

## TASK ORDER STATEMENT OF WORK (SOW)

Date: 10/25/2019  
Task Name: Range and Mission Management Office General Engineering Support  
Task No. / Mod: 30/8  
Period of Performance: 11/18/19 to 11/17/20  
Contract number: NNG14WA48C

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### 1. Scope

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Background – The Range and Mission Management Office (RMMO) requires development engineering support of Range systems. As new Projects use the Range services, there is an increasing demand to ensure the Range assets meet evolving requirements. In the evolution of new programs and projects, RMMO will need engineering support for the analysis, research and development of new systems, engineering analysis of existing systems and engineering support for technical studies and special projects.

- a. Detailed Summary of work – Provide engineering support in the research and development of new systems, provide engineering assessment for system upgrades/enhancements, mission assurance analysis, and various special projects as requested. This can include the development of hardware and software products as well as analysis of existing systems for requirements verification.
- b. For this task, the contractor shall be required to perform, and track at the subtask level the following activities;

#### **Subtask 1 - Engineering and Technical Support**

Provide hardware and software systems engineering and technical support services in support of WFF range systems and technical activities. The support efforts include, but are not limited to:

1. By working with Code 589, support the initiation and development of range instrumentation system upgrades, and transition to operational use as requested. Projects include, but are not limited to, STING, RADAC, Tri-Mode FTS, and Range Data Display System
2. Projects shall include requirements analysis, documentation, trade studies, white papers, vendor selection, defining system interfaces and interaction, design consultation, participation in various design and readiness reviews, code reviews, presentations, and quality assurance functions.
3. Engineering support requirements shall include hardware, firmware, and/or software development, testing, analysis, problem correction, system documentation, and operator training for requested systems.
4. Provide systems engineering support for assigned advanced range technology programs in the areas of development, procurement, documentation, reviews, testing, launch, and post flight reporting. The support is broad in scope and is an effort to assist in advanced range technology development to meet project, engineering and

safety requirements. Projects shall include, but not be limited to AFSS and LCT.

These efforts include, but are not limited to:

- Provide systems engineering expertise to the assigned program teams.
- Generate, compile information, and track interface control information.
- Conduct and/or interpret reliability assessments for component, subsystems or systems.
- Establish and track requirements/verification traceability at system and subsystem level.
- Develop and maintain verification plan.
- Verify compliance of system/subsystem verification plans to system requirements.
- Develop and track engineering and system level schedule

### **Subtask 2 – Centennial Challenge Support [INACTIVE]**

Engineering support for the Centennial Challenge program, which is a competition involving multiple Cubesat mission. This subtask includes work very similar to that described in Subtask 1 but are being tracked separately due to distinctly different funding sources.

**Subtasks 3 and 4 are no longer active. [INACTIVE]**

### **Subtask 5 – Range Safety Certification Technical Support**

The contractor is to provide support for Range Safety System Software certification. This task will be supporting Codes 803 and 840. The primary function to be accomplished and supported by the contractor includes ensuring safety-critical and mission-critical projects document and follow standard NASA Safety processes to meet software engineering requirements as part of the software certification. Additionally, the contractor shall ensure that safety-critical software products meet NASA Standards and requirements. The contractor shall develop and document a tailored approach to meeting these standards and requirements for Wallops applications. It will be the responsibility of the contractor to document and implement configuration management control of the all documentation (requirements and products) developed in this effort. All funded efforts to obtain safety certification for Range systems are considered part of this scope.

#### **Detailed Summary of Work:**

1. Range Safety Office support (Code 803) - Provide support to ensure NASA Range Safety requirements are implemented as part of the safety-critical certification process for range systems necessary to support launch. Determine, where applicable, tailoring of NASA Standards can be applied for Wallops applications and document this process. Develop procedures, plans and processes that implement defined Range Safety requirements that will be audited and/or reviewed by the safety office Software Mission Assurance representative for requirement compliance. Conduct hazard and failure analysis on software products. Provide Subject Matter Expertise (SME) in Range Safety Systems as a peer reviewer to assist the Range Software MA representative. Support safety critical certification efforts in requirements, reliability and certification testing, for safety critical requirements, per the product development

- plan. The individual should possess knowledge of the setup and configuration of mission graphics display systems used by Range Safety to support RDDS.
2. Range and Mission Management Office support (Code 840) – Participate in the Range Software Safety System Integrated Project Team (IPT) meetings.

### **Subtask 6 ASR-8 Upgrade/Replacement Study [COMPLETE]**

There has been a history of cooperation between US Navy Patuxent River Naval Air Station (Pax) and NASA Goddard Space Flight Center's Wallops Flight Facility (WFF) including tracking and data acquisition for Pax flight programs and the instrumentation services required in support of these dynamic requirements. The implementation of the Airport Surveillance RADAR-8 (ASR-8) at WFF provides dual utilization benefits to both Pax and WFF. In 2001, an operational Memorandum of Agreement between Pax and WFF was established to define the utilization and maintenance approach of an ASR-8 based on the expected longevity and maintainability of the existing Airport Surveillance Radar-7 (ASR-7) that was located on the roof of Building N-159 at WFF and the capabilities, reliability, maintainability and control of a newer ASR-8. In 2003, Pax's ASR-8 was replaced with a Digital Airport Surveillance RADAR-11 (DASR-11) as part of a Navy wide Air Traffic Control (ATC) acquisition program. Upon its replacement, it was decided to relocate and install the ASR-8 to WFF to provide improved airspace management for several stakeholders within the region. In June 2003, installation of the ASR-8 antenna tower on Wallops Island began (Attachment 1). The Navy's Space and Naval Warfare (SPAWAR) organization and the WFF institutional services contractor performed the work. In March 2004, the ASR-8 equipment shelter was shipped from Pax to WFF. In April 2004, SPAWAR installed the ASR-8 on Wallops Island.

Through the upgrade program the ASR-8s have been phased out and replaced by the DASR-11 by the Navy, Marine Corps, Air Force as well as the Federal Aviation Administration (FAA) through a joint acquisition program contract led by the Air Force. As the ASR-8 systems were phased out, the availability of logistics support has diminished. No new spare parts are being procured which leaves only the previously stocked spares and system components cannibalized from the systems taken offline until they are exhausted. The ability to maintain and sustain the ASR-8 has become an increasingly difficult issue over time. The Pax Atlantic Test Range (ATR) currently has one qualified and certified ASR-8 maintenance technician (support contractor). In 2003, two WFF range operations contractor staff attended the Navy ASR-8 school at Pensacola, Florida. To assist with this shortfall, other members of the ATR RADAR Team (RADAR Subject Matter Experts consisting of engineers and technicians) and members of the WFF range operations staff are being trained via on-the-job training as available.

In addition to the current ASR-8 obsolescence and sustainment risk posture, there is a new payload processing facility being constructed by the Mid-Atlantic Regional Spaceport (MARS) on Wallops Island that may impact the ability of the current ASR-8 to provide air surveillance information utilized by multiple stakeholders (Attachments 2 & 3).

### **Detailed Summary of Work:**

Based on the attached information defining the new payload processing facility location and dimensions, the contractor shall define the performance impact to the existing ASR-8 system configuration including line-of-sight blockage and potential need for sectoring. Performance impacts shall include a graphical representation clearly showing the three-dimensional coverage area and estimated minimum detection height versus range with and without the new payload processing facility.

The contractor shall deliver a study providing recommended solutions to eliminate obsolescence issues with WFF's current air surveillance capability.

The solutions defined shall not be solely limited to the installation of a DASR-11 or the upgrade of the current ASR-8. Other radar systems meeting the requirement can be considered if they are FAA certified.

The resultant study can include a change in location from the current ASR-8. Other locations on Wallops Island, the Wallops Mainland, and the WFF Main Base are open for consideration.

The resultant study shall define multiple solutions with risks, benefits, cost magnitude, approximate schedule to complete, capabilities assessment and technical approach for each.

The resultant technical solutions shall include information gathered by documenting the current system capabilities and deficiencies and by interviewing personnel to understand obsolescence and sustainment risks and issues.

Proposed solutions mitigating impacts shall include new three-dimensional coverage areas. Any references to use of the radar for surface contacts can be deleted. This is not a requirement.

The resultant study shall define the make, model and source for all electronics components proposed as part of a solution.

The resultant study shall define the make, model and source for all mechanical components and systems proposed as part of a solution.

The resultant study shall include recommended training for components and systems proposed as part of a solution.

The resultant study shall include recommended spares for components and systems proposed as part of a solution.

The resultant study shall include high level (not detailed) drawings of the proposed site layout, the antenna structure including tower and radome (if required), and facilities requirements (power, communications, etc.).

The resultant study shall include a cost magnitude definition for all proposed solutions (\$, \$\$, \$\$\$, etc.) and where the major cost drivers exist for each solution. If cost information is readily available for specific components or systems, it should be included.

### **Subtask 7 E-28 Arresting Gear Inspections and Maintenance**

The purpose of this sub-task is to provide Airfield Arresting Gear Maintenance safety and

quality oversight. Ad-hoc/emergency support may be required in response to mission priorities and schedules. The duration and period of performance of the work can vary in response to changing mission priorities and schedules.

#### **Detailed Summary of Work:**

Maintenance of facility E-28, Shore Based Arresting Gear, shall be supervised using NAVAIR 51-5-31 E28 Emergency Runway Arresting Gear (current edition) and the most current 3M Maintenance Requirements Cards. Results of maintenance performed will be documented in a report and delivered to the project manager via the maintenance personnel's supervisor. Following report delivery, the contractor shall be available upon request to discuss inspection findings and site visit.

Annual gear recertification shall be conducted in May. Quality Assurance Representative will accompany NAVAIR inspector during this inspection to provide technical and administrative assistance for all current history of equipment.

Peter Dell (X1658) is the NASA Project Manager to issue work requests under this task and all efforts, status, etc. shall be coordinated through Peter Dell or Dawna Marr (Ext. 1302).

References: NAVAIR 51-5-31 and associated current MRC (Maintenance Requirement Card's)

#### **Subtask 8 Range Safety Course Update [COMPLETE]**

The NASA Range Flight Safety (NRFS) Program management is delegated by OSMA to KSC. The NRFS Program Manager (PM) at KSC maintains the NRFS Program across all Centers for the Agency and part of that responsibility is providing range safety related training courses. The Range Safety Operations course, SMA-SAFE-NSTC-0097 is currently being updated and the KSC PM is requesting support to assist with the completion of this update and to provide instruction at WFF for the course when the update is completed.

#### **Detailed Summary of Work:**

The contractor shall provide SMA technical support to the NRFS Program Manager and the contractor team at KSC. Technical support provided will include the following tasks:

- Review the course content and provide information to update slide presentations. This information shall include:
- Comments and suggestions on ways to improve the course (i.e. format, exercises, simulations, etc.)

- Changes and data needed to update the existing vehicle examples (Terrier Improved Orion for Unguided, BQM-34S for UAS, and Minotaur I for Guided) used in the course to more applicable and current vehicles.
- Updated reference material to be made available to course attendees
- Proposals for changing structure of the course to reduce course to 4 days and to minimize impact to WFF to support course console time
- Provide instruction for the Range Safety Operations Course to be taught at WFF (4 days) to include reserving rooms needed and scheduling simulation exercises.

The period of performance for these tasks are February 12, 2018 through August 31, 2018. The planning should include 4 months of preparatory work updating content and gathering data. Based on the scheduling of the course, the planning should include 4 weeks of preparatory time leading up to the course instruction and 1 week for the actual course instruction.

During this period, the contractor shall provide a monthly status to the NRFS Program Manager to include what was worked on during the month, progress made, and a financial update of monthly costs and charges.

#### **Subtask 9 Bio Lab Engineering Assessment [COMPLETE]**

Subtask for development and submission of a report, which assesses the maturity of the Biology and Integration Lab (Bio Lab) being developed at the Wallops Flight Facility (WFF).

##### **Detailed Summary of Work:**

The Contractor shall conduct an engineering assessment of the WFF Bio Lab. After the assessment, the Contractor shall deliver a report that details the current state of the WFF Bio Lab and detailed future-state recommendations to bring the Bio Lab in-line with other NASA centers. This includes recommendations for upgrade/outfit of existing labs and build/outfit of new lab space.

The Contractor shall also review literature and scientific data for Antares OA-9 (Launch NET 05/20/18) to determine specific payload needs and other biological and chemical requirements provided by principal investigators, and payload developers associated with the flight project.

#### **Subtask 10 COYOTE Conops and Support Development [INACTIVE]**

Provide services in support of the Activation of the GQM-163A (Coyote) Target Launch capability at Wallops. Effort includes advisement and Safety Systems Engineering for CONOPS and Support Development in support of the GQM-163A Target Activation at Wallops.

Additional GQM analysis is required that is within scope. The change is related to a reduction in relay aircraft transmission delay due to using the RASA aircraft for relay. Contractor shall provide the initial analysis as well as the revised analysis as related to the RASA aircraft.

### **Subtask 11 Antares Explosive Analysis (X-79) [INACTIVE]**

Subtask for re-evaluation of administrative control on the Bi-Directional Destruction Charges (BDDC) associated with the Antares launch vehicle limiting the presence of the BDDCs in building X-79 to no more than 90 days.

#### **Detailed Summary of Work:**

The Contractor shall assess an explosive article consisting of the follow explosive components:

- a. Destruct Charges, H/D 1.1, 5 lbs.
- b. 2nd Stage Motor, H/D 1.3, 55,000 lbs.
- c. Miscellaneous Pyrotechnics, H/D 1.4, 10 lbs.

The specific details on the explosive components and their configuration will be provided separately.

The purpose of the assessment is to render a recommendation for an overall hazard classification for the larger explosive article. The Contractor's assessment shall follow the hazard classification procedures for transportation and storage of explosives as defined by Occupational Safety and Health Administration (OSHA) through its adoption of the United Nations (UN) Recommendations on the Transportation of Dangerous Goods—Model Regulations, and Manual of Tests and Criteria. The NASA Safety Standard for Explosives, Propellants, and Pyrotechnics, NASA-STD-8719.12, serves as a supplemental standard to OSHA regulations thereby also accepting the results of hazard classifications derived from the appropriate UN Test Series or equivalent.

The assessment shall be performed Department of Transportation (DoT) approved explosives examiners as defined by 49 CFR 173.57(b).

To assist in the evaluation, the Contractor will be provided:

- a. The results of previous Super Large-Scale Gap Testing for BDDCs
- b. Video and high-speed camera footage from the October 2014 launch anomaly where the BDDCs were detonated in very close proximity to the 2nd stage motor
- c. Technical specifications of the explosive components and their layout

### **Subtask 11 Deliverables**

The Contractor shall deliver a draft and final summary report identifying the

recommended hazard classification for the explosive article with supporting justification. If the recommended hazard classification is H/D 1.1, then the Contractor shall identify any additional testing that can be done to reach a potential hazard classification of H/D 1.3.

The Contractor shall deliver a draft summary report no later than 45 days after sub-task award. The Government shall review and provide comments within two weeks of receipt of the draft summary report. The Contractor shall deliver the final summary report no later than 75 days after sub-task award.

### **Subtask 12 Mobile Gate Project [INACTIVE]**

The Contractor shall provide construction and project management services to Wallops Flight Facility to upgrade and outfit the existing mobile gate and build and outfit a new mobile relay station. The Contractor shall provide project management services for installation of a static gate that will be powered by the mobile relay station.

The Contractor shall meet with Code 548 and 840 as requested to provide progress updates and discuss necessary modifications.

After procurement of the initial mobile gate as detailed above, Contractor shall procure an additional gate and integration of upgrades to meet or exceed NASA security requirements. The security asset is a mobile gate with a barrier arm for controlled access to hazard areas, integrated mesh networking radios allowing the system to be operated by a remote user, and a camera with zoom and object tracking capability.

#### **Detailed Summary of Work:**

The Contractor shall:

- 1) Upgrade and outfit the existing mobile gate with Voice Over Internet Protocol (VOIP) Push-to-Talk (PTT) and a vehicle sensing device that will notify home base operator.
- 2) Build and outfit a new mobile relay station using the existing electric cart Nasa Property ID #5029694. Cart shall have 200-amp hour batteries, Sylvus radio compatible with item 1, VOIP (PTT), vehicle sensing device. The mobile relay station shall also interface and power item 3 listed below.
- 3) Provide project management services for the installation of a static barrier gate at a location to be specified by Code 840
- 4) Provide periodic on-site support, as requested.

Contractor shall provide all hardware, integration services, and training to facilitate the mobile security gate with all upgrades as follows:

- 1) Provide required hardware:
  - a. Provide a second mobile security gate
  - b. Upgrade the base model to include the following:

- i. Integration of Global Position System (GPS) receivers into the system.
  - ii. Integration of Push-To-Talk (PTT) and Voice Over Internet Protocol (VOIP) communications into the system.
  - iii. Integration of motion/vehicle detection into the system.
  - iv. Integration of Silvus communications network into the system.
  - v. Integration of Mobile Sentinel into the existing NASA Gate infrastructure.
- 2) Install all required software for the gate security system.
- 3) Integrate the ruggedized notebook into the Silvus communications network.
- 4) Provide engineering and test personnel to support validation and verification test at the customer defined location.
- 5) Provide system training to user and key personnel
- 6) Support security operations and demonstrations, as requested.

Deliverables:

- a. One (1) SRS Mobile Sentinel Gate Security System.
- b. Two (2) ruggedized notebook computers.
- c. One (1) Silvus GPS Receiver.
- d. One (1) PTT/Motion Detector and camera system.
- e. Documentation (including operational, installation, and test) for the SRS Mobile Sentinel Gate Security System. All documents must be submitted to ASRC Federal.
- f. Software for the SRS Mobile Sentinel Gate Security System.

**Subtask 13 Explosive Hazard Analysis (HIF) [INACTIVE]**

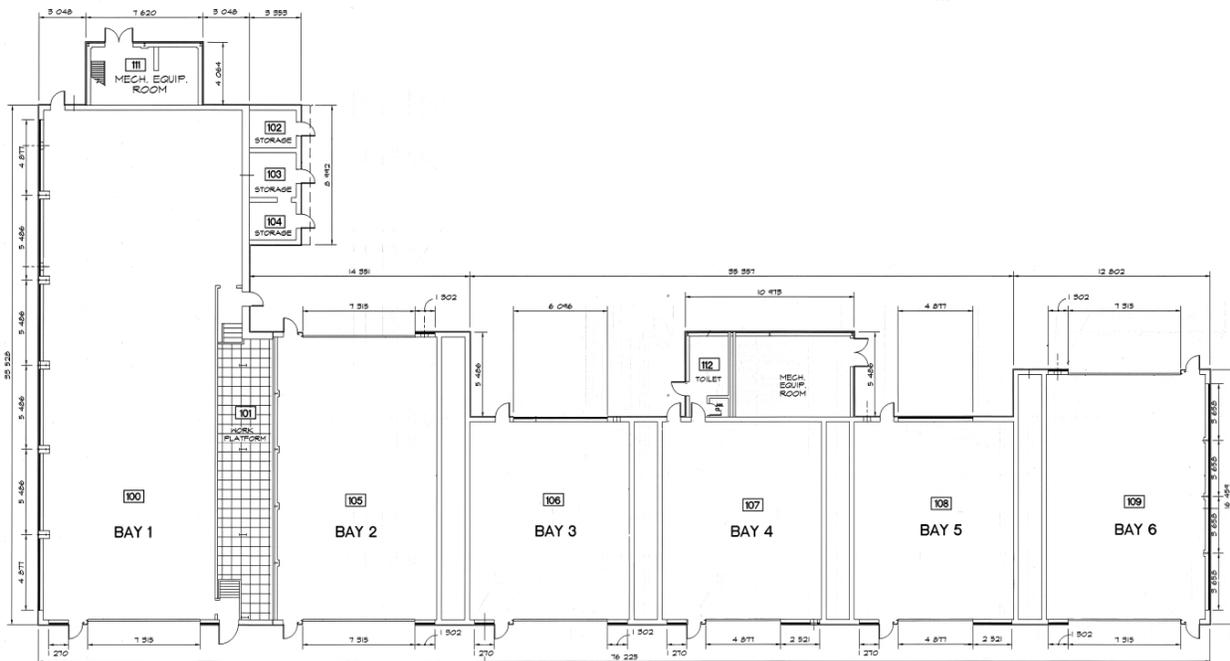
The purpose of this task is to perform a hazard analysis and operations review of the Northrop Grumman Corporation's (NGC) Antares program and DoD program as intended to be operated under the Commercial Resupply Services 2 (CRS2) contract within the Horizontal Integration Facility (HIF) and W-65 at NASA's Wallops Flight

Facility (WFF). An Explosive Hazard Analysis cannot be performed on the HIF without also performing one for W-65 since the areas overlap.

The Antares program has evolved since it first began at WFF. The CRS2 contract brings new mission requirements translating into several modifications to the current concept of operations (ConOp) for flight vehicle processing and launch. NGC has requested that NASA perform this hazard analysis and operations review to potentially adjust or remove current administrative controls enacted at the HIF that could hinder necessary ConOp changes to meet new mission requirements.

As currently planned, there are three unrelated DoD programs slated to occupy Building W-65. Furthermore, there exists a high probability that two of the DoD programs will conduct co-located simultaneous operations within Building W-65.

Building W-65 is a multi-bay facility built by NASA in the 1960s in support of the Scout program ([https://artsandculture.google.com/exhibit/twISgejPzIk\\_KQ](https://artsandculture.google.com/exhibit/twISgejPzIk_KQ)). The building was upgraded in the 1990s to provide additional capabilities. The figure below provides a recent floor plan:



Building W-65 has six bays total with five bays separated by sand filled fragmentation walls. There are blast blow-out panels at each end of the bays to ensure sufficient venting in the event of a deflagration incident. The notional plan is to assign bays 1 & 2 to one DoD project and bays 5 & 6 to a second DoD project. Bay 3 may be used as inert storage for the project assigned to bays 1 & 2. Bay 4 is shared space due to the restroom facilities.

The PHA will be used to benchmark the DoD utilization of Building W-65 and determine if additional engineering and administrative controls are warranted for the protection of personnel within the building. An evaluation of the area surrounding Building W-65 will

be performed looking at the risk to unrelated personnel transiting the area during a potential catastrophic event within the building.

This hazard analysis and operations review will also be used to benchmark NGC's current utilization of the HIF and associated occupancy to determine if additional engineering controls are warranted for the protection of personnel within the HIF. An evaluation of the area surrounding the HIF will be performed looking at the risk of harm to unrelated personnel transiting the area during a potential catastrophic event within the HIF; this occurs on a regular basis and also intermittently (i.e. site tours).

The hazard analysis and operations review are to be performed to ensure compliance with the following government regulations:

- NASA Safety Standard for Explosives, Propellants, and Pyrotechnics, NASA-STD-8719.12 rev A
- DoD Ammunition and Explosives Safety Standards, DoDM 6055.09 incorporating Change 2
- U.S. Air Force Explosives Safety Standards, AFMAN 91-201 dated Mar 2017
- DoD Contractor's Safety Manual for Ammunition and Explosives, DoD 4145.26-M

NASA-STD-8719.12A was significantly modified in the latest revision to be more consistent with the other two Department of Defense (DoD) reference documents.

The contractor is not required to perform detailed Quantity-Distance (QD) or Quantitative Risk Assessment (QRA) analyses as part of an explosive site plan of Building W-65 when evaluating risk to unrelated personnel exterior to the building. NASA is looking for recommendations for risk mitigation measures including potential engineering and administrative controls to reduce risk for operations within Building W-65.

The contractor performing the hazard analysis and operations review must have extensive experience applying the regulations of the DoD references and have submitted findings of similar analyses to an organization like the DoD Explosive Safety Board (DDESB) for approval.

### **Detailed Summary of Work**

To perform the hazard analysis and operations review, the contractor shall review the Net Explosive Weight (NEW) limits, proposed ConOps, and facility layout addressing the following aspects:

- HIF Quantity-Distance (QD) limits for various operations involving:
- Hazard Division (H/D) 1.1, 1.2, 1.3, 1.4 solid energetics
- Launch Vehicle (LV)/Spacecraft (SC) Fuels and Oxidizers

- Tiered QD maps resulting from various operations conducted at the HIF tied to certain operations or NEW limits
- Exposure to related personnel within HIF and W-65
- Evaluation of existing engineering controls and mitigations such as protective construction, fire suppression systems, etc.
- Exposure of unrelated personnel on Bypass, Seawall Road, and in nearby X-79
- 1,300 vehicles per day between the two roads as measured in latest traffic survey
- The installation and application of sprinkler systems at the HIF including deluge systems
- The potential impact of current processes and procedures that may affect risk (e.g. material handling equipment, waste handling, housekeeping, etc.)
- Provide recommendations for administrative controls to mitigate hazards to related personnel within Building W-65 and unrelated personnel exterior to the building

Where applicable, the contractor shall assistance with setup of risk-based explosive siting analyses to be conducted in-house by the government when QD safe standoff distances cannot be achieved.

#### Government Furnished Items

The government shall provide the contractor with the following:

- Detailed engineering drawings of the HIF and W-65
- Detailed WFF site and mapping information
- Results of the recent explosive facility assessment
- Details on current HIF and W-65 occupancy loads including personnel locations, duty hours, etc.
- Details on Antares LV/SC and DoD processing ConOps
- Access to HIF and W-65 for walkthrough

#### Site Visit and Associated Travel

The contractor is authorized up to a three-day site at WFF to collect data on the HIF and conduct interviews with personnel. Authorization is also provided for a three-day site visit for W-65.

#### Deliverables

The contractor shall provide a report summarizing the findings from the hazard analysis and operations review. The report will be delivered first in draft to give the government two-weeks for review and comment. The final report will include responses to the government's comments.

The contractor's report will focus on the following:

- 1) Identification of critical compliance deficiencies against noted references
- 2) Recommendations for administrative controls to mitigate hazards to related and unrelated personnel including routine tour groups who visit the HIF and W-65
- 3) Recommendations for engineering controls to mitigate hazards to unrelated personnel outside the HIF and W-65 who may be transiting the area

#### Schedule

- Transfer of government data to contractor 2-week period starting at award
- Contractor review of data 4-week period after data transfer
- Contractor site visit for additional data 1-week as allowed by schedule
- Delivery of draft report 4 weeks after site visit
- Deliver of final report 4 weeks after draft report

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## 2. Period of Performance

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The period during which the work for this task shall be performed is from Award through 11/17/2020.

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## 3. Deliverables/Schedules/Milestones/ (Specifically required for this task)

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Monthly Progress Reports in accordance with clause B1 and C2, and weekly status report for active projects. The contractor is also required to submit preliminary findings, discrepancy report and project specific presentation as specified in the specific testing schedule.

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## 4. Place of Performance

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This work shall be performed primarily on-site at the Wallops Flight Facility, but the contractor may be required to perform some work at other NASA sites. The contractors may also be requested to travel short term for integration and testing support at other government facilities, including locations such as Patuxent River Range.

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## 5. Special Requirements/Other Comments

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No specific work assignments within the scope of the Task Order shall be performed under this Task Order unless first initiated by the Task Monitor. This Task Order is not for sustainment of service capability. This Task Order is being initiated to enable quick response special engineering actions within the scope addressed within this Task Order but only if initially approved by the Task Monitor.