provide the improved tracking capabilities and reliability required to support CubeSat missions. High level requirements shall be to provide functional replacement of the current UHF RADAR ACU. The system capabilities shall match or exceed the existing ACU with regard to functionality, reliability, and tracking accuracy. The contractor shall provide a detailed requirements document within 180 days of contract award.
- **Schedule Breakout:** The duration of this project shall be 36 months, which will include two phases. The first phase shall commence on the contract effective date for a period of 24-months. The second phase shall commence on the effective date of the Option Period I, if authorized, of the contract for a period of 12-months.
- **Delivery Requirements Breakout:** The Contractor shall provide development and requirements testing prior to completion of Phase I. If Phase II is authorized, the Contractor shall provide Safety Certification and the system with the new ACU shall transition to operations within 12 months after the start date of the Option Period I schedule.

**VIII. Project Title:** Command System Control Replacement Project

- **Project Purpose:** The scope of this project shall be to design, build, test, install and certify a replacement safety control subsystem for the existing Wallops command system. This system shall interface to Wallops fixed command assets. The new components shall be installed in Building U-55 and in the Wallops Range Control Center. The current subsystems that support transmitting command tones and receiving transmission verifications have become obsolete and there are a limited number of spare components. The current control subsystem utilizes existing Wallops copper communications infrastructure along with high risk transmission methods such as dial-up modems. High level requirements shall be to provide functional replacements for the existing control subsystem for the Wallops command system. The subsystem capabilities shall match existing capabilities with regard to redundancy, reliability, accuracy, power, and tone generation. A separate detailed requirements document shall be provided by the contractor within 90 days of contract award. The design shall minimize software changes to reduce overall cost and safety certification testing.

- **Schedule Breakout:** The duration of this project shall be 24 months from contract effective date.
- **Delivery Requirement:** The Contractor shall transition the systems to operations within the project schedule.

**VIII. Project Title:** Transportable Command and Telemetry System Activation and Certification Project

- **Project Purpose:** This project shall include receipt, inspection, engineering gap analysis, engineering design, and integration of the Transportable Command and Telemetry System (TCATS) into the existing Wallops mobile range architecture to demonstrate capabilities for future mission support. The purpose of this project shall be to prepare the newly acquired TCATS B2 and B3 systems for operational use at Wallops. High level requirements shall be to certify the TCATS B2 and B3 systems for operation at Wallops including operator training and production of all associated documentation such as operations and maintenance manuals, training programs, configurations and drawings. Development and approval of the Range Safety Officer/Missile Flight Control Officer (RSO/MFCO) training program shall also be within scope of this project.
- **Schedule Breakout:** The duration of this project shall be 48 months, which will include two phases. The first phase shall commence on the contract effective date for a period of 24-months. The second phase shall commence on the effective date of the Option Period I, if authorized, of the contract for a period of 24-months.
- **Delivery Requirements Breakout:** For the first phase, the B2 system shall be transitioned into operation within 18 months of the contract effective date and a draft document provided 30 days prior to the completion date of phase two outlining the work accomplished as well as a work plan delineating the remaining work to be completed in order for the B3 systems to be fully transitioned into operations. For the second phase, the RSO/MFO training program shall be ready for approval and implementation within 12-months from the effective date of the second phase. In addition, in the second phase, the B3 system shall be transitioned into operation prior to the completion date of the second phase.

**X. Project Title:** Tri-Mode Command System Implementation Project

- **Project Purpose:** The contractor shall conduct system design, development and testing of the existing WV Communications Incorporated tri-mode command systems to demonstrate feasibility for eventual integration into the Wallops fixed and mobile command infrastructure leading to safety certification of the upgraded system. The contractor, once feasibility has been demonstrated and approved by the Government, shall procure and implement all necessary systems, and achieve safety certification and transition to operations. The purpose of this

project shall be to fully implement the tri-mode command systems at Wallops and obtain NASA safety certification of the newly implemented systems.

- **Schedule Breakout:** The duration of this project shall be 54 months, which will include four phases. The first phase shall commence on the contract effective date for a period of 24-months. The second phase shall commence on the effective date of the Option Period I, if authorized, of the contract for a period of 24-months. The third phase shall commence on the effective date of the Option Period II of the contract for a period of 6-months.
- **Delivery Requirements Breakout:** For the first phase, the Contractor shall provide a draft document no later than 30 days before the end date of the first phase outlining the work accomplished as well as a work plan delineating the remaining work to be completed in order for the fixed systems to achieve NASA safety certification and the mobile systems to achieve NASA safety certification. For the second phase, the fixed systems shall achieve NASA safety certification no later than 12-months prior to the end date of the second phase and a draft document shall be provided 30 days prior to the completion date of the second phase outlining the work accomplished for the mobile systems as well as a work plan delineating the remaining work to be completed in order for the mobile systems to achieve NASA safety certification. For the third phase, the mobile systems shall achieve NASA safety certification prior to the completion date of the third phase.

**XI. Project Title:** Mobile Command System Antenna Control Unit Replacement Project

- **Project Purpose:** The scope of this project shall be to replace all current mobile command system antenna controllers, manufactured by QuikSet, and heritage pointing data processing computer systems, and to obtain NASA range safety certification and subsequent transfer to operations. The current systems have critical sustainability issues that threaten readiness for future operations. The scope of this project shall be limited to replacing and certifying these components only. Changes to other equipment and systems such as mechanical, power, HVAC, communications, range safety displays, and other interfacing or supporting infrastructure in the mobile command systems shall be out of scope. High level requirements shall be to provide project management, logistics, engineering, telemetry, command, and scheduling services to define requirements; design, plan, procure, install, integrate, and test a solution to meet requirements; obtain safety certification; and transition the systems to operations. Any software will be safety critical, Class B software, and therefore obtain NASA safety certification prior to transition to operations.
- **Schedule Breakout:** The duration of this project shall be 36 months, which will include two phases. The first phase shall commence on the contract effective date for a period of 24-months. The second phase shall commence on the

effective date of the Option Period I, if authorized, of the contract for a period of 12-months.

- **Delivery Requirements Breakout:** The Contractor shall provide development and requirements testing prior to completion of Phase I. If Phase II is authorized, the Contractor shall provide Safety Certification prior to transition to operations and shall transition to operations within 12 months after the start date of the Option Period I schedule.

## **XII. Project Title:** Mobile Telemetry System Reconfiguration Project

- **Project Purpose:** The contractor shall repackage all existing hardware that currently resides in a mobile telemetry trailer and integrate Antenna Control Units for two mobile telemetry antenna systems into an existing, unutilized, expandable trailer. The purpose of this project shall be to provide a new mobile telemetry control and readout capability to improve current reliability and availability. High level requirements shall be to repackage the systems into the new trailer as outlined above for operations at Wallops, to include training the operators and publishing of all associated operations and maintenance manuals, training materials, and engineering configurations and drawings.
- **Schedule Breakout:** The duration of this project shall be 42 months, which will include two phases. The first phase shall commence on the contract effective date for a period of 24-months. The second phase shall commence on the effective date of the Option Period I, if authorized, of the contract for a period of 18-months.
- **Delivery Requirements Breakout:** For the first phase, a draft document shall be provided 30 days prior to the completion date of phase one outlining the work accomplished as well as a work plan delineating the remaining work to be completed in the next phase to be transition to operations. For the second phase, the new system shall be transition to operations within 18 months from the effective date of the second phase.

## **XIII Project Title:** Air Traffic Control Radio System Sustainment Project

- **Project Purpose:** The purpose of this project shall be to solve the sustainability and maintainability issues with the current system that provides communication capability to the airfield control tower, Wallops Fire Department, and Range Control Center. This project shall include development of a technical solution due to existing sustainment and maintainability problems with the current air traffic control radio systems. The contractor shall perform a trade study and recommend a vendor based on an approved set of requirements and future use. This contractor shall ensure all requirements are captured and the replacement design meets those requirements and is implemented in controlled fashion to ensure current operations are not interrupted. The contractor shall develop

preliminary requirements, solution concept, detailed requirements and design, procure the equipment, implement the solution, conduct testing, attain required certifications, and transition to operations.

- **Schedule Breakout:** The duration of this project shall be 36 months, which will include two phases. The first phase shall commence on the contract effective date for a period of 24-months. The second phase shall commence on the effective date of the Option Period I, if authorized, of the contract for a period of 12-months.
- **Delivery Requirements Breakout:** The Contractor shall provide development and requirements testing prior to completion of Phase I. If Phase II is authorized, the resulting system shall transition to operations no later than 12 months after the completion date of the second phase.