ATTACHMENT A

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

GODDARD SPACE FLIGHT CENTER (GSFC)

WALLOPS FLIGHT FACILITY (WFF)

RANGE OPERATIONS CONTRACT II

STATEMENT OF WORK

RFP NNG17611358R

CONTRACT TBD

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TABLE OF CONTENTS

1. DESCRIPTION OF SERVICES 4

2. GENERAL 6

3. PROGRAM MANAGEMENT 8

3.1 PROGRAM MANAGEMENT REPORTING 9
3.1.1 Weekly Activity Report 9
3.1.2 Monthly Status Report 10
3.2 MISSION PREPARATION PRODUCTS AND REVIEWS 11
3.2.1 Instrumentation Support Review 11
3.2.2 Range Readiness Reviews 12
3.2.3 Launch Readiness Reviews 12
3.2.4 Post Mission Summary Report 12
3.3 PERFORMANCE METRICS AND REPORTING 13
3.3.1 Instrumentation System Availability 13
3.3.2 Data Systems Performance and Reliability 15
3.3.3 Radar Systems Performance 15
3.3.4 Telemetry Systems Performance 16
3.3.5 Mission Success Criteria 17
3.4 CONFIGURATION MANAGEMENT 17
3.5 ALTERNATE FACILITIES OPERATIONS 18
3.6 HEALTH AND SAFETY MANAGEMENT 18
3.7 PHYSICAL SECURITY MANAGEMENT 19
3.8 HUMAN CAPITAL MANAGEMENT 19
3.9 SPECIAL CONSIDERATIONS 20
3.10 FINANCIAL MANAGEMENT 20
3.11 EDUCATION AND OUTREACH 21

4. INTEGRATED RANGE SERVICES MANAGEMENT 22

4.1 OPERATIONS PROJECT MANAGEMENT 24

5. RANGE SERVICES 28

5.1 MAINTENANCE AND SUSTAINMENT SERVICES 28
5.2 RANGE ENGINEERING AND TECHNOLOGY DEVELOPMENT 30
5.3 NEW SYSTEMS TRANSITION TO OPERATIONS 30
5.4 TELECOMMUNICATIONS ENGINEERING 31
5.5 INFORMATION TECHNOLOGY AND RANGE NETWORK ENGINEERING SERVICES 31

6. TELEMETRY OPERATIONS SERVICES 33

6.1 MOBILE TELEMETRY OPERATIONS 34

7. RADAR OPERATIONS SERVICES 35

7.1 PRECISION TRACKING RADAR OPERATIONS 35
7.2 SURVEILLANCE RADAR OPERATIONS 35
7.3 RESEARCH WEATHER AND SCIENCE RADAR SERVICES 36

8. RANGE CONTROL CENTER AND MISSION OPERATIONS CONTROL CENTER SERVICES 37

8.1 RANGE CONTROL CENTER SERVICES 37
8.2 MISSION OPERATIONS CONTROL CENTER SERVICES 38
8.3 RANGE DATA PROCESSING AND DISPLAY OPERATIONS 39
8.4 RANGE DATA SYSTEMS 40

8.5 RANGE SURVEILLANCE AND RECOVERY OPERATIONS 41

9. RANGE COMMUNICATIONS, TIMING, AND COMMAND SERVICES 44

9.1 RANGE COMMUNICATIONS AND FREQUENCY MONITORING OPERATIONS 44
9.2 AIR-TO-GROUND COMMUNICATIONS OPERATIONS 46
9.3 COMMAND OPERATIONS 46
9.4 RANGE TIMING AND COUNTDOWN OPERATIONS SERVICES 47

10. VIDEO/PHOTOGRAPHY (OPTICAL) 49

10.1 VIDEO/PHOTOGRAPHY REQUIREMENTS 49
10.2 OPTICAL TRACKING OPERATIONS 49
10.3 VIDEO SURVEILLANCE OPERATIONS 49
10.4 DIGITAL PHOTOGRAPHY AND VIDEO SERVICES REQUIREMENTS 50
10.5 VIDEO DISTRIBUTION REQUIREMENTS 50
10.6 GRAPHIC SERVICES REQUIREMENTS 50

11. METEORLOGICAL SERVICES 52

12. MOBILE ELECTRIC POWER AND HYDRO-MECHANIC SERVICES 54

13. WIDE AREA NETWORK (WAN) SERVICES 56

14. LOGISTICS SUPPORT SERVICES 58

14.1 SHIPPING SERVICES 58
14.2 RESEARCH AND PROCUREMENT SERVICES FOR SPARE PARTS 59
14.3 EQUIPMENT DEPOT SERVICES 59
14.4 PROPERTY MANAGEMENT SERVICES 59
14.5 EQUIPMENT CALIBRATION SERVICES 59
14.6 CHEMICAL LABORATORY SERVICES 60

15. GROUND OPERATIONS 61

15.1 LAUNCH SITE SUPPORT PLAN 61
15.2 LAUNCH PAD AND BLOCKHOUSE 62
15.2.1 Launch Pad and Blockhouse Requirements 62
15.3 VEHICLE PROCESSING 63
15.3.1 Vehicle Processing Requirements 63
15.4 PAYLOAD PROCESSING 65
15.4.1 Payload Processing Requirements 65
15.5 SUPPLEMENTAL GROUND OPERATIONS SERVICES 66

16. ACRONYM LIST 67

STATEMENT OF WORK
for
NASA's WFF
RANGE OPERATIONS CONTRACT II

1. DESCRIPTION OF SERVICES

The overall scope of this contract is to provide Wallops Range operations and maintenance; support services; training; command, control, communications, information and computer systems services; testing, modifying and installing communications and electronic systems at launch facilities, launch control centers and test facilities; range sustainment engineering services, and ground operations support. This effort provides direct customer support to NASA WFF's Range by providing qualified personnel, equipment, tools, materials, vehicles, specialized test equipment, supervision, and other services. NASA's WFF requires an innovative, integrated, flexible and effective management approach and the contractor must provide technical support in a planned and coordinated manner which will ensure essential Wallops Range support systems are ready to support user requirements, and cause no impact to Wallops Range program schedules due to equipment degradation, failures, system problems or reprioritization of preexisting program requirements. The wide variety of support systems involves flexible workload planning, cost management, and scheduling of resources to identify and resolve technical systems problems.

Available capacity for operations, maintenance, and sustaining engineering may be made available to other WFF organizations with the permission of the Contracting Officer's Representative (COR), and RMMO Management.

Instrumentation systems are permanently located at WFF, Bermuda, and in Alaska. In addition, mobile instrumentation is deployed to locations worldwide, including but not limited to Norway; Kwajalein Atoll; Coquina, NC; Australia; and French Guiana to meet Range customer requirements.

The Wallops Range receives and provides Range support from and to 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 pursue ongoing preventive and corrective maintenance and sustaining engineering tasks to ensure readiness and mitigate the effects of obsolescence of its current Range equipment and systems. The contractor shall also work with RMMO in cooperation with other NASA Centers and organizations to maintain and sustain Range systems to common standards. The contractor shall work with WFF organizations and provide operational requirements to support new engineering and/or technology development activities approved by the Range. Such activities enable the evolution of the Range architecture to include space-based metric tracking, telemetry, and command relay, and mission planning systems. The

contractor shall also provide operational requirements and support transitioning new engineering or technology developments to operations.

For the purposes of this document, the following definitions apply:

- Operations – to turn on; to control the function of a system per existing procedures and obtain output.
- Maintenance – to enable a system to continue functioning (e.g. lubricate, calibrate, and repair) per existing procedures and parts.
- Sustainment – to repair and maintain with new parts or subsystems but operating procedures do not change and no new capabilities are added.
- Engineering Development – Upgrades to existing systems that add capabilities, including new parts and procedures. Engineering Development is typically led and provided by the Wallops Civil Servant Engineering Organization (Code 500). Engineering Development support may be in the scope of work of this contract with the permission of the COR and Chief of the Range after discussions with Range Chief Engineer.
- Technology Development – Upgrades to existing systems or wholesale development that adds or develops capabilities or technologies that exceed the current state of the art or changes that are considered revolutionary, rather than evolutionary, to systems. Technology Development is not in the scope of work of this contract.

2. GENERAL

The instrumentation systems that make up the Wallops Range include aging infrastructure existing in a highly corrosive environment that must continue to successfully support missions subject to schedule and requirements variability common on test ranges. These systems are located at WFF, and deployed to sites around the world which sometimes requires simultaneous operations management and staffing.

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 work with the Wallops Flight Facility (WFF) Regional IT Services and Solutions Division, Code 780, to define the intra-building cable plant requirements and transmission and distribution of data, voice, and video communications at the WFF for missions that require these services.

The contractor shall provide long-range planning for all systems.

The contractor shall comply with all Agency CIO and Communications Services Office (CSO) directives for the development, implementation, and operation of communications systems, network systems, and computer systems.

The contractor shall utilize the Agency I3P contracts or the SEWP contract for the procurement of any communications systems, network systems, and computer systems components.

The contractor shall ensure customer products and services are provided when needed and minimize the impact system maintenance has on the range operations schedule with a balanced program of effective preventative maintenance and operational load using the technical workforce proposed.

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, launch operations and maintenance. Available capacity for training, qualification, and certification may be made available to other WFF organizations with the permission of the COR and Chief of the Range. Qualifications shall be specific to each service area supported such as: radar, telemetry, video/photo (optical), communications, timing, command, control centers, meteorological, and ground operations.

Certification examples would include but not limited to: crane and mobile aerial platform operations, high pressure operations, cryogenics, oxygen systems, precision cleaning,

metalizing coatings, Self-Contained Atmospheric Protective Ensemble (SCAPE), Hazardous Waste Operations and Emergency Response (HAZWOPER), NASA Soldering, NASA Crimp and Cabling, Department of Transportation Commercial Driver's License with hazardous endorsement, tubing fabrication, medium pressure fittings, and orbital tube welding.

The Contractor's maintenance and sustainment activities 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
- 1194.23 Telecommunications products
- 1194.24 Video and multimedia products
- 1194.26 Desktop and Portable Computers

The contractor's maintenance and sustainment efforts shall comply with requirements from NASA Procedural Requirements (NPR) 7123.1 NASA Systems Engineering Processes and Requirements, 7150.2 NASA Software Engineering Requirements, STD 8739.8 NASA Software Assurance Standard, and STD 8719.13 NASA Software Safety Guidebook. The contractor is responsible for providing requirements associated with life cycle phases (typically operation and maintenance) for Class B to E software. The contractor's maintenance and sustainment efforts shall support 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. As of this SOW release date, the current version of all standards and procedural requirements listed above are to be used.

The contractor is not responsible for the permanent buildings located at WFF, Alaska, or Bermuda that house the majority of the range instrumentation support systems. The contractor is responsible for various containers for mobile instrumentation, equipment, and/or systems. The Wallops Institutional Consolidated Contract (WICC) provides typical institutional services for buildings at the Wallops Flight Facility.

Other traditional institutional services such as physical security, shipping, etc., are provided by the WICC contractor unless otherwise stated in this Statement of Work (SOW).

Performing Range Safety functions is not the responsibility of the contractor. However, many systems that are used by Range Safety personnel shall be maintained, sustained and sometimes operated by the contractor.

3. PROGRAM MANAGEMENT

Program Management shall be proposed by the contractor for each task initiated under the contract. The program management required for the contract will not be initiated under a separate task order.

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 decisions (real time, if required) 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, range projects management, continuous risk management, contract management, material management, cost control management, operations and future planning, contract administration, performance measurement, mission setup, quality control, data management, integrated logistics support, property management, facility management, employee safety, and employee training programs.

The contractor shall review and develop draft directives, monitor work in progress and coordinate with designated Government interfaces or other vendors and contractors.

The contractor shall develop and implement an innovative management philosophy to meet evolving mission requirements for the Wallops Range and its customers. Customers include NASA, other Government Agencies and commercial entities with range requirements. The customers' requirements are defined and provided by the Contracting Officer's Representative (COR), NASA WFF Range and Mission Management Office, or NASA WFF Project Managers

The contractor shall establish, maintain, and implement a Quality Assurance Plan (QAP) to ensure compliance with quality management requirements in this SOW and/or established by the contractor. The QAP will be an attachment and become part of the contract.

The contractor shall establish and maintain a quality management program that facilitates the accomplishment of total work responsibility including management and technical interfaces between the Government and the associated customers and other contractors. The quality management program shall document and implement a quality system that substantiates that all products and services conform to contractual requirements.

A Risk Management Plan, including how the contractor will be performing continuous risk management, shall be delivered by the contractor with their proposal. Continuous risk management practices shall be documented, implemented, and evaluated for effectiveness.

The contractor shall establish and maintain a work control system as part of their overall quality management system. This system shall use appropriate work authorization documents to provide adequate controls and reports, ensuring effective, efficient, and prompt responses to workload requirements and proper reporting of costs incurred. 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 electronic data in Maximo® upon contract completion.

The contractor shall adhere to NPR 7120.5E, NASA Space Flight Program and Project Management Requirements for operations, maintenance, and sustaining engineering activities. Missions supported may involve NPR 7120.5E, NASA Space Flight Program and Project Management Requirements or NPR 7120.8, NASA Research and Technology Program and Project Management Requirements. Additional management standards required to be followed will be defined in mission specific requirements documents and NASA project plans.

Mission specific management standards will be defined in mission specific requirements documents and project plans.

The contractor shall develop and maintain a Program Management Plan (PMP) for tracking programs supported, range services customer requirements, services provided, maintenance activities, actual labor hours, material costs, special projects, work requests, configuration management, and other areas the program office requires 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. The completed PMP shall be delivered with the proposal and the plan shall be updated and delivered to the COR and Chief of the Range upon completion of each contract year. The Government will retain ownership of all PMP related data in an electronic, open source format upon contract completion.

3.1 Program Management Reporting

3.1.1 Weekly Activity Report

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

The WAR shall include a forecast of the technical operations, maintenance and sustainment engineering work, as well as planned system downtime that will be accomplished during the following week.

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

The WAR shall be delivered no later than Noon every Wednesday unless otherwise defined by the Chief of the Range.

3.1.2 Monthly Status Report

The overall program management status shall be provided to the COR and RMMO management as a Monthly Status Report (MSR), in PowerPoint with specific content identified below and updated over the course of the contract life as defined by the COR and RMMO management. The MSR shall be delivered electronically by the 28th of each month unless otherwise defined by the COR and RMMO Management.

The MSR shall be provided electronically and, at the option of RMMO management, be presented monthly to an audience defined by the Government.

If the task order defining the work 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 shall contain the following information:

- Covers significant contract activities;
- Consolidated report of sustainment 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 sustainment engineering effort using the NASA/GSFC Problem/Issue/Risk RYG definitions and presentation process defined by the Chief of the Range;
- Contract performance metrics;
- Discrepancy Report (DR) status;
  - Average open time for DRs assigned to the contractor
  - Worst case open time for DRs assigned to the contractor
- Status of Deliverables;
- Plan for large (over $50K) material purchases (including purchase date, invoice date, and cost);
- Develop schedule for each mission/project with key milestones;
- Major accomplishments for each mission/project;
- Mission/project priorities;
- Staffing changes with justifications/reasoning;
- New Mission/projects as a Result of Government Request or contractor initiated effort;
- Cancellation or Postponement of Mission/projects with Justification/Reasoning;

- Outdated systems recommended for consideration by RMMO for upgrade along with rationale such as lack of vendor support, low reliability (high failure rate), high maintenance costs, etc.;
- Proposed maintenance or sustaining activities along with personnel resources applied to each activity, materials, implementation schedule and estimated costs;
  Note: given that it is difficult to accurately forecast precise operational mission schedules (and therefore costs associated with overtime, premium, and travel), it is critical for the contractor carefully consider and plan for wide variations in available funds for maintenance and sustaining activities and to plan for likely contingency scenarios.
- Current and projected period of performance end cost and obligation variance;
- Monthly Range Summary Schedule defining additions or deletions since the last report as well as completed mission/projects and activities.
- Instrumentation System Availability (see Section 3.3.1)

3.2 Mission Preparation Products and Reviews

For each mission assigned, the contractor shall provide a plan to the NASA Project Manager that describes in detail how they will meet mission operational requirements.

The contractor shall participate in meetings and reviews as requested by the Government to ensure adequate communication to range operations personnel, NASA and Wallops Range customers. Participation may occur as part of a combined NASA/contractor team and may involve other contractors. Examples of the meetings and/or reviews requested by the Government are:

- Monthly Engineering Status Review (MESR)
- Weekly Range Instrumentation Working Group (RIWG)

Unless mission specific requirements dictate otherwise, the contractor shall provide a single review spokesperson, typically the RSM, defined in Section 4.1, covering all areas of instrumentation; however, each operational area lead shall be present during all formal reviews to answer detailed questions as needed.

3.2.1 Instrumentation Support Review

In support of the NASA Project Manager, the contractor shall present at a boarded NASA Instrumentation Support Review (ISR) for each mission. The ISR shall be held prior to Range Readiness Review to provide a detailed implementation plan to meet mission operational requirements of all in-scope activities.

At the ISR, the contractor shall clearly define their understanding of pertinent mission requirements and the implementation plan to meet the mission's operational requirements. The contractor shall seek concurrence from the review board to move forward with the proposed implementation plan to satisfy mission operational requirements.

The ISR, as defined in mission specific documents, shall provide a brief overview of the mission, mission operational requirements, range instrumentation systems and configurations to satisfy the requirements, first use items, planned deliverables, applicable issues, and risk associated with each major function of the plan.

3.2.2 Range Readiness Reviews

In support of the NASA Project Manager, the contractor shall be 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, primary and backup equipment for major Range instrumentation service areas, and how the systems and personnel were verified as being ready to support the mission's operational requirements.

The RRR, as defined in mission specific documents, 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 and their complexity (number of, effort required to close, substance)

At the RRR the contractor shall present the results of system 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.

3.2.3 Launch Readiness Reviews

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

At the LRR, the contractor shall present the status of systems and personnel readiness to support the mission's operational requirements.

The contractor shall present any system or personnel modifications/changes since the RRR.

3.2.4 Post Mission Summary Report

The contractor shall provide a Post Mission Summary Report (PMSR) to the Chief of the Range within 15 business days following the completion of a simple mission and 30 business following the completion of a complex mission. Mission complexity and completion will be defined in mission specific requirements documents or by the Chief of the Range. Critical components of the PMSR shall be at least the following:

- Results that include the performance of prime and backup systems and includes formal post-mission summary reports
- Work performed
- Lessons learned
- Results obtained
- Recommendations
- Assessment of performance against mission success criteria

3.3 Performance Metrics and Reporting

Additional mission-specific performance metrics beyond those defined in Section 3.2 will be defined in mission requirements documents or in specific IDIQ task orders.

3.3.1 Instrumentation System Availability

The contractor shall collect and provide monthly systems availability metrics, 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. Planned system downtime shall be authorized by the Range Chief. 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 the mission.

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

The systems, including any accompanying instrumentation systems/trailers, that at a minimum shall be reported for availability metrics are as follows:

- Fixed Telemetry 7.3-meter System #1
- Fixed Telemetry 7.3-meter System #2
- Fixed Telemetry 10-foot System
- Fixed Telemetry 8-meter System
- Fixed Telemetry 9-meter System
- Fixed Telemetry Redstone 9M-1 (at PFRR Alaska)

- Fixed Telemetry Redstone 9M-2 (at PFRR Alaska)
- Fixed Telemetry 11M (at PFRR Alaska)
- Mobile Telemetry 8-meter System (at PFRR, Alaska)
- Mobile Telemetry 20-foot System
- Mobile Telemetry 7-meter System #1
- Mobile Telemetry 7-meter System #2
- Mobile Telemetry 10-foot System
- Mobile Telemetry 20-foot System
- Mobile Telemetry 40-foot System
- LowG1 (2.4M) Antenna
- LowG2 (2.4M) Antenna
- Mobile Integrated Telemetry System (MITS)
- Mobile Power Systems
- Fixed Radar #3
- Fixed Radar #5
- Fixed Radar #18
- Doppler Radar Systems
- ASR-8
- LSTAR (at PFRR Alaska)
- SPANDAR Radar System
- UHF Radar System
- Mobile Radar #2
- Mobile Radar #8
- Mobile Radar #10
- Mobile Radar #11
- Mobile Command Systems
- RADAC System
- Fixed Command System (U-55 Building Systems)
- WISSRDS Sea Surveillance Radar System (X-band and S-band)
- Mission Graphics System
- Wind Weighting System
- Master Timing System
- RF Communication Systems
- RFDF/EMCON Systems
- NASCOM
- Meteorological Systems
- Optical Systems
- STING Surveillance System
- Ship Surveillance System
- Range Data Systems (such as VTARS, RAPS, STARSS, PCDQS, PCGDS)

The contractor shall present this list to the Range Chief and Range Chief Engineer for their review and approval annually.

3.3.2 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. Assurance activities for maintenance and sustaining are tailored based on the classification and criticality of hardware and software systems. NASA directives list requirements for both the software acquirer (e.g., NASA) and the software provider (e.g., the contractor).

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 documents 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 contactor 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.

3.3.3 Radar Systems Performance

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:

- ±0.10 milliradian for Radar #5
- ±0.15 milliradian for Radar #18
- ±0.20 milliradian for Radars #3, #10, #11
- ±0.25 milliradian for Radars #2, #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 Range Control Center;
- Quality of recorded data;

Radar operations services reporting shall be included in the PMSR.

3.3.4 Telemetry Systems Performance

The telemetry systems shall perform the following performance testing and report monthly or as required by mission specific requirements documents:

- G/T
- EIRP
- Error gradient (tracking error)

The results shall meet minimum specifications for each system.

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
- Quality of recorded data

3.3.5 Mission Success Criteria

The success criteria requirements that shall be met by the contractor and demonstrated by reporting specific performance metrics as defined in this SOW are:

- Metric tracking, range safety, surveillance, telemetry, command and control, and other instrumentation objectives shall be satisfied for each mission. The primary equipment shall perform without data loss impacting mission objectives, resulting in unplanned safety risks or missed surveillance targets for each mission. The trend over time shall show a reduced dependence on backup instrumentation equipment for assuring mission success. Over time the requirement for backup equipment shall be reduced, lowering the cost of operations and maintenance and increasing availability of equipment for parallel missions. These trends shall be documented and demonstrated to the Government to achieve comprehensive success.

- No mission delays or unplanned safety risk occur due to instrumentation, project management, preventive maintenance, configuration checkout, and operational procedures are performed per approved plans. Critical maintenance and sustainment shall be completed with adequate time to test prior to the mission utilizing the change as demonstrated with a regimented project management approach.

- Operations, maintenance, and/or sustainment cost savings are identified and realized.

- New, mission specific operational systems are transitioned into use with no delays or unplanned risks.

3.4 Configuration Management

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

The contractor shall comply with 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 Range Operations Management System (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.

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

3.5 Alternate Facilities Operations

The contractor shall provide Alternate Facilities Operations Manager (AFOM) services by acting as Alternate FOMs for certain Wallops Range facilities.

Contractor Alternate FOMs shall be recommended by the contractor and approved by the Range Chief.

The duties associated with being an Alternate FOM are minimal and can be accomplished by existing contract personnel residing at those respective locations. AFOM duties are described in GPR-8830.1A.

Any required training for these positions will be provided by the Government.

3.6 Health and Safety Management

A comprehensive and proactive health and safety 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 health and safety or environmental infractions caused by the contractor's negligence.

Contractor shall comply with all applicable NASA and Occupational Safety and Health Administration (OSHA) standards related to smoking while on duty. Compliance with all posted signs is mandatory.

3.7 Physical Security Management

The Contractor shall safeguard all Government property provided for contractor use in accordance with the clauses of this contract.

Government facilities, support equipment, and material shall be secured when not in use. The GSFC Security Manual, GHB 1600.1, will be utilized in evaluating performance under this requirement.

3.8 Human Capital Management

The contractor shall provide qualified personnel with the necessary training, 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.

The contractor shall abide by all work-hour limitation rules in accordance with NASA Procedural Requirements (NPR) 1800.1 NASA Occupational Health Program Procedures, for their own employees and manage within these bounds to maintain service availability.

Normal duty hours of operation shall be 0800 – 1630 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.

Contractor personnel are required to travel as directed. 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 conducted accordance with applicable Federal, Joint, State Department, and NASA Travel Regulations (NPR 9700.1 and NID 9700.2) as applicable for each travel destination unless a deviation is requested and approved by the Contracting Officer. All Contractor personnel travel requirements shall be the responsibility of the Contractor including medical certifications, immunizations, passports, ticketing and transportation, and lodging.

Appendix A (NID 9700.2): FMR NASA Federal Travel Regulations Supplement (NFTRS) Chapter 301 Subpart C: Reduced Per Diem is applicable to this contract.

3.9 Special Considerations

The contractor shall obtain all licenses and permits required for the performance of this contract.

Unless otherwise stated in this SOW, the contractor shall provide, upon completion of Phase In, the list of recommended special equipment/operations capabilities requiring specialized licensing, permits, training and certifications, and the proposed method and schedule for obtaining them.

All personnel proposed shall have at a minimum, a National Agency Check (NAC), or current equivalent as required by HSPD-12, either completed or in process.

Certain mission data such as flight profile data, vehicle radar signatures, vehicle performance data, etc. are known classified data for certain missions. Contract personnel likely to be exposed to classified data or to work closely with NASA and their customers for requirements planning, etc., shall have at least a SECRET-level security classification to meet unique classified mission requirements support at the Wallops Range unless otherwise approved by the Government.

In accordance with HSPD-12 and NASA processes, the contractor is responsible for completing all visitor requests for any individuals requiring access to NASA facilities or requiring access to Government IT systems in support of assigned tasks and for completing/supporting any associated access support requirements (such as visitor escort requirements, etc.).

The contractor shall provide personnel to support incident response and mishap investigations as required in accordance with NPR 8621.1.

3.10 Financial Management

The contractor shall participate in a monthly Financial Status Review to provide financial status and planning to support 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 will include all formulas and work products associated with the final product as directed by the COR and shall be in accordance with the budget or and reporting format specified by NASA.

3.11 Education and Outreach

The Education and Outreach program is part of a Wallops-wide effort to inspire the next generation of explorers and engineers through communications and opportunities offered in the rich hands-on environment at WFF. Wallops supports NASA's strategic objective to share NASA with the public, educators, and students to provide opportunities to participate in our Mission, foster innovation, and contribute to a strong national economy.

The Contractor shall support various conferences, events and activities related to education and outreach.

The Contractor shall provide support including informational booths and associated equipment from Wallops' programs at conferences. Informational booth support includes building, expanding, or modifying a booth; storing the booth offsite; shipping/transporting the booth to and from conference sites; set-up, staffing, and tear-down of the booth at conferences and other events.

The Contractor shall implement an Internship program that includes various career fields across the Wallops Range.

4. INTEGRATED RANGE SERVICES MANAGEMENT

The contractor shall use and maintain the Government-owned Range Operations Management System (ROMS) that enables accurate, timely, and coordinated project planning, and is accessible by authorized personnel.

The contractor shall have a process to allow efficient access and control of tracking and reporting systems by the contractor and the Government.

The ROMS shall support planning, budgeting, performance measurement, resource obligations, Range mission and operational requirements, Range system improvement efforts, and special projects as requested by the Chief of the Range.

The contractor shall provide range scheduling services for Wallops Range mission activities that are conducted at the WFF and at other ranges that are established or exist worldwide. The contractor shall support other Wallops organizations operational scheduling as required. Non-Range operational activities will include sounding rockets, aircraft, balloon, and special orbital and suborbital projects deployments and operations.

The contractor shall respond to range schedule requests from NASA Range Project Managers and the NASA WFF Test Directors. The response will include confirmation of receipt and any impacts to current operational plans.

Range scheduling services shall include:

- assigning unique project numbers to Wallops Range missions
- tracking project start/stop dates for the Wallops Range monthly calendar
- integrating Sounding Rocket, aircraft (including UAS), balloon and other suborbital and special orbital project schedules into the range schedule
- scheduling individual Wallops Range assets/resources for specific project requirements so resource deconfliction can occur
- assisting with frequency coordination by scheduling operational frequencies in use and reporting potential conflicts to the Government
- distribution of the above products to enable tracking and scheduling facilities maintenance schedules around mission operations and these services shall include scheduling project reviews, and presentation of any above information at various meetings and reviews.

ROMS schedules shall include comprehensive Wallops Range mission instrumentation systems preparation and implementation milestones in support of Range operations.

The Government shall retain conflict resolution authority for the operations schedule whether that is an automated de-confliction process or manual. Any conflicts shall be identified by the contractor to the Government for resolution in a timely manner to ensure mission operations commitments.

As an integral part of the ROMS system, the contractor shall provide controlled access to Government-defined personnel to view range resources.

The contractor shall consider use of the Government-provided Operations Tracking System (OTS) and work with the Government to implement and integrate OTS in ROMS.

The resources to be scheduled include various processing facilities, range instrumentation systems, frequencies, buildings/labs, runways, hangars, control centers, launch pads, etc.

The system shall describe scheduling-specific requirements and project nomenclatures such as unique project numbers, project names, NASA project manager, contractor Range Services Manager, etc.

The system shall incorporate a highly capable query search tool to enable display and print of queried data in an electronic non-proprietary format.

In addition to the delivery methods/requirements defined, all activity reports and review documentation defined in this SOW shall be uploaded to the ROMS.

To communicate the next day's range operations schedule, the contractor shall prepare the Wallops Daily Range Schedule, load it on a Government-defined server and provide a link via email each afternoon for a Chief of the Range-approved distribution list.

ROMS shall list major range instrumentation systems that are unavailable due to maintenance or are off-line for whatever reason for greater than one day.

ROMS shall define when the equipment/system is scheduled to come back on line (or an estimate if evaluations are not complete).

The contractor shall document in ROMS desired systems/process enhancements for the Wallops Range as they are realized as a result of DRs, Lessons Learned, etc.

To maintain continual quality of services improvement, the contractor shall utilize the electronic Discrepancy Report (DR) entry and tracking system as part of the ROMS.

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

DRs shall be generated by the contractor or NASA, under the current CM process, in the event of a process failure, system or subsystem malfunction, or operator error. A DR shall be written whenever it is noticed that equipment, a process, or personnel have not performed as expected. This may occur during simulations, preventive maintenance, or during a mission.

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

Once a DR is resolved it shall be closed out within 12 hours of resolution.

4.1 Operations Project Management

For the purposes of this document, the following definitions apply:

- Operations – to turn on; to control the function of a system per existing procedures and obtain output.
- Maintenance – to enable a system to continue functioning (e.g. lubricate, calibrate, and repair) per existing procedures and parts.
- Sustainment – to repair and maintain with new parts or subsystems but operating procedures do not change and no new capabilities are added.
- Engineering Development – Upgrades to existing systems that add capabilities, including new parts and procedures. Engineering Development is typically led and provided by the Wallops Civil Servant Engineering Organization (Code 500). Engineering Development support may be in the scope of work of this contract with the permission of the COR and Chief of the Range after discussions with Range Chief Engineer.
- Technology Development – Upgrades to existing systems or wholesale development that adds or develops capabilities or technologies that exceed the current state of the art or changes that are considered revolutionary, rather than evolutionary, to systems. Technology Development is not in the scope of work of this contract.

To ensure thorough and effective operations planning and systems integration, the contractor shall provide management of mission-specific operations teams and services.

The contractor shall support the NASA WFF Project Managers as a member of the project team and assist NASA WFF Project Managers in the technical development and establishment of a formal NASA project-specific support document as required. NASA WFF Project Managers are primarily in the Wallops Range and Mission Management Office but may come from other WFF organizations.

The contractor shall support overall project leadership in identifying NASA WFF customer requirements, providing required documentation, reviews, and approvals with the assignment of contractor Range Services Managers (RSMs).

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

Under the leadership of the assigned RSM, the contractor shall support all NASA WFF paneled reviews per the direction of the NASA WFF Project Manager and/or the Chief of the Range. Examples of these reviews are:

- Operations Concept Review (OCR)
- Operations Requirements Review (ORqR)
- Instrumentation Support Review (ISR)
- Range Readiness Review (RRR)
- Launch Readiness Review (LRR)
- Operations Readiness Review (ORR)

In addition to reviews as directed by the PM, the contractor shall plan and conduct the mission/project-specific reviews to ensure quality and completeness of operations planning and preparations. Examples of appropriate reviews are:

- Pre-Ship Review
- Deployment Readiness Review
- Systems and Personnel Readiness Review
- Discrepancy Report Review
- Lessons Learned Review

The Chief of the Range or PM will dictate operations support requirements to the RSM and the RSM shall manage the range contract services specific to the mission from requirements identification phase through post-flight support phase.

The contractor shall develop a technical service approach and document a support plan for each operation.

Through insights obtained during operations, the contractor shall provide recommendations for operational and technological improvements of range services and/or systems.

The contractor shall present proposed operational support plans in formal reviews and at related meetings.

The operational plans proposed shall support the cost estimate provided to the Government and define gaps in mission support capabilities versus requirements.

The contractor shall produce reliable, accurate, and timely labor hours, materials, and travel cost estimates to support customer planning and execution and track and report the status of these elements in various forums and reports.

Certain individual missions included within IDIQ Task Orders will require similar cost estimates and for those missions work orders will be generated.

The contractor shall generate and provide cost estimates for their services for mission-specific Wallops Range customers within 15 days of Government request unless a different delivery schedule is mutually established.

Cost risks and issues shall be reported by the RSM in various reviews with reports delivered to the Chief of the Range and NASA WFF PM on a schedule based on the project operations requirements.

The contractor shall support the NASA Project Manager in the development of an Operations Directive (OD) for each 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
- Event Timeline
- Radar
- Telemetry
- Other Instrumentation Systems as required
- Timing
- Command
- Communications
- Meteorology
- Optical And Television
- Range Control Center
- Mission Operations Control Center
- Range Data Systems (RADAC, Mission Graphics, VTARS)
- Surveillance Systems
- Services – Security, Crash, Fire & Rescue, Medical, Public Affairs, Utilities

- Special Operational Procedures
- Go/No Go Criteria
- Countdown
- Acronyms And Definitions

5. RANGE SERVICES

5.1 Maintenance and Sustainment Services

For the purposes of this document, the following definitions apply:

- Operations – to turn on; to control the function of a system per existing procedures and obtain output.
- Maintenance – to enable a system to continue functioning (e.g. lubricate, calibrate, and repair) per existing procedures and parts.
- Sustainment – to repair and maintain with new parts or subsystems but operating procedures do not change and no new capabilities are added.
- Engineering Development – Upgrades to existing systems that add capabilities, including new parts and procedures. Engineering Development is typically led and provided by the Wallops Civil Servant Engineering Organization (Code 500). Engineering Development support may be in the scope of work of this contract with the permission of the COR and Chief of the Range after discussions with Range Chief Engineer.
- Technology Development – Upgrades to existing systems or wholesale development that adds or develops capabilities or technologies that exceed the current state of the art or changes that are considered revolutionary, rather than evolutionary, to systems. Technology Development is not in the scope of work of this contract.

The contractor shall provide all aspects of maintenance and sustainment to ensure the readiness of existing systems and provide recommendations that lower maintenance and operations costs and describe capability gaps that could be addressed by upgrades or the next generation of range systems.

Maintenance and sustainment services shall be applied to existing fixed and mobile Wallops Range systems and capabilities.

Maintenance and sustainment services shall include DR analysis, hardware and software maintenance and sustainment support, operational and acceptance test support, system maintenance plan generation and analysis, network security compliance, systems administration, configuration management, and new project/requirement assessment, including Radio Frequency link analysis for range systems and operations.

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

The contractor shall utilize streamlined maintenance and sustainment 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 or exceeds manufacturer's 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 system assessments necessary to provide effective maintenance and sustainment reporting at various reviews defined in Sections 3 and 4.

The WFF 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 the range instrumentation systems along with the estimated costs per year to implement the approach and justification of the choice made.

If the contractor chooses to utilize the IRSP for systems other than radars (radars are required to utilize the IRSP for DLM activities), these estimated costs and justifications for approach shall also be defined.

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 shall be approved by the COR and RMMO Management.

As systems age, the need and opportunity for incorporating state-of-the-art system upgrades increases. The contractor shall identify and recommend range technologies and systems that would enhance the WFF Range.

The contractor's maintenance and sustainment efforts shall comply with requirements from NASA Procedural Requirements (NPR) 7123.1 NASA Systems Engineering Processes and Requirements, 7150.2 NASA Software Engineering Requirements, STD 8739.8 NASA Software Assurance Standard, and STD 8719.13 NASA Software Safety Guidebook. The contractor is responsible for providing requirements associated with life cycle phases (typically operation and maintenance) for Class B to E software. The contractor's maintenance and sustainment efforts shall support 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. As of this SOW release date, the current version of all standards and procedural requirements listed above are to be used.

5.2 Range Engineering and Technology Development

This contract scope of work does not perform independent engineering or technology development. However, as the operator and maintainer of such new systems, the contractor has a role in the development of requirements and testing of new operational systems.

The contractor shall provide support to NASA WFF Engineering Project Managers engaged in full life-cycle engineering services to ensure systems are able to meet NASA and customer requirements, evolve new capabilities and improve the operational support process, solve system problems, and identify and reduce system risks. Such support may include:

- Example 1. Support various NASA engineering reviews such as:
    - Systems Concept Review (SCR)
    - Systems Requirements Review (SRR)
    - Preliminary Design Review (PDR)
    - Critical Design Review (CDR)
    - Acceptance Test Readiness Review (ATRR)
    - Operational Readiness Review (ORR)
- Example 2. Identification of capability gaps
- Example 3: Trade studies and assessments
- Example 4: Transition of systems planning and testing
- Example 5: Operational requirements development

The contractor shall support NASA Project Managers and/or NASA Engineering Leads in systems engineering and management for development of operational requirements and delivery of various Range systems, tools, and/or services for the Wallops Range, as requested by the NASA PM, Engineering Lead, or RMMO Management.

The contractor shall support integration of Range systems, tools, and/or services into Wallops Range infrastructure by providing the NASA PM or Engineering Lead with operational, maintenance, or sustainment requirements and assisting with transitioning the system, tool, or service to operations.

The contractor shall support RMMO interfacing with other ranges and organizations in identifying and assessing Range system, tool, or service options.

5.3 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 so as not to cause undue delay to Government's ability to provide services.

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

Transitioned systems shall be documented and configuration controlled upon receipt for operation.

In some cases, for more complex, more expensive, and highly critical systems, these new systems may be implemented and/or transitioned under a stand-alone IDIQ task. 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.

5.4 Telecommunications Engineering

The contractor shall provide data center support and IT Project Support/communications services and materials in support of Wallops range customers and mission requirements.

The contractor shall maintain IT security services and provide COMSEC services to Wallops personnel and Range customers as required, including provision of access to secure communications networks such as SIPRnet and other similar networks

The contractor shall maintain configuration management of telecom systems under their control.

5.5 Information Technology and Range Network Engineering Services

The contractor shall comply with Information Technology (IT) security standards in accordance with Federal Information Security Management Act (FISMA) policies and 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 Continuous Monitoring and recertification activities, evaluating information system risk management, and supporting external audits during the contract in accordance with NPR 2810.1, Security of Information Technology.

The contractor shall provide network maintenance and sustainment 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, monitoring during operations and configuration management. All systems obsolescence or mission unique requirements gaps shall be identified and communicated to the Government for evaluation and resolution. The contractor shall provide services including installing, maintaining, and supporting computer communication networks for Wallops Range operations.

The contractor shall operate, maintain, and sustain NASA Communications (NASCOM). NASCOM is the capability that provides the primary interface with internal and external

Range Control Center (RCC) communications, as well as the control for data distribution within the RCC.

The contractor shall operate, maintain, and sustain the primary support instrumentation based in NASCOM, listed below:

1. Communications interface to external points and distribution of RCC communications including telephone, video, range intercom, remote radio circuits, command remote, tone keying, timing data, Radar data, Telemetry data and Technical Control
2. Data analyzers, recording systems, patch panels, distribution amplifiers, voice bridges, analog and digital multiplex and demultiplex equipment, modems, and associated test equipment
3. Fiber optic cable system interface, which supports video, high-speed data, and access to the WFF LAN
4. Video Switching and Recording systems
5. Technical Control access, which provides real-time voice and data communications with other locations through the Technical Control network
6. Programmable intercom for range communications, which provides patchable radio, telephone, SCAMA (Switching, Conferencing, and Monitoring Arrangement), and range operations channels

6. TELEMETRY OPERATIONS SERVICES

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. Training and certification for operations, installation, sustainment, and maintenance shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for a particular telemetry system, for a defined mission, event, or timeframe.

Telemetry services shall include receiving, decoding, recording, relay and display of telemetered data from aircraft, Unmanned Aerial Systems (UASs), sounding rockets, Expendable Launch Vehicle (ELVs), balloon payloads, ground test articles, and satellites.

Each fixed or mobile telemetry systems (single receiving aperture) shall be capable of supporting requirements of one or more 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 distribute telemetry data to NASCOM and other distribution points as required by each mission.

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.

6.1 Mobile Telemetry Operations

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 provide support from Wallops or at deployed locations worldwide.

Mobile operations shall include personnel travel and services in remote locations worldwide with varying lengths of deployment time.

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

The Poker Flat Research Range (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.

The contractor shall support remote campaigns and associated mobile range operations annually and shall support these remote operations 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) or the operation of a combination of at least three mobile or fixed systems at the PFRR.

Maintenance trips to remote sites 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 remote sites shall remain at that site unless otherwise directed by the Government.

7. RADAR OPERATIONS SERVICES

The contractor shall operate, install (as required), sustain, and maintain available radar instrumentation and provide trained and certified radar operations staff. Training and certification for operations, installation, sustainment, and maintenance shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for a particular radar, for a defined mission, event, or timeframe.

The contractor shall provide Radar Operations Services for the Wallops Range locally and at other Wallops Range instrumentation sites that are established worldwide.

Radar services may be required simultaneously for various missions based on mission schedules as defined in various Task Orders and Work Orders.

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, Doppler radar systems, Radar Transponder Flight Systems, and LIDAR.

Radar 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.wff.nasa.gov/code840/

Radar operations services mission reporting shall be incorporated into the PMSR. However, quick look data reports shall be provided to the RMMO Management, NASA Range Project Manager, and RSM or Range Chief Engineer on request within a time period defined by the NASA PM.

7.1 Precision Tracking Radar Operations

The contractor shall provide radar operations services for a Wallops Range local mission requiring both fixed and downrange 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.

7.2 Surveillance Radar Operations

In support of launches at WFF 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.

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

7.3 Research Weather and Science Radar Services

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 systems located on the Wallops Mainland, two mobile research radars, TOGA and NPOL, shall be supported by the contractor on a non-interference basis and with no additional staffing attributable to these systems.

If additional support is required in support of these two systems, a separate IDIQ task order will be issued.

8. RANGE CONTROL CENTER AND MISSION OPERATIONS CONTROL CENTER SERVICES

8.1 Range Control Center Services

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 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 and Test Director area
- 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 security measures are required. This can include RF-shielded walls, encrypted communications systems, etc.

The contractor shall operate, maintain, and sustain all Wallops Range Control Center systems. Training and certification for operations, sustainment, and maintenance shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for a particular RCC system for a defined mission, event, or timeframe.

The contractor shall provide RCC services at Wallops and simultaneously for missions requiring support at remote locations per mission specific requirements.

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, including but not 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, or per mission specific requirements and/or Range or NASA Agency procedures, whichever is longer.

The contractor shall provide post mission data products to the NASA Project Manager and/or RMMO Management. Specific post mission data products, including formats and delivery requirements, will be defined by the NASA PM in mission specific requirements documents.

The contractor shall provide historical data in support of analysis as required by NASA Project Managers.

8.2 Mission Operations Control Center Services

The Mission Operations Control Center (MOCC) complements the operations, systems, and services occurring in the RCC. Data made available in the RCC is also available and displayed in the MOCC.

Systems supporting the MOCC offer real-time data display. 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 systems are protected using Uninterruptible Power Supplies (UPS) and backup power generators.

The MOCC is multi-functional, addressing all aspects of missions of varying levels of complexity. To support such a broad spectrum of need, the MOCC is comprised of

collocated but separate work areas devoted to the various range operations control functions including the following:

- Control Center 1: One of two main rooms of the MOCC, containing large screen video displays and mission controller consoles.
- Control Center 2: One of two main rooms of the MOCC, containing large screen video displays and mission controller consoles.
- Control Center 3: Smaller than Control Center 1 and 2, this center is useful for face-to-face and network communications. It contains two medium screen video displays on opposite walls and mission controller consoles.
- Meeting Space: Area where the range user can set up its team for flight operations.

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

The contractor shall operate, maintain, and sustain all MOCC systems owned by RMMO. MOCC systems owned by RMMO include but are not limited to:

- Video wall displays
- Video processing systems
- MOVE network communications system
- Range Mission Network systems

Training and certification for operations, sustainment, and maintenance shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for a particular MOCC system for a defined mission, event, or timeframe.

The contractor shall provide MOCC services at Wallops and simultaneously for missions requiring support at remote locations per mission specific requirements.

The contractor shall provide historical data in support of analysis as required by NASA Project Managers.

8.3 Range Data Processing and Display Operations

The existing Radar Data Acquisition Computer (RADAC) ingests positional data and processes it in real time. Radar slaving data is also ingested.

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.

The contractor shall operate, maintain, and sustain the RADAC system which includes but is not limited to: performing data ingestion, conversion, display, and reduction of various types of positional data.

The contractor shall operate, maintain, and sustain custom software applications provide parameters necessary to determine present position, predicted impact position, state vectors, and occasionally orbital elements.

In certain circumstances, the contractor will be required to operate, maintain, and sustain plug-in type modules that are used to enable special functions such as vehicle guidance, vectoring payload recovery vehicles, or tracking balloons.

The contractor shall configure the RADAC and other data processing and display systems for each mission per mission specific requirements.

The contractor shall test the mission configuration of the RADAC system and other data processing and display systems for each mission and report readiness for mission support and operation.

The contractor shall archive processed data on the system's hard drive and may be required to further reduce per customer specifications.

The contractor's operation, maintenance, and sustainment activities shall be accomplished through use of various computer and display systems with variable levels of service.

Development and lab computers exist that are functionally equivalent to the operational DQCA and DQCB computers. Software modifications for the purposes of maintenance or sustaining engineering 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 be used for sustaining engineering testing without explicit NASA approval and oversight.

8.4 Range Data Systems

The contractor shall operate, maintain, and sustain all Range Data Systems. Range Data Systems include, but are not limited to:

- VTARS (Vehicle Telemetry and Range Safety)
- RAPS (Radar Auxiliary Processing System)
- STARSS (Space vehicle radar Target Acquisition & Transmission Replacement System)
- PCDQS (Personal Computer Data Quality System)
- PCGDS (Personal Computer Graphical Display System)

The contractor shall operate, maintain, and sustain custom software applications that are part of any Range Data System to provide parameters necessary for mission specific requirements.

In certain circumstances, the contractor will be required to operate, maintain, and sustain plug-in type modules that are used to enable special functions such as vehicle guidance, vectoring payload recovery vehicles, or tracking balloons.

The contractor shall configure required Range Data Systems and other data processing systems for each mission per mission specific requirements.

The contractor shall test the mission configuration of required Range Data Systems and other data processing systems for each mission and report readiness for mission support and operation.

The contractor shall archive processed data and may be required to further reduce the data per customer specifications.

The contractor's operation, maintenance, and sustainment activities shall be accomplished through use of various computer and display systems with variable levels of service.

The operational Range Data Systems, including both hardware and software, shall not be used for sustaining engineering testing without explicit NASA approval and oversight.

8.5 Range Surveillance and Recovery Operations

The contractor shall provide operations planning, management, oversight, implementation, and reporting on range air and sea surveillance and recovery activities. Training and certification for operations planning, management, oversight, implementation, and reporting shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for a particular surveillance and/or recovery operation, for a defined mission, event, or timeframe.

The contractor shall provide Surveillance and Recovery 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 surveillance and recovery provided services.

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

Except in cases where other Government agencies such as the US Coast Guard are providing services, the contractor shall provide all range 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 as specified in mission specific documents;
- Onboard Global Positioning System;
- Onboard Automated Information Systems (AIS);
- Marine band or more capable radio communications;
- Iridium Satellite Phone; and
- Carrying recovered payloads as specified in mission specific documents.

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 in Government (STING) 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 Government provided systems that enable 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.

Systems unavailability shall be reported to the NASA PM and RMMO Management and tracked within the overall operations reporting processes established by the contractor and/or defined in this SOW.

9. RANGE COMMUNICATIONS, TIMING, AND COMMAND SERVICES

9.1 Range Communications and Frequency Monitoring Operations

The contractor shall operate, maintain, and sustain range communications systems, timing systems, command systems, and frequency monitoring systems. Training and certification for operations, sustainment, and maintenance shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for a particular system (permanent or mobile), for a defined mission, event, or timeframe.

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 the Wallops Range, 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 UHF/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 WFF Spectrum Manager and/or the WFF Range Test 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 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.

The operations personnel assigned by the contractor to perform this function shall possess the radio operators licenses required to operate within the SHARES Program.

9.2 Air-to-Ground Communications Operations

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. Training and certification for operations, sustainment, and maintenance shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for air-to-ground communications, for a defined mission, event, or timeframe.

The existing UHF-Band voice system shall be maintained and operated at 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 NASA Integrated Services Network (NISN) voice/data circuits to provide connection to Mission Controllers at NASA's Johnson Space Center.

9.3 Command Operations

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. Training and certification for operations, sustainment, and maintenance activities shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for a particular command system (permanent or mobile), for a defined mission, event, or timeframe.

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 ranging from omni-directional to directional helix and quad helix configurations shall be utilized.

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, including the Omni-directional, single helix, and quad helix arrays.

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

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

9.4 Range Timing and Countdown Operations Services

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 Range fixed range sites 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 the Wallops Range.

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

10. 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
- Image archiving

10.1 Video/Photography Requirements

The contractor shall operate, maintain, and sustain photography, optical tracking, television, and production lab services at Wallops and at other ranges that are established worldwide. Training and certification for operations, sustainment, and maintenance activities of video and photography systems shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for a particular system (permanent or mobile), for a defined mission, event, or timeframe.

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, IT services, simulation and testing, logistics, documentation, and training and other related support services to support photography and video services function.

10.2 Optical Tracking Operations

Optical Tracking Systems shall be operated in their current location or deployed to support Sounding Rocket, target, UAS, 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.

10.3 Video Surveillance Operations

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 Project Manager, Test Director or Range Safety Officer.

Existing cameras and controllers in a variety of locations shall be operated, maintained, and sustained.

All surveillance 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.

10.4 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, UAS, target, drone, ELV, and aircraft missions.

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

10.5 Video Distribution Requirements

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 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.

10.6 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 operate, maintain, and sustain 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.

When a scanned image of an old film negative is used, the digital image database archive shall include a specific location 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.

11. METEORLOGICAL SERVICES

The contractor shall operate, maintain, and sustain Meteorological Services at the WFF and at other ranges and mobile deployments worldwide. Training and certification for operations, sustainment, and maintenance shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for a particular system (permanent or mobile), for a defined mission, event, or timeframe.

Meteorological services shall be provided at the WFF 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 WFF closed circuit television system.

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.

Twice-daily balloon soundings of the upper atmosphere and associated surface observations shall be provided at midnight and noon GMT, seven days per week, in compliance with the National Weather Service (NWS) Letter of Agreement (LOA) for Routine Upper-Air and Associated Surface Observations at Wallops Island and the Department of Commerce.

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 WFF and remote project locations worldwide.

The contractor shall provide preventive and corrective maintenance services for the Digital Ionospheric Sounding System (DISS) and Dynasonde systems located on the Wallops Main Base with major parts being provided by NASA.

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

The contractor shall provide meteorological forecasting services to meet mission requirements and propose personnel that 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.

The contractor shall ensure personnel that are responsible for making upper air and surface observations possess a National Weather Service "Certification of Observers."

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

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.

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 Surface Observation System (ASOS)
- Wallops Surface Observation System
- Digital Ionospheric Sounding System (DISS) – maintain and sustain ONLY
- Dynamic Sounding System (Dynasonde) – maintain and sustain ONLY
- Low Altitude Wind Measurement Systems (located on 300-foot tower on Wallops Island)
- Ceilometers
- Lightning Detection Systems
- E-field Measurement System
- Tethered Aerostats
- Associated Meteorological Systems at the Atmospheric Science Research Facility

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.

12. MOBILE ELECTRIC POWER and HYDRO-MECHANIC SERVICES

The contractor shall operate, maintain, and sustain Mobile Electric Power Services and Hydro-Mechanic Services at Wallops and at other ranges that are established or exist worldwide. Training and certification for operations, sustainment, and maintenance shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for a particular system, for a defined mission, event, or timeframe.

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, 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 hydraulically 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.

13. WIDE AREA NETWORK (WAN) SERVICES

The contractor shall operate, maintain, and sustain interfaces for all WAN services required to support the Wallops Range including Systems Administration of systems supporting LAN services. Training and certification for operations, sustainment, and maintenance shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for a particular system and/or service, for a defined mission, event, or timeframe.

The contractor shall work with the Wallops Flight Facility (WFF) Regional IT Services and Solutions Division, Code 780, to define requirements for Wallops Range missions requiring WAN services.

Code 780 will provide the actual WAN services providing communications to and from WFF, but the contractor shall provide mission WAN requirements to Code 780 and manage all WAN interfaces that reside in mobile and fixed range instrumentation and facilities operated by the contractor.

The contractor shall, for each site location, define WAN interfaces and lines of demarcation and develop and/or maintain a common-format Interface Control Document (ICD) between the WAN and that location.

The contractor shall ensure a consistent WAN baseline description of each interface at every site.

The contractor shall update and maintain the ICDs to ensure continued technical accuracy and submit revised ICDs as needed through the configuration control process.

The contractor shall document the interfaces only to the demarcation point of the services they are responsible unless tasked otherwise by the Government to perform this additional configuration management function.

The Contractor shall designate a WAN representative and an alternate for each site when missions are underway (with the Wallops location being defined as one site and remote locations being a separate site) who will serve as the site focal point for all WAN activity.

The WAN representative shall be responsible for scheduling maintenance periods during non-operational hours to perform approved maintenance activities and testing.

The contractor shall perform preventive maintenance activities at intervals determined by manufacturer recommendations and operational experience to ensure maximum equipment availability and reliability.

The contractor shall periodically review preventive maintenance procedures and results to ensure compliance and effectiveness and present recommended configuration changes using the configuration control process.

14. LOGISTICS SUPPORT SERVICES

The contractor shall provide Government property management and logistics services for all areas of the Wallops Range activity. Available capacity for logistical support may be made available to other WFF organizations.

The logistics function shall consist of research, procurement, and property and inventory support. Routine materials shipping, handling, and equipment calibration will be handled by Government on-site. With prior government approval alternative shipping, handling, and equipment calibration will be provided by the contractor.

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 shall be an attachment and become part of the contract.

14.1 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 WFF.

It shall be the responsibility of the contractor to initiate all required shipping documentation, 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 also 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.

14.2 Research and Procurement Services for Spare Parts

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.

It shall be the responsibility of the contractor to ascertain the current state of the spares pool by reviewing the Installation Accountable Government Property list.

14.3 Equipment Depot Services

The contractor shall manage and store equipment and supplies in locations that ensures instrumentation availability and security while minimizing storage space and personnel required.

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

14.4 Property Management Services

The contractor shall serve as Property Custodian and ensure 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 COR and Chief of the Range 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.

14.5 Equipment 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 WFF. For those calibration services not obtainable from the on-site Government-provided service due to technical or responsiveness requirements, with Government approval the contractor shall obtain or provide alternative calibrations services for those items. Such alternative calibration services may be made available to other WFF organizations as capacity is available.

14.6 Chemical Laboratory Services

Chemical laboratory services for vehicle, payload, and facility commodity sampling will be provided by the Government on-site. The contractor shall be responsible for ensuring all commodity samples are obtained and handled per Government approved procedures/directives and shall maintain appropriate levels of cleanliness during commodity handling. The contractor shall be responsible for obtaining and delivering samples to/from the on-site chemical laboratory at WFF. For those chemical laboratory services not obtainable from the on-site Government-provided service due to technical or responsiveness requirements, with prior Government approval the contractor shall obtain or provide alternative chemical laboratory services for those items. Such alternative chemical laboratory services may be made available to other WFF organizations as capacity is available.

15. 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

In addition to facilities listed, ground operations, maintenance, and sustainment shall include, but is not limited to, the following Ground Support Equipment (GSE) and mobile assets:

- Recharger
- RIX
- BA Trailer
- Clean Rooms
- Launchers
- Pressure storage vessels
- Pressure systems

Pressure storage vessels and pressure systems must meet performance specifications defined in National Consensus Standards and NASA Standard 8719.17 Requirements for Ground-Based Pressure Vessels and Pressurized Systems (PV/S).

15.1 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
    - Payload and/or Spacecraft Processing
    - Vehicle Processing
- Contingency Planning
- Special Agreements

- Deliverables
- Acronyms And Definitions

15.2 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
- Other associated structure(s) (i.e., flame deflector)

15.2.1 Launch Pad and Blockhouse Requirements

The contractor shall track, maintain, and provide sustaining engineering for government-owned rocket launchers permanently installed at Wallops. This includes preventative maintenance, functional tests, load tests, spare parts inventory, documentation, as required to support missions. Training and certification for operations, sustainment, and maintenance shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for a particular launcher, for a defined mission, event, or timeframe.

Other major launcher maintenance and refurbishment efforts are outside the scope of routine maintenance and configuration. Government-owned rocket launchers includes, but is not limited to, those listed Table 1.

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

Table 1. 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
- Other supporting systems as required for launch

To meet these requirements, the contractor shall operate, maintain, and sustain the systems and personnel required to launch rockets from the blockhouses. Efforts shall also include documenting the current configuration of blockhouse systems, corrective maintenance support, and proposing facility upgrades and sustainment efforts. Training and certification for operations, sustainment, and maintenance shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for a particular blockhouse, for a defined mission, event, or timeframe.

15.3 Vehicle Processing

Vehicles include aerospace vehicles such as rockets, launch vehicles, balloons, aircraft, and UAS, as well as non-traditional research vehicles such as land/sea surface vehicles and underwater robotic systems.

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

Vehicle processing is generally performed by the 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. Vehicle processing also includes detailed integrated vehicle testing with the range in preparation for launch.

Payload typically refers to the experiment or system-under-test carried or transported by the vehicle to its target operational regime. Regimes may include subsurface, atmospheric, or in-space.

15.3.1 Vehicle Processing Requirements

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

To meet these requirements, the contractor shall operate, maintain, and sustain the systems and personnel required to process various vehicles, though the most challenging are typically ELVs (Expendable Launch Vehicles) and their associated payloads at Wallops. Efforts shall also include documenting the current configuration of Wallops Range systems, corrective maintenance support, and proposing facility upgrades and sustainment efforts. Training and certification for operations, sustainment, and maintenance shall be made available to Government personnel as requested. At its

discretion, the Government may provide personnel to support any or all of the above functions for vehicle processing, for a defined mission, event, or timeframe.

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 but are not limited to: nitrogen rechargers, Liquid Nitrogen (LN2) Dewars, fueling waste tankers, box trucks, and 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 maintenance to include: clean room operation and maintenance, consumables, obtaining sample analysis for commodities and pneumatic systems, and verifying calibration and critical spare maintenance.

Sustainment, 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, payload, and vehicle processing in NASA facilities such as the HIF, PPF, and SFF are normally provided by the Government. At the government's discretion the commodities may also be provided by the contractor. The commodities include but are not limited to Helium, Liquid Nitrogen, Gaseous Nitrogen, Oxygen, and air. The scope of work shall also include managing commodity supply, and maintaining system cleanliness integrity and operability.

The contractor shall operate, maintain, and sustain precision cleaning services and equipment. Precision cleaning is defined as cleaning components, hardware, or systems to meet a measured limit of contaminants, such as the Particle Count and/or Non-Volatile Residue (NVR) requirements, which are supplied by the Range or industry standard (typically IEST-STD-1246). Precision cleaning is the need for measurement of post-cleaning residual contamination.

The contractor shall precision clean all systems providing gasses or fluids that have cleanliness and/or purity requirements associated with processing vehicles, payload, and spacecraft to prepare them for launch, flight, or operation. Precision cleaning is also required for all systems containing oxidizers, breathing air, aviators oxygen, and hypergolic fuels.

The contractor shall provide qualified operators and technicians to operate the Government-supplied precision cleaning laboratory. Particle counts and NVR measurements associated with the verification of systems cleaned in the cleaning lab shall be performed by cleaning lab personnel. All chemical analysis shall be performed by the

WFF Chemistry Lab unless otherwise directed by the Government. Precision cleaning laboratory services may be made available to other WFF organizations as capacity is available.

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

15.4 Payload Processing

Payload processing is similar to 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, electrostatic discharge (ESD), etc.) until such time it is actually integrated on to the 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 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.

15.4.1 Payload Processing Requirements

The contractor shall support spacecraft fueling (if required) and shall manage the spacecraft fueling configuration and support systems including but not limited to: vacuum systems, nominal and high rate exhaust vents, breathing air systems, 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). Training and certification for operations, sustainment, and maintenance shall be made available to Government personnel as requested. At its discretion, the Government may provide personnel to support any or all of the above functions for payload processing, for a defined mission, event, or timeframe.

The contractor shall operate, maintain, and sustain precision cleaning services and equipment. Precision cleaning is defined as cleaning components, hardware, or systems to meet a measured limit of contaminants, such as the Particle Count and/or Non-Volatile Residue (NVR) requirements, which are supplied by the Range or industry standard (typically IEST-STD-1246). Precision cleaning is the need for measurement of post-cleaning residual contamination.

The contractor shall precision clean all systems providing gasses or fluids that have cleanliness and/or purity requirements associated with processing vehicles and spacecraft to prepare them for launch, flight, or operation. Precision cleaning is also required for all systems containing oxidizers, breathing air, aviators oxygen, and hypergolic fuels.

The contractor shall provide qualified operators and technicians to operate the Government-supplied precision cleaning laboratory. Particle counts and NVR measurements associated with the verification of systems cleaned in the cleaning lab shall be performed by cleaning lab personnel. All chemical analysis shall be performed by the WFF Chemistry Lab unless otherwise directed by the Government. Precision cleaning laboratory services may be made available to other WFF organizations as capacity is available.

15.5 Supplemental Ground Operations Services

Supplemental Ground Operations Services are services provided to organizations other than RMMO.

Supplemental Ground Operations services shall be on a non-interference basis and prioritized by the Government. These support elements may be requested across all programs and projects at WFF or its component facilities, NASA, or other government agencies as requested by the program or project.

1. The contractor shall provide services in support of technical commodity systems to include: operational requirements and review of design, routine fabrication activities as defined by WFF engineering drawings or sketches, maintenance, repair, cleaning, testing, and servicing with cryogenic or specialized gasses, liquids, fuels, and oxidizers.
2. The contractor shall provide services in support of ground support equipment to include: operational requirements and review of design, routine fabrication activities as defined by WFF engineering drawings or sketches, maintenance, repair, refurbishment, cleaning, and testing. This effort is intended for technical ground support equipment which directly or indirectly supports flight or operational hardware. It is not intended to support facility maintenance or modifications except as applicable to item 1 above.
3. The contractor shall provide specialized support to Wallops programs in the areas of pressurized or hazardous systems to include requirements specification, routine fabrication activities as defined by WFF engineering drawings or sketches, test, installation, checkout, and operations.

16. ACRONYM LIST

AFOM	Alternate Facilities Operations Manager
ASR	Airport Search Radar
ASRF	Atmospheric Scientific Research Facility
ATRR	Acceptance Test Readiness Review
CCB	Configuration Control Board
CDR	Critical Design Review
CFR	Code of Federal Regulations
CIO	Chief Information Officer
CM	Configuration Management
CMMI	Capability Maturity Model Integration
COR	Contracting Officer's Representative
CSO	Communications Services Office
DISS	Digital Ionospheric Sounding System
DLM	Depot Level Maintenance
DMSP	Defense Meteorological Satellite Program
DQCA	Data Quality Computer - System A
DQCB	Data Quality Computer - System B
DR	Discrepancy Report
ELV	Expendable Launch Vehicle
ESD	Electrostatic Discharge
FAA	Federal Aviation Administration
FOM	Facilities Operations Manager
GMT	Greenwich Mean Time
GPS	Global Positioning Satellite
GSE	Ground Support Equipment
GSFC	Goddard Space Flight Center
HAZWOPER	Hazardous Waste Operations and Emergency Response
HF	High Frequency
HIF	Horizontal Integration Facility
I3P	IT Infrastructure Integration Program
ICD	Interface Control Document
IDIQ	Indefinite Delivery Indefinite Quantity
IPAC	Intra-Governmental Payment and Collection System
IRIG	Inter-Range Instrumentation Group
IRSP	Instrumentation Radar Support Program
ISO	International Standards Organization
IT	Information Technology
LEADS	Leading Environmental Analysis and Display System
LN2	Liquid Nitrogen
LMR	Land Mobile Radio

LOA	Letter of Agreement
LSSP	Launch Site Support Plan
MSR	Monthly Status Reviews
NAC	National Agency Check
NASA	National Aeronautics and Space Administration
NISN	NASA Integrated Services Network
NOTAM	Notices to Airmen
NPOL	NASA Polarimetric Radar
NPR	NASA Procedural Requirements
NSEP	National Security Emergency Preparedness
NWS	National Weather Service
ODIN	Outsourcing Desktop Initiative for NASA
ORR	Operational Readiness Review
PDR	Preliminary Design Review
PFRR	Poker Flat Research Range
PM	Project Manager
PMSR	Post Mission Services Report
PPE	Personal Protective Equipment
PPF	Payload Processing Facility
PPR	Permit Prior Request
RADAC	Radar Data Acquisition Computer
RADCAL	Radar Calibration Satellite
RCC	Range Control Center
RF	Radio Frequency
RMS	Root-Mean-Square
ROMS	Range Operations Management System
RRR	Range Readiness Review
RSM	Range Services Manager
RSO	Range Safety Officer
RYG	Red Yellow Green
S3	Ship Surveillance System
SCAPE	Self-Contained Atmospheric Protective Ensemble
SCBA	Self-Contained Breathing Apparatus
SCR	Systems Concept Review
SEWP	Scientific and Engineering Workstation Procurement
SFF	Spacecraft Fueling Facility
SHARES	Shared Resources
SRR	Systems Requirements Review
TDRSS	Tracking and Data Relay Satellite System
TOGA	Tropical Ocean Global Atmosphere
UAS	Unmanned Aerial System
UHF	Ultra High Frequency
UPS	Uninterruptible Power Supply
USDA	U.S. Department of Agriculture
UTC	Universal Time Code
VHF	Very High Frequency

WAN	Wide Area Network
WAR	Weekly Activities Report
WFF	Wallops Flight Facility