

Statement of Work

for

Safety, Health, Environmental, and Mission Assurance
Support Services

(SHEMA Support Services)

NASA Glenn Research Center

SHEMA Support Services

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**STATEMENT OF WORK
FOR
SAFETY, HEALTH, ENVIRONMENTAL AND MISSION ASSURANCE
Support Services**

(SHEMA)

1. PURPOSE

The purpose of this solicitation is to obtain support services in four broad technical areas, namely, Operational Safety, Occupational Health, Energy & Environmental, and Aero/Space Systems Mission Assurance. Services will be required at the Glenn Research Center (GRC) which includes the Lewis Field (LF) and the Plum Brook Station (PBS). These services will enable GRC to comply with NASA policies and Federal regulations in each of the four technical areas.

2. SCOPE-GENERAL

The Contractor shall provide the necessary management, personnel, equipment, facilities, materials, supplies, and services, except as may be expressly set forth in the contract as Government Furnished Property, to effectively implement, control, track, and sustain all requirements of this contract.

The Contractor shall provide support services for Operational Safety, Occupational Health, and Energy and Environmental disciplines, as well as providing Mission Assurance and Management support for Aero/Space Flight Systems and Ground Support Equipment programs at GRC. These services shall support all institutional facilities and the Mission Assurance aspects of space flight and aeronautics activities at GRC's Lewis Field (LF) in Cleveland, Ohio, and Plum Brook Station (PBS) in Sandusky, Ohio. For the purpose of this document, unless otherwise noted, a reference to GRC means that the statement of work is applicable to both LF and PBS.

In three of the four areas in this solicitation, GRC has developed program manuals detailing program requirements, implementation approach, metrics, and verification approach for all regulations and policies GRC must implement. The general scope of work for all four areas within this SOW follows:

1. Operational Safety program development, implementation, compliance assurance and verification based on the details found in the following document:

<http://smad-ext.grc.nasa.gov/shed/pub/gsm/gsm-manual.pdf>

2. Occupational Health program development, implementation, compliance assurance and verification based on the details found in the following document:

<http://smad-ext.grc.nasa.gov/shed/pub/ohpm/ohpm-manual.pdf>

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3. Energy and Environmental program development, implementation, compliance assurance and verification based on the details found in the following document:

<http://www.grc.nasa.gov/WWW/FTD/EEMO/documents/epm-TOC.pdf>

4. For Aero/Space Systems Mission Assurance area, there is no specific program manual. The work primarily involves Mission Assurance activities in support of Aero/Space programs and projects managed by GRC. For space systems assurance activities, the work involves ensuring that space flight programs and projects comply with Space Assurance Requirements (SAR), GLPR 7120.5.30.

The Contractor shall plan and execute multiple tasks in the areas of Safety Compliance, Safety Engineering, Safety Management, Construction Safety, Industrial Hygiene, Health Physics, Environmental Compliance, Emergency Response, Environmental & Energy Engineering, Environmental and Energy Management, Chemical Management, Waste Management, Environmental Sampling, Chemical Sampling and Analysis, Flight System Safety Engineering, Reliability and Maintainability Engineering, Probabilistic Risk Assessment, Materials and Processes Engineering, EEE/Mechanical Parts Engineering, Quality Assurance Engineering, Software Quality Assurance, and Continuous Risk Management, as specified.

The functional tasks defined in this Statement of Work are required to comply with and be in support of the Center's ISO-9001 and AS-9100 Rev-C Business Management System (BMS), GLID 8730.5A and ISO-14001 Environmental Management Systems (EMS.) The Contractor shall ensure that all work products meet the requirements of GRC's ISO-9001 registered/AS-9100 Rev-C Business Management System (BMS), GLID 8730.5A, and ISO-14001 registered Environmental Management System (EMS.) The Contractor shall prepare and maintain BMS, and EMS documentation and records. The Contractor shall participate in all internal and external audits and ensure the effective correction and closure of audit findings and recommendations.

All work performed under this contract shall comply with established and applicable Federal Regulations, and NASA and GRC policies, procedures, directives, standards, specifications and instructions. See applicable and reference material in this SOW.

Tasks described herein shall not be construed as implying that the Contractor has the authority to approve or disapprove Government policies, procedures, specifications, or requirements or those of any other Government Contractor. Nor shall language herein be construed to mean that the Contractor has the authority to accept or reject on the Government's behalf any products or services. The Contractor's functions shall require presentation of its analysis to the appropriate Government official for further action. The Contractor is not authorized to act as an agent of the Government or to represent itself as such.

2.1 BASE EFFORT

The Base Effort is defined as on-going technical activities supporting the overall mission of GRC as described in Section 3 of this Statement of Work (SOW).

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2.2 INDEFINITE DELIVERY INDEFINITE QUANTITY (IDIQ)

The IDIQ work will be accomplished by the issuance of discrete task orders. Discrete work requirements will be defined in Government issued Task Orders authorized under clause G.6 Technical Direction (NFS 1852.242-70). IDIQ requirements are defined as non-recurring, one-time, non-routine activities supporting the overall mission of GRC. Tasks can include any or all items mentioned in this statement of work which shall be of a temporary nature. They may include tasks performed at GRC or at another NASA Center, NASA Headquarters, another Federal Agency, or at Contractor facilities. Tasks will be numbered in sequential order in accordance with the NASA Federal Acquisition Regulation (FAR) Supplement; Task Orders will be issued by the Contracting Officer (CO) and Contracting Officer's Technical Representative (COTR).

The entire section 4 of this SOW will be accomplished via the issuance of discrete task orders. Other types of IDIQ work activities are at the CO or COTR discretion and may include any of the work effort described in Sections 3 and 4 of this SOW or when all or a combination of the following characteristics are directly defined:

- Period of Performance (Start and End dates)
- Unique technical skills not presently in the Base
- Government's need for extra visibility into a requirement
- Deliverables
- Separate funding and financial reporting
- Substantive dollar value

3. SCOPE - SPECIFIC: OPERATIONAL SAFETY, OCCUPATIONAL HEALTH, AND ENERGY AND ENVIRONMENTAL REQUIREMENTS

The Contractor is responsible for providing the necessary management, personnel, equipment, and supplies (not otherwise provided by the Government) required to perform services for planning, implementation, and assessment of Operational Safety, Occupational Health, Energy, and Environmental programs at GRC. This section of the Statement of Work (SOW) defines the requirements for the support of GRC's Safety and Health Division (Code QS) and Energy and Environmental Management Office (Code FE) in meeting their present and long-term institutional program objectives at GRC. In addition, work may include supporting other GRC organizations, other NASA Centers, NASA Headquarters, or other Government Agencies. GRC is an ISO-9001 and ISO-14001 registered facility.

3.1 OPERATIONAL SAFETY

The primary objectives of Operational Safety include: assuring mission success at GRC and NASA; protecting the GRC workforce; protecting the public, flight, ground, and laboratory facilities; protecting the environment; protecting the aircraft, spacecraft, and payloads; and protecting the facilities, property, and equipment from operations-related safety hazards. GRC achieves these objectives thru the use of measures associated with Safety Management, Facility Safety, Safety Engineering, Construction Safety and Fire Protection Engineering.

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3.1.1 Safety Management

The Contractor shall support the implementation of and maintain the Safety Permit program per GSM Chapter 1A. The Contractor shall operate and maintain the NASA Incident Reporting and Information System (IRIS) to document mishaps close calls and other incident information. Additionally, The Contractor shall:

3.1.1.1 Prepare reports detailing requested safety management system metrics, including, but not limited to incidence case rate, injury/illness rates, days away, restricted duty, and other pertinent data and statistics

3.1.1.2 Participate and support GRC to achieve and maintain mandated initiatives or GRC-directed safety awareness activities

3.1.1.3 Maintain safety-related subsystems needed to record, communicate, and analyze safety management information

3.1.1.4 Support implementation of NASA Headquarters standards for programs

3.1.1.5 Support mishap investigations

3.1.2 Facility Safety

The Contractor shall support the implementation of the requirements of GRC Safety Manual (GSM) as follows:

3.1.2.1 Facility System Safety

The Contractor shall support the implementation of the requirements of GSM Chapter 3 to ensure the safe and continuous operation of GRC facilities. The requirements of this chapter are intended to ensure that the appropriate level of safety analysis, oversight, and resources are applied to projects involved in the construction of facilities (CoF) process as well as modifications made to existing facilities.

3.1.2.2 Office Safety

The Contractor shall support the implementation of GSM Chapter 32 to encompass the responsibilities, regulation, and requirements that ensure a safe working environment for personnel in an office setting at the NASA GRC.

3.1.2.3 Electrical System Safety

The Contractor shall support the implementation of the requirements of GSM Chapter 8 to ensure electrical safety guidelines and standards within the framework of GRC safety policies and constraints. Electrical systems safety encompasses the responsibilities, regulations, and requirements that ensure a safe working environment for personnel engaged in electrical work at GRC.

3.1.2.4 Student Safety and Health

The Contractor shall support the implementation of the requirements of GSM Chapter 4 to ensure policies and procedures and assigns responsibilities pertaining to Environmental Health, and Safety (EHS) training for NASA GRC students and mentors.

3.1.2.5 Lockout/Tag-out

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The Contractor shall support the implementation of the requirements of GSM Chapter 9 to establish requirements for a program to achieve proper lockout/tagout (LO/TO) to protect employees and equipment from all sources of potentially hazardous energy at GRC. Specific definitions, practices, and procedures are outlined by the Occupational Safety and Health Administration (OSHA) as given in 29 Code of Federal Regulations (CFR) 1910.147, Control of Hazardous Energy (LO/TO).

3.1.2.6 Oxygen Safety

The Contractor shall support the implementation of the requirements of GSM Chapter 5 to ensure the safe design, fabrication, and use of systems for gaseous and liquid oxygen at GRC.

3.1.2.7 Hydrogen Safety

The Contractor shall support the implementation of the requirements of GSM Chapter 6 to provide requirements and to serve as a guide for the safe design and use of hydrogen systems at GRC.

3.1.2.8 Pressure Systems Safety

The Contractor shall support the implementation of the requirements of GSM Chapter 7 pertaining to the Safety and Health Division support for certification and recertification, design, construction, operation, inspection, and maintenance of Pressure Vessel Systems. Hazardous Operations

3.1.2.9 Hazardous Operations

The Contractor shall support the implementation of the requirements of GSM Chapter 10 to protect employees who may engage in Hazardous Operations (HazOps) involving materials or equipment that, if misused or mishandled, have a high potential to result in loss of life, serious injury or illness to personnel, or damage to systems, equipment, or facilities.

3.1.2.10 Shop Safety

The Contractor shall support the implementation of the requirements of GSM Chapter 14 for working safely in machine and fabrication shops as well as for working with typical machining and metal-forming equipment and tools.

3.1.2.11 Personal Protective Equipment

The Contractor shall support the implementation of the requirements of GSM Chapter 15 to establish procedures and practices for the selection and use of personal protective equipment (PPE) not covered by specific programs (e.g., hearing protection or respiratory protection) at GRC. The purpose of this chapter is to provide guidance to employees and supervisors on the selection of appropriate PPE to prevent injury or illness that may result from hazards that cannot be controlled using administrative or engineering controls.

3.1.2.12 Explosives, Propellants, and Pyrotechnics Safety

The Contractor shall support the implementation of the requirements of GSM Chapter 18 to ensure the safety of GRC staff or facilities that are involved in explosives handling or processing.

3.1.2.13 Vehicle and Pedestrian Safety

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The Contractor shall support the implementation of the requirements of GSM Chapter 19 to address regulations and safe practices to be exercised by motor vehicle operators and pedestrians within the boundaries of LF and PBS. The Ohio State Digest of Motor Laws is the primary reference document for this chapter.

3.1.2.14 Lifting Devices and Equipment

The Contractor shall support the implementation of the requirements of GSM Chapter 20 which establishes NASA's minimum requirements for the design, testing, inspection, maintenance, personnel certification, and operation of lifting devices and equipment (LDE) at GRC. These requirements are established in accordance with NASA Technical Standard 8719.9.

3.1.2.15 Mishap and Close Call Reporting, Investigating, and Recordkeeping

The Contractor shall support the implementation of the requirements of GSM Chapter 21 to provide requirements to report, investigate, and document mishaps, close calls, and previously unidentified workplace hazards to prevent recurrence of similar accidents.

3.1.2.16 The Buddy System

The Contractor shall support the implementation of the requirements of GSM Chapter 22 to specify the requirements, procedures, and responsibilities for implementation of the Glenn Buddy System. It specifies the safety practices to be followed by employees working in potentially hazardous buildings or areas or by employees working alone in other buildings or areas at GRC.

3.1.2.17 Facility Safety and Health Inspection

The Contractor shall support the implementation of the requirements of GSM Chapter 24 to provide requirements for the conduct of Facility Safety and Health Inspections at GRC. This chapter identifies the types of facility safety and health inspections conducted at GRC, the frequency of these inspections, the composition of the inspection teams, and the responsibilities of the inspectors, management, and the GRC Safety and Health Division.

3.1.2.18 Combustible-Gas, Toxic-Gas, and Low-Oxygen Detection Systems

The Contractor shall support the implementation of the requirements of GSM Chapter 25 to establish procedures and practices for determining the need for systems to detect low oxygen, combustible gases and vapors, and toxic gas and for installing and maintaining these systems at GRC.

3.1.2.19 Building Emergency Evacuation Plan Program

The Contractor shall support the implementation of the requirements of GSM Chapter 27 to adhere to the GRC Building Emergency Evacuation Plan, including the basic procedures and responsibilities.

3.1.2.20 Job Hazard Analysis

The Contractor shall support the implementation of the requirements of GSM Chapter 33 to establish procedures and practices for conducting Job Hazard Analysis (JHA) at GRC.

3.1.2.21 Safety, Health and Environmental Training

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The Contractor shall support the implementation of the requirements of GSM Chapter 2 to conduct environmental, occupational health, and safety (EHS) training for NASA GRC employees.

3.1.3 Safety Engineering

The Contractor shall provide safety engineering for proactive planning and design of infrastructure, facilities process systems, and operational procedures to ensure a safe work environment with a focus on loss prevention and mission success. The Contractor shall provide various safety engineering services to include, but, not be limited to review of proposed new facility and process designs, review of proposed changes to facility or infrastructure for safety considerations, inspection of existing facility and infrastructure to determine compliance with regulations and standards, recommendations for process or facility improvements, and evaluation of prescriptive and performance-based criteria for safe facility

3.1.4 Safety Compliance and Integration

The Contractor shall conduct safety compliance activities to ensure compliance with all relevant regulatory requirements and to satisfy applicable guidance documents dealing with the recognition, evaluation, and control of unsafe work practices which may cause injury or death. The Contractor shall conduct assessments, audits, inspections, studies, designs, code compliance reviews, conferences, and training associated with safety and occupational health analysis, risk management, safety permitting, mishap reporting, data tracking, reporting, trending, and hazard forecasting.

3.1.5 Construction Safety

3.1.5.1 Construction Safety and Health

The Contractor shall support the implementation of the requirements of GSM Chapter 17 to ensure compliance with safety and health requirements for all construction activities at GRC.

3.1.5.2 Fall Protection

The Contractor shall support the implementation of the requirements of GSM Chapter 34 to ensure the policies and minimal safe practices relating to all activities where fall protection is required at GRC. The Contractor shall design and review fall protection systems, including horizontal lifelines, as required by an ANSI Z359 Qualified Person.

3.1.5.3 Confined Space Entry

The Contractor shall support the implementation of the requirements of GSM Chapter 16 to adhere to guidelines for the evaluation of, safe entry into, and work in permit-required confined spaces (PRCS.)

3.1.5.4 Hot-Work Authorization

The Contractor shall support the implementation of the requirements of GSM Chapter 28 to ensure provisions to prevent loss of life, property, and research capability caused by ignition from hot work operations and specific requirements to prevent such ignition.

3.1.5.5 Safety Barricades

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The Contractor shall support the implementation of the requirements of GSM Chapter 29 to address the policies and procedures to be followed for all barricading within the boundaries of LF and PBS. It includes what types of barricades are used and who the responsible parties are for each type.

3.1.5.6 Digging, Trenching, and Excavation Procedures

The Contractor shall support the implementation of the requirements of GSM Chapter 35 to provide guidelines to ensure the safety of employees who work in or around excavation activities performed at GRC.

3.1.5.7 Construction Plan Engineering/Design Review

The Contractor shall support the implementation of the requirements of GSM Chapter 17 to ensure safety compliance oversight is practiced in the construction design process from the beginning of project planning and design through the preparation of drawings and specifications.

3.1.5.8 Health And Safety Plan (HASP) Review

The Contractor shall support the implementation of the requirements of GSM Chapter 17 to ensure safety and health reviews are performed for all GRC construction activities requiring a HASP. HASP describes how identified hazards will be managed.

3.1.6 Fire Protection Engineering/AHJ (Authority Having Jurisdiction) Support

The Contractor shall support the implementation of the requirements of GSM Chapter 31 to address GRC policy guidance for fire protection provisions to prevent loss of life, property, and research capability. The Contractor shall perform construction and fire protection system design reviews and approve plans related to with respect to compliance with international, state and local building and fire codes, and NASA policy and guidance documents. The Contractor shall assist in the performance testing of required fire protection and suppression systems for repair and new system installations.

3.1.7 Operational Safety Support to Center Emergency Response and Interim Response Functions

The Contractor shall provide operational safety discipline support to emergency response and interim response functions. Such support may include involvement prior to, during, and after such events.

3.2 OCCUPATIONAL HEALTH

The occupational health requirements are comprised of industrial hygiene and health physics services.

3.2.1 Industrial Hygiene Services

The Contractor shall help to ensure compliance with all relevant regulatory requirements to satisfy applicable guidance documents dealing with the recognition, evaluation, and control of workplace factors or stresses that may cause sickness, impaired health, and well-being or significant discomfort and inefficiency among workers. The Contractor shall support the

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implementation of the requirements of the GRC Occupational and Health Programs Manual (GOHPM) as follows:

3.2.1.1 Hazard Communication Program

The Contractor shall support the implementation of the requirements of GOHPM Chapter 20 to ensure GRC compliance with OSHA 29 CFR 1910.1200 and with the GRC hazard communication policy. Activities involve chemicals inventory; material safety data sheets; labels and other forms of warning, information, and training.

3.2.1.2 Asbestos Program

The Contractor shall support the implementation of the requirements of GOHPM Chapter 2 for the handling, maintenance, use, removal, and disposal of all friable and non-friable asbestos-containing materials (ACMs), ACM debris, and presumed asbestos-containing materials

3.2.1.3 Chemical Hygiene Program

The Contractor shall support the implementation of the requirements of GOHPM Chapter 25 for the safe laboratory-scale use and handling of hazardous chemicals, including the use of engineering controls and wearing appropriate protective apparel and personal protective equipment (PPE).

3.2.1.4 Hearing Conservation Program

The Contractor shall support the implementation of the requirements of GOHPM Chapter 3 to minimize the likelihood of occupational noise-induced hearing loss among GRC employees, Contractors, students, and visitors.

3.2.1.5 Acquisition of Hazardous Chemicals and Materials

The Contractor shall support the implementation of the requirements of GOHPM Chapter 14 to utilize, support, and implement the inventory system required in GOHPM Chapter 25 to collect data on all incoming chemicals. The Contractor shall perform reviews of all incoming chemicals and materials with respect to existing safety, health, environmental, and homeland security requirements. The Contractor shall perform audits of the chemicals at GRC once a year, using statistical models and prepare reports on the validity of the Chemical Inventory Program based on the audit results and make recommendations for improvement.

3.2.1.6 Respiratory Protection Program

The Contractor shall support the implementation of the requirements of GOHPM Chapter 4 to protect employees from exposure to harmful concentrations of hazardous or toxic fibers, dust, fumes, mists, vapors, gases, or oxygen-deficient atmospheres where effective engineering controls are not feasible.

3.2.1.7 Lead

The Contractor shall support the implementation of the requirements of GOHPM Chapter 5 for handling, use, removal, and disposal of all lead-containing materials.

3.2.1.8 Elemental Mercury

The Contractor shall support the implementation of the requirements of GOHPM Chapter 6 to eliminate or minimize employee exposure to mercury-containing materials through a system of administrative and engineering controls and safe work practices.

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3.2.1.9 Local Exhaust Ventilation

The Contractor shall support the implementation of the requirements of GOHPM Chapter 7 to control occupational exposure to air contaminants.

3.2.1.10 Blood-borne Pathogens

The Contractor shall support the implementation of the requirements of GOHPM Chapter 11 to minimize the employee risk of exposure to blood-borne pathogens from blood and other potentially infectious materials (OPIMs).

3.2.1.11 Indoor Environmental Quality (IEQ)/Indoor Air Quality

The Contractor shall support the implementation of the requirements of GOHPM Chapter 12 to provide healthful indoor environments through proper facility design, operation and maintenance and to provide a mechanism for resolving concerns about IEQ.

3.2.1.12 Ergonomics

The Contractor shall support the implementation of the requirements of GOHPM Chapter 15 to assess risk factors that can lead to musculoskeletal disorders (MSD) and complete ergonomic evaluations.

3.2.1.13 Food Sanitation

The Contractor shall support the implementation of the requirements of GOHPM Chapter 16 to prevent outbreaks of food-borne illnesses by assuring that all food served or vended at Glenn Research Center (GRC) is clean, wholesome, and free of pathogenic organisms and organic or inorganic toxins (including those of bacterial origin).

3.2.1.14 Automated External Defibrillators (AED)

The Contractor shall support the implementation of the requirements of GOHPM Chapter 18 to support the use of automatic external defibrillators (AEDs) at GRC needed to provide a timely response to victims of sudden cardiac arrest caused by ventricular fibrillation.

3.2.1.15 Synthetic Inorganic Fiber

The Contractor shall support the implementation of the requirements of GOHPM Chapter 19 to reduce the risk of occupational illness resulting from exposure to synthetic fibers.

3.2.1.16 Hazard Assessment/Exposure Assessment

The Contractor shall support the implementation of the requirements of GOHPM Chapter 21 to provide healthful working environments throughout GRC by reviewing potentially hazardous operations and conducting personal and, where appropriate, area monitoring to evaluate worker exposure to hazardous chemical agents.

3.2.1.17 Reproductive Hazards

The Contractor shall support the implementation of the requirements of GOHPM Chapter 22 to protect the reproductive health of all employees, students, and visitors from occupational exposures to substances (chemical, biological, radiological, or physical) known or suspected of being able to pose a hazard to human reproduction and to identify potential reproductive and developmental hazards and implement appropriate exposure control measures.

3.2.1.18 Nano-material Health and Safety

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The Contractor shall support the implementation of the requirements of GOHPM Chapter 23 to reduce the risk of occupational illness resulting from exposure to nano-materials.

3.2.1.19 OSHA Regulated Materials

The Contractor shall support the implementation of the requirements of GOHPM Chapter 24 to protect employees who may be exposed to chemicals specifically regulated by OSHA from adverse health effects.

3.2.1.20 Facility Safety Occupational Health Support

The Contractor shall provide relevant occupational health support to programs described in section "3.1.2 Facility Safety" of this Statement of Work (e.g. gas monitoring as needed, hazardous operations, PPE, facility inspections).

3.2.1.21 Construction Safety Occupational Health Support

The Contractor shall provide relevant occupational health support to programs described in section "3.1.4 Construction Safety" of this Statement of Work (e.g. hotwork, confined spaces, HASP).

3.2.1.22 Occupational Health Support to Center Emergency Response and Interim Response Functions

The Contractor shall provide occupational health support to emergency response and interim response functions. Such support may include involvement prior to, during, and after such events.

3.2.1.23 Occupational Health Equipment and Laboratory Management

The Contractor shall coordinate the activities associated with maintaining the occupational health laboratories and equipment therein. Such tasks may include calibration, maintenance, and coordination of repairs of instrumentation, preparation for occupational sampling/surveys, and maintain adequate supplies of laboratory consumables and sampling media.

3.2.1.24 Chemical Sampling and Analysis Tasks and Off-Site Chemical Analysis

The Contractor shall provide comprehensive chemical sampling and analysis services and expert consulting in the areas of chemical analysis for contaminants in a variety of bulk samples and other media anticipated in supporting occupational health, environmental, and waste management tasks. These services could include the operation and maintenance of a chemistry laboratory (see equipment description in the "Government Furnished Property" listing), collection of various field samples, coordination of sampling and analysis tasks performed by subcontractors or other external entities, and coordination of sample analysis by off-site laboratories.

3.2.2 Health Physics

The health physics effort is focused on using sources of ionizing and non-ionizing radiation, including lasers, in a manner that is not only safe, but compliant with applicable regulations and consistent with recognized guidance documents. The Contractor shall provide various health physics services to include, but, not be limited to coordinating instrument calibration, dosimetry program business services, and various health physics technical services associated with the

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following health physics programs: Radiation Protection for Radioactive Materials (RAM); Radiation Protection for Radiation-Generating Equipment (RGE); Non-ionizing Radiation Safety; and Laser Safety.

3.2.2.1 Radiation Protection for Radioactive Materials

The Contractor shall support the implementation of the requirements of GOHPM Chapter 8 for the receipt, use, storage, or transfer of radioactive material (RAM) or equipment using such materials.

3.2.2.2 Radiation protection for Radiation – Generating Equipment

The Contractor shall support the implementation of the requirements of GOHPM Chapter 9 for the procurement and use of radiation-generating equipment (RGE), which includes, but is not limited to, x-ray-producing equipment.

3.2.2.3 Non-Ionizing Radiation

The Contractor shall support the implementation of the requirements of GOHPM Chapter 10 regarding suitable criteria for human exposure to non-ionizing radiation, including bands of light radiation (except for lasers).

3.2.2.4 Laser Safety

The Contractor shall support the implementation of the requirements of GOHPM Chapter 13 for the safe use of lasers and laser products.

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3.3 ENERGY AND ENVIRONMENT

The Energy and Environmental Management Office, in the Facilities and Test Directorate, provides overall coordination and integration of Glenn's energy and environmental efforts. The office is responsible for establishing energy and environmental metrics, in compliance with federal, state and local government regulations and mandates, and in alignment with Agency sustainability policies. The office oversees the planning and implementation of institutional initiatives to ensure synergy, environmental benefits and energy savings.

The Contractor shall support the implementation of, and improve the energy and environmental compliance tasks while maintaining currency with regulatory changes. The energy and environmental compliance tasks provide policy, oversight, and coordination for institutional and programmatic environmental issues. These tasks encompass a wide range of activities including but not limited to: environmental program development, education, outreach, training and implementation, environmental regulation updates and guidance development, permitting, environmental audits, coordinating with regulatory agencies, identifying and mitigating environmental consequences, minimize life-cycle costs, supporting Earth Day and America Recycles Day events and ongoing activities, collecting and maintain data, providing data interpretations, preparing reports and presenting data as necessary to customers including but not limited to government agencies, NASA HQ, GRC, other NASA Centers, GRC Code-FE, Code-QS, regulatory agencies and outside agencies. The contractor shall be required to collect, compile, and manage data in a variety of databases including but not limited to the NASA Environmental Tracking System (NETS), Corrective and Preventive Action Reporting System (CPARs), Chemical Inventory and Exchange Program (CHEMEX), internet-based collaborative electronic reading room, and Ohio EPA eBusiness software applications.

3.3.1 Environmental Management System (EMS)

The Contractor shall be responsible for supporting and implementing GRC's EMS as described in the GEPM Chapter 1 and GLPR8553.1C in the BMS demonstrating compliance and conformity with NASA Procedural Requirement (NPR) 8553.1 and ISO 14001 requirements.

3.3.1.1 The Contractor shall develop and track the Centers annual EMS Objectives and Targets.

3.3.1.2 The Contractor shall present program information to the GRC Mission Support Council.

3.3.1.3 The contractor shall develop and conduct EMS training.

3.3.1.4 The Contractor shall organize and conduct Internal Compliance Evaluations (ICE) as detailed in GLWI-QS-8550A.

3.3.1.5 The Contractor shall address and track all compliance issues, CPARS and audit findings including reporting these issues and their status in NETS.

3.3.2 Outreach Activities

The Contractor shall provide outreach as outlined in GEPM and Green Earth Committee <http://earthday.grc.nasa.gov/>. This task includes supporting and implementing outreach events

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and ongoing activities such as Stormwater Pollution Prevention, Species Management Sustainability, Adopt A Highway, Pollution Prevention, Earth Day and America Recycles Day.

3.3.3 Energy

The contractor shall be responsible for supporting and implementing NASA energy efficiency activities, such as energy and water conservation, greenhouse gas reduction, and the use of renewable energy sources, as per NPR 8570.1 Energy Efficiency and Water Conservation, Energy Efficiency Team (EET), and Energy Efficiency Panel (EEP). The contractor shall oversee critical elements of the GRC facilities management program including facility operation, maintenance, design, construction, real property, master planning, and energy and water conservation management. The primary purpose of this program is to optimize the use of energy and water resources in enabling the mission at GRC with minimal impact on the environment. The contractor shall purchase sustainable Energy and water efficient products.

3.3.4 Emergency Planning and Community Right-to-Know

3.3.4.1 The Contractor shall compile the Ohio State Emergency Response Forms (Ohio EPA Forms 0316 and 0317) for Lewis Field and Plum Brook Station per Chapter 13 of the GEPM.

3.3.4.2 The Contractor shall collect data for, and prepare the Superfund Amendments and Reauthorization Act (SARA) 312/313 reports.

3.3.4.3 The Contractor shall compile the U.S. EPA Toxic Chemical Release Inventory Reporting Form R for Lewis Field and Plum Brook Station per Chapter 13 of the GEPM.

3.3.5 Environmental Labeling Program

The contractor shall be responsible for implementing the Environmental Labeling Program for GRC. This includes reviewing labeling needs in the field, oversight of new labels or providing labels for all containers and equipment that require them. All labels must be in accordance with all Federal, state, and local laws and regulations (e.g., Ohio Administrative Code (OAC) 1301 BUSTR, Ohio Administrative Code (OAC) 3745-21-09, 40 CFR 82.106, 40 CFR 80.570 and 40 CFR Parts 260 to 299).

3.3.6 Onsite and Offsite Environmental Sampling and Analysis

3.3.6.1 The contractor shall provide expert advice and consulting in the areas of chemical analysis for environmental contaminants in a variety of matrices (i.e., soil, air, water, structures, wastes, and others).

3.3.6.2 The contractor shall provide sample collection, testing services, analytical results and data interpretations.

3.3.7 Implementation of the Clean Air Act

3.3.7.1 The Contractor shall perform tasks to implement the Clean Air Act (CAA) program as described in GEPM, Chapters 4 and 19. The contractor shall perform data analysis, data collection, permit application preparation, permit compliance, emission calculations, record

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keeping and reporting. The contractor shall assist in the implementation of all regulatory requirements at GRC.

3.3.7.2 The Contractor shall provide air emission sampling personnel and equipment to meet the regulatory standard for the pollutants being tested.

3.3.7.3 The Contractor shall support implementation of the Asbestos Blanket Permit

3.3.7.4 The Contractor shall maintain, improve, and implement the chemical management process including the speciated acquisition (chemical purchases broken down to account for individual chemical constituents), transportation, handling, use, usage rate, storage, and disposal rate of fuels and chemicals at GRC to ensure emissions meet all regulatory requirements (e.g., Ensuring that the Hazardous Air Pollutants emissions are in compliance with all Air Permit emission limits in the Lewis Field Title V Air Operating Permit).

3.3.8 Implementation of CERCLA

The contractor shall provide engineering services for Comprehensive Environmental Response Compensation and Liability Act (1980) (CERCLA) remedial investigations and remedial actions as described in GEPM, chapter 18. This may include design and review of work, other plans prepared by remedial action contractors, restoration meetings, teleconferences and video conferences, document preparation, document reviews, data management, restoration cost estimation using Integrated Data Evaluation and Analysis Library (IDEAL™) and/or NETS Xpress™, restoration program internal web, risk communications and community outreach for associated environmental tasks.

3.3.9 Implementation of NEPA

3.3.9.1 The Contractor shall support EEMO and the National Environmental Policy Act (NEPA) Manager in the review of NEPA studies, surveys, and assessments upon request and perform other NEPA tasks such as: environmental impact statements, environmental assessment, endangered species and/or wetlands analysis, watershed analyses, natural resource, cultural resource, economic, technical and/or risk analyses, NEPA and environmental planning related documentation including, but not limited to, preparation or review of NEPA and other environmental planning documents, and related programs as described in GEPM, Chapters 2, 11, 12, 21, and 24.

3.3.9.2 The Contractor shall utilize the NASA Electronic Tracking System (NETS) to record major NEPA analyses.

3.3.9.3 The Contractor shall maintain and update the Environmental Recourse Document. The Environmental Recourse Document is required by NASA regulation as a reference source for the preparation of environmental assessments and environmental impact statements.

3.3.9.4 The Contractor shall support the review of and response tracking of Safety Permits, 8095 and C150 forms.

3.3.10 Floodplain and Wetlands Management

3.3.10.1 The Contractor shall maintain an inventory of all known GRC floodplain and wetlands maps per GEPM Chapter 11.

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3.3.10.2 The contractor shall compile and review all applications to the Army Corps of Engineers for floodplain and wetlands permits.

3.3.10.3 The Contractor shall coordinate and facilitate critical communications with outside agencies including but not limited to the Army Corps of Engineers and the Ohio Department of Natural Resources. Records will be maintained and provided to the Government.

3.3.11 Endangered and Threatened Species

3.3.11.1 The Contractor shall develop and implement the endangered and threatened species program in accordance with GEMP Chapter 12 including identification and tracking of endangered flora and fauna at GRC.

3.3.11.2 The Contractor shall maintain and implement the Species Management plan at PBS. This includes but is not limited to the development of annual metrics with coordination of PBS management, tracking these metrics and reporting the progress of these metrics on a quarterly basis to the GRC EMS Program Manager. The Contractor shall support the annual deer hunts, field burns and other species management activities to complete the annual metrics.

3.3.11.3 The Contractor shall review proposed projects at their respective sites for impacts on threatened or endangered species per GEMP Chapter 12.

3.3.11.4 The Contractor shall maintain a record for the Government of all known occurrences of threatened and endangered species at GRC.

3.3.12 Pest Control

The Contractor shall support the implementation of the requirements of GEMP Chapter 21 including auditing of maintenance activities.

3.3.13 Cultural Resource Management and Historic Preservation

3.3.13.1 The Contractor shall support the GRC Historic Preservation Officer and shall support the implementation of the requirements of GEMP Chapter 24. The Contractor shall integrate cultural resource management into GRC comprehensive planning tasks, streamline the State Historic Preservation Office (SHPO) consultation process, ensure that GRC complies with legislation, regulations and guidelines including but not limited to: Federal Laws, Executive Orders, and Federal Guidelines as described in GEMP Chapter 24.

3.3.13.2 The Contractor shall support the Facilities Division in the implementation of GEMP Chapter 24.

3.3.13.3 The Contractor shall prepare documents for submission to the Ohio Historic Preservation Office, such as Section 106 reports, Cultural Resources Management Plan updates, Memorandum of Agreements and Programmatic Agreements.

3.3.13.4 The Contractor shall prepare cultural resources management studies, surveys, and reports for historically significant architectural and archeological properties at GRC.

3.3.13.5 The Contractor shall promote preservation to minimize adverse effects to cultural resources

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3.3.13.6 The Contractor shall identify the particular features that make each cultural resource significant and distinct and provide a comprehensive listing of GRC's cultural resources.

3.3.13.7 The Contractor shall provide advice and consult to the GRC and Facilities Division for cultural resource management

3.3.14 Emission Modeling, Global Positioning System (GPS), and Geographic Information System (GIS)

The contractor shall provide operation support, advice, or guidance to include but not be limited to mapping and cartography, natural resource planning, site selection, migration pattern analyses, pollution analyses, air pollution modeling, emergency preparedness planning, topographic data, 3D interactive visualization, packages, and data interpretation such as GPS and GIS.

3.3.15 Implementation of Clean Water Act

3.3.15.1 The contractor shall provide technical services and engineering analyses of water management issues including design and review of water treatment systems, water discharge (water includes wastewater and stormwater) and analysis, environmental sampling, report preparation and submission, troubleshooting to track contaminants in sewer systems or water, and tasks as described in GEPM, Chapter 3 and 27 and stated in this document in Section 3.2.1.21.

3.3.15.2 The contractor shall provide sampling of waters from secondary containment, tank cavities, impacted stormwater and wastewater, and coordinate waste management from construction activities. The contractor shall support the implementation of the storm water pollution prevention plan (SWP3) as described in GEPM, Chapter 27 and ensure that individual construction sites are adequately covered.

3.3.15.3 The contractor shall ensure compliance with, implement, maintain and update the National Pollution Discharge Elimination System (NPDES) Permit and any waivers. The contractor shall prepare all NPDES permit monthly reports. The Contractor shall compile the NPDES noncompliance, monthly monitoring and annual discharge fee reports. The Contractor shall compile the North East Ohio Regional Sewer District (NEORS) Underground Storage Tank (UST) Temporary Discharge Permit Application and the Hangar Semiannual Self-Monitoring Report. The contractor shall compile the Stormwater MS4 Annual Report, Permit renewal and Maintain Storm Water Management Plan and Annual Discharge Fee Report.

3.3.15.4 The Contractor shall annually inspect all water quality units and oil water separators and maintain as necessary as per post construction best management practices.

3.3.15.5 The Contractor shall provide outreach including supporting Earth Day activities such as GRC Clean the Creek initiative as described at the following web page <http://earthday.grc.nasa.gov/>

3.3.15.6 The Contractor shall investigate permit violations, probable and potential permit violations and complaints such as odors, colors, sediments and foam in the effluent.

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3.3.15.7 The Contractor shall collect water samples as directed by the COTR and in accordance with methods established by the U. S. Environmental Protection Agency (USEPA). The contractor shall participate in the USEPA's Performance Analysis Testing Program for analysis of samples under the National Pollutant Discharge Elimination System and shall maintain acceptable performance results. The contractor shall, at a minimum, have the capability to perform the following analyses: Turbidity, pH, iron (as Fe), total residue zinc (as Zn), oil and grease, residual chlorine, and total mercury.

3.3.16 Environmental Spill, Mishap and Incident Response

3.3.16.1 The Contractor shall provide qualified staff to assist the Office of Protective Services and the GRC Incident Command in the event of any environmental spill, mishap or Incident as described in GEPM, Chapter 8.

3.3.16.2 The Contractor shall be on call 24/7 to support emergency response. The Contractor shall provide emergency support as needed to the Security Office, First Responders, the Emergency Operations Center (EOC), and Emergency Response Team (ERT) for incident response.

3.3.16.3 The Contractor shall make any required notifications and prepare and present any necessary reports to NASA and or any outside regulatory agency.

3.3.16.4 The Contractor shall review, update and maintain the environmental sections of the Emergency Preparedness Plan.

3.3.17 Spill Prevention Control and Countermeasures Plan

3.3.17.1 The Contractor shall be responsible for implementing and maintaining the Spill Prevention Control and Countermeasures Plan (SPCC). These responsibilities include reviewing and updating the plan and GEPM Chapters 3, 8, 20, 25, 27 associated with the plan, assisting with implementing the plan, emergency response, tracking and reporting spills. The contractor shall compile the data required to generate these plans and chapters and provide data interpretations as needed. The contractor shall provide the appropriate Professional Engineer (PE) certifications and signatures to update the plan.

3.3.17.2 The Contractor shall provide the required SPCC training to the GRC Staff.

3.3.17.3 The Contractor shall have and maintain OSHA 40 hr 29 CFR - Hazardous Waste Operations and Emergency Response (HazWOPER) Training.

3.3.18 AST and UST Program Implementation

3.3.18.1 The contractor shall be responsible for implementing and maintaining the Aboveground Storage Tanks (AST) and Underground Storage Tanks (UST) programs as described in GEPM Chapters 20 and 25. These responsibilities include, addressing tank-related air permits, data collection and data interpretation, reviewing and updating SPCC plan as tank conditions change, preparing reports to the Bureau of Underground Storage Tank Regulations (BUSTR), Annual BUSTR registration of tanks, providing training to the tank site managers and other personnel involved with oils, and environmental course development and updates to training materials as needed. The Contractor shall obtain any required BUSTR Training.

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3.3.18.2 The Contractor shall oversee annual tank inspections. The contractor shall oversee regulatory inspections.

3.3.19 The Sustainable Acquisition Program Green Purchasing Initiative.

3.3.19.1 The Contractor shall be responsible for purchasing green designated products, which include recycled content, bio-preferred, environmentally preferred products, energy star, and water conservation materials per NPR 8530.1 and GEPM Chapter 6. The Contractor will make this purchasing data available to the sustainable acquisition program.

3.3.19.2 As required by the Resource Conservation and Recovery Act (RCRA), Executive Order (EO) 13514, Federal Acquisition Regulations (FAR) 23.4, and NPR 8530.1, the Contractor shall submit reports to the Energy and Environmental Management Office via NASA Environmental Tracking System (NETS) Quarterly detailing Green Purchases and Diverted Wastes. The Green purchase reports include but are not limited to recycled content, bio-preferred, energy star, and water conservation products purchased by the Contract. The Diverted Material reports include but are not limited to Composted, Recycled, Universal Waste, Hazardous Wastes, Construction Wastes and Solid Waste materials diverted from GRC waste streams. See.

<http://www.epa.gov/cpg/products.htm> <http://www.biopreferred.gov/ProductCategories.aspx>
<http://www.energystar.gov/products> <http://www.epa.gov/WaterSense/products/index.html>

3.3.19.2.1 For the recycled content products, the Contractor shall report the total dollar amount of each item, both virgin and biobased/recycled content, purchased during the previous fiscal year. (FAR clause 52.223-9, Estimate of Percentage of Recovered Material Content for EPA-Designated Products). The Contractor shall report the total dollar amount of each listed item purchased during the previous fiscal year that contained at least the minimum recommended percentages of recycled content or bio-based content. Estimating the percentage of the total recovered material used in contract performance, including, if applicable, the percentage of post-consumer material content. The reporting period shall be from October 1 of each year through September 30 of the following year and reported on Calendar Quarters into NETS. The final report shall be submitted by December 31 of the same calendar year.

3.3.19.2.2 The Contractor shall provide copies of the report to the Contracting Officer and the GRC Energy and Environmental Management Office. A complete listing of all categories and products designated in EPA's Comprehensive Procurement Guideline can be found at <http://www.epa.gov/cpg/products.htm>.

3.3.19.3 The Contractor shall request a waiver, Form (NASA C-138) if the EPA-designated items purchased cannot contain the specified amount of recovered materials. NASA C-138 form shall be completed and submitted (including supporting documentation) to the COTR for processing. The Contractor shall submit a copy of the completed forms to the Energy and Environmental management Office for approval.

3.3.20 The Sustainability and Pollution Prevention Programs.

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3.3.20.1 The contractor shall be responsible for implementing the sustainability and pollution prevention programs including life cycle assessments, recycling and waste reduction opportunities and related studies, pollution prevention alternatives including literature searches and managing program data as described in the GEPM Chapter 6.

3.3.20.2 The Contractor shall conduct life cycle assessment studies, research pollution prevention assessment opportunities, and green alternative substitutions.

3.3.21 Waste Management Tasks

3.3.21.1 The contractor shall be responsible for solid waste characterization. This includes the proper characterization and tracking of all offsite shipments of: solid wastes; hazardous wastes, soils to be used for commercial and/or industrial fill, construction and demolition debris, recyclables. This requires manifest development, review and tracking and storage.

3.3.21.2 As Per Section 3.2.1.21, the contractor shall have the capability to perform hazardous waste analysis including the toxicity characteristic leaching procedure (TCLP) as described in 40 CFR 261, Appendix II, and the following additional test for hazardous waste characteristics: reactivity, corrosiveness, and ignitability. All methods shall be in accordance with United States Environmental Protection Agency (US EPA) Publication SW-846, Methods for Evaluating Solid Waste.

3.3.21.3 The contractor shall be responsible for ensuring that all regulated waste (including solid waste, hazardous waste, universal waste, non-hazardous waste, used oils, construction and demolition debris, commercial/industrial soils, recyclable materials, resource conservation and recovery act (RCRA), hazardous, toxic substances control act (TSCA), asbestos containing materials (ACM), polychlorinated biphenyls (PCB's), lead based paint (LBP), medical waste, impacted storm water and impacted waste water, and excess property is properly disposed in accordance with all laws, regulation and NASA guidance.

3.3.21.4 The contractor shall maintain, improve, and implement the waste management programs such as those described in GEPM Chapters 5, 6, 7, 8, 10, 14, 23 and 26 to ensure that waste generators, including but not limited to medical services, chemical users, project managers, construction managers and COTR's properly dispose of regulated waste.

3.3.21.5 The contractor shall provide all necessary data and reports including reporting in the NETS, Ohio EPA eBusiness systems, and any other media as required such as Ohio EPA Annual Generators Report, material disposed, reused, and recycled, recycling funds generated, Notification of Regulated Waste Activity, EPA 8700-12.

3.3.21.6 The contractor shall provide the program for the collection, identification, segregation, packaging and offsite shipment of RCRA regulated waste to regulatory compliant treatment storage and disposal facilities (TSDF's).

3.3.21.7 The Contractor shall perform destination facility Audits

3.3.21.8 The contractor shall provide the program for the identification and training of RCRA waste generators and managers and conducts field reviews to assure regulatory compliance.

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- 3.3.21.9 The contractor shall support the program for the management and inspection of RCRA hazardous waste 90 day accumulation areas, satellite accumulation areas, used oil collection areas, recyclable material collection areas and solid waste collection areas.
- 3.3.21.10 The contractor shall maintain currency in regulatory changes affecting the GRC's waste management programs and update the GRC's programs to reflect changes in regulatory requirements by the date required by the regulations and GRC management.
- 3.3.21.11 The contractor shall maintain up-to-date knowledge of and assure compliance with all applicable RCRA and DOT regulations.
- 3.3.21.12 The contractor staff shall be qualified by having and maintaining current RCRA and DOT Training and having a minimum of 2 years of experience to perform RCRA site inspections and to perform RCRA waste management.
- 3.3.21.13 The contractor shall have and maintain OSHA 29 CFR - Hazardous waste operations and emergency response (HazWOPER) Training.
- 3.3.21.14 The Contractor shall have experience with the Incident Command System (ICS).
- 3.3.21.15 The contractor shall provide disposal data and records to GRC chemical management and all environmental program areas such as the Air program, Water Program, Sustainability and Pollution Prevention program and EMS.
- 3.3.21.16 The Contractor shall be trained and qualified in the use of cranes and rigging, trained and qualified to access and to work in confined spaces, trained and qualified in use of fall protection.
- 3.3.21.17 The contractor shall perform an annual review of the GRC's waste management programs, update the GEPM chapters, and recommend opportunities for improvement and opportunities to better integrate with the other environmental media and the operation of the GRC.
- 3.3.21.18 The contractor shall be responsible for assisting in the development of emergency response plans and hazardous materials spills, implementing and maintaining the RCRA Contingency Plan (currently combined with the SPCC Plan), the waste management procedural manual, auditing treatment storage and disposal (TSD) facilities that handle GRC wastes and assisting in investigations of mishandled wastes.
- 3.3.21.19 The contractor shall be responsible for investigating, setting up, inspecting, documenting, new RCRA waste storage sites and for the closure of RCRA waste accumulation sites.
- 3.3.21.20 The contractor shall be responsible for maintain regulatory compliance, collecting waste from various temporary storage sites, inspecting the wastes, inspecting the storage sites, consolidating the waste for shipment, arranging for transport and disposal, coordinating construction-related waste with other NASA and construction contractor organizations at GRC, and maintaining records as required by RCRA regulations and in accordance with the GEPM, Chapters 5, 6, 7, 10, 14, 23 and 26.
- 3.3.21.21 The contractor shall be responsible for ensuring that all waste characterizations, uniform hazardous waste manifests, solid waste manifests, NASA GRC non-solid waste forms,

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contractor property passes, land bans, hazardous waste profiles, and supporting analytical data, all waste shipping papers and all bills of lading are accurate, correct, and complete.

3.3.21.22 The contractor shall provide signatures for waste characterizations, uniform hazardous waste manifests, solid waste manifests, NASA GRC non-solid waste forms, contractor property passes, land ban forms, hazardous waste profiles, all waste shipping papers, all bills of lading and all supporting analytical data.

3.3.21.23 The Contractor shall ensure programmatic and regulatory compliance with all aspects of all shipping papers for the Government including the waste manifests and other necessary documents including tracking, reporting open manifests, tracking closure, regulatory required storage of the documents and long term document storage and retrieval of the documents.

3.3.21.24 The Contractor shall ensure that all labels and placards are present and correct.

3.3.21.25 The Contractor shall oversee the hazardous waste minimization program and must provide consulting on a variety of solid and hazardous waste disposal questions.

3.3.21.26 The Contractor shall work in accordance with the NASA Environmental Management System (EMS)

3.3.21.27 The Contractor shall manage the program related data and provide data to all environmental program areas. The contractor shall interface with and support all environmental program areas by providing this data.

3.3.21.28 The Contractor shall provide training to waste generators and additional personnel as needed, update and customized training materials, assist with emergency response activities, and coordinate remedial support for emergency response and incidences requiring off site assistance.

3.3.21.29 The Contractor shall provide engineering services, technical consultation and engineering evaluations to support environmental investigations and remedial actions. The Contractor shall prepare soil sampling plans for investigation of sites possibly contaminated by hazardous materials or past disposal of hazardous wastes, coordination of such sampling, analysis of data collected, and preparation of data for presentation to regulatory agencies. The contractor shall collate the data gathered in such assessments in a computerized spreadsheet and shall ensure proper quality assurance/quality control procedures are followed in data collection. Where the contractor conducts such assessments, the task performed shall be covered by a site-specific health and safety plan. All soils handled and/or disposed of shall be in accordance with GEPM, Chapter 23.

3.3.21.30 The Contractor shall provide container management for, hazardous materials, hazardous wastes, solid wastes, construction and demolition debris, soil spoils from drilling, and recyclable materials.

3.3.21.31 The contractor shall ensure that all funds earned through recycling efforts are managed through the GRC Recycling Program.

3.3.21.32 The Contractor shall perform additional tasks including but not limited to the following: cleaning manholes, and sewers, cleaning oil water separators, cleaning building

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sumps, remediate wood block floors, equipment decontamination, site characterization (e.g., asbestos containing material, lead-based paint, mercury, and polychlorinated biphenyl), site preparation/sweep for remediation (e.g., building sweep for chemicals, ozone depleting material, bulbs, ballasts, and oil containing devices.), coordination of utility isolation or utility abandonment and facility reclamation (e.g., test cell cleanout, hazardous material abatement, excess equipment and animal waste decontamination)

3.3.21.33 The contractor shall be on call 24/7 for emergency response. The Contractor shall provide emergency support as needed to the Security Office, First Responders the Emergency Operations Center (EOC), and ERT Emergency Response Team for incident response, including response, cleanup, and remediation where necessary.

3.3.21.34 The contractor shall be responsible for collecting soil borings at depths of up to 100 feet below ground level using a split-spoon sampler, auger, or other collection method as agreed upon with the COTR. Soil borings shall be in accordance with ASTM D-1586, ASTM D-2487, and ASTM D-2488. Soil boring results should include at a minimum depth to groundwater, nature of the soils encountered, and the presence of any hydrocarbons or other contaminants.

3.3.21.35 The Contractor shall support the Facilities Division (FD) with Institutional Construction Projects in complying with all energy and environmental requirements including but not limited to providing environmental sampling, remediation, and recycling support.

3.3.22 Drinking Water Program

3.3.22.1 The Contractor shall develop and implement a Drinking Water program

3.3.22.2 The Contractor shall use GEPM Chapter 22 titled Drinking Water as a guide to developing the program.

4. SCOPE SPECIFIC: AERO/SPACE SYSTEMS AND GROUND SUPPORT EQUIPMENT MISSION ASSURANCE

The Contractor shall provide the necessary management, personnel, equipment, and supplies (not otherwise provided by the Government) required to perform services for planning, implementation, and assessment of System Safety Engineering; Reliability and Maintainability Engineering; Electrical, Electronic, and Electromechanical (EEE) Parts; S&MA Management Information; Quality Assurance/Engineering; Software Assurance Engineering; Materials and Processes Engineering; Project Assurance; Risk Management; Independent Assessment; Documentation and Report Support elements for the GRC S&MA Directorate (SMAD).

4.1 GENERAL REQUIREMENTS

4.1.1 The Contractor shall assess compliance with NASA and GRC System Safety, Reliability, Maintainability, EEE Parts, Software Assurance, Risk Management, Materials & Processes, and Quality Assurance policies, requirements, standards, and controls listed in the Applicable Documents and Reference Documents Appendices below.

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- 4.1.2 The Contractor shall be certified in compliance with AS9100 revision C. If not presently certified, the Contractor shall be in the process of becoming compliant and achieve compliance within 12 months after contract award. The Contractor shall provide a copy of a compliance or certification audit report and correspondence confirming the compliance or certification to the government.
- 4.1.3 The Contractor shall evaluate the design, manufacturing, and testing of in-house and contracted aero/space hardware and software to ensure delivery of products in accordance with functional, performance, and design requirements. The Contractor shall perform S&MA activities throughout program and project life-cycles.
- 4.1.4 The Contractor shall assure that technical performance assessment information is provided in a timely manner to the GRC SMAD to support the decision-making process regarding open problems, hazards, and risks pertaining to accomplishing GRC's mission. This includes operation and maintenance of the S&MA management information processes and documents that are currently housed in the GRC BMS. The BMS is an electronic, hierarchal, collaborative, file sharing database where all GRC S&MA documents are housed.
- 4.1.5 The general requirements in this section support the SMAD's overall assurance efforts and independent assessment responsibilities. General requirements include:
- 4.1.5.1 The Contractor shall evaluate project activities and plans, including Safety and Mission Assurance Plans, for the GRC SMAD.
- 4.1.5.2 The Contractor shall coordinate system safety, reliability/maintainability, quality assurance (QA), materials and processes (M&P), software assurance (SA), risk management, and electrical, electronic, and electromechanical (EEE) parts control issues with S&MA, project, and Contractor personnel, and provide guidance, advice, and presentations, as appropriate, to help minimize risk and increase the probability of mission success.
- 4.1.5.3 The Contractor shall provide the GRC SMAD organization with recommendations for corrective and preventative action in identification of project deficiencies. Support the GRC's Corrective and Preventive Action Reporting System.
- 4.1.5.4 The Contractor shall interact with GRC Program/Project Office and other Contractors, as needed, to achieve project goals by requested deadlines.
- 4.1.5.5 The Contractor shall provide coordination and support (including: administrative support, preparation of presentations, and other conference materials) for on-site and off-site Technical meetings, and key program/project milestone reviews, as requested.
- 4.1.5.6 The Contractor shall make recommendations for improvements and innovative techniques which can be utilized to enhance the achievement of the S&MA/program's mission.

4.2 PROGRAM MANAGEMENT

4.2.1 SMA Continuous Improvement

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The Contractor shall assist in S&MA continuous improvements efforts.

4.2.2 Procedures and Work Instructions

4.2.2.1 The Contractor shall prepare system-level procedures and detailed work instructions of S&MA processes for GRC approval.

4.2.2.2 The Contractor shall review, update, and maintain program and project related S&MA procedures and work instructions

4.2.3 Personnel Training and Certification

For applicable tasks, the Contractor shall provide Certified Welding Inspector (CWI), all levels of Nondestructive Evaluation (NDE), ISO/AS9100 Quality Systems Auditor, and Risk Management Training personnel with the required knowledge and qualifications. The Contractor shall support the implementation of, and maintain a program for developing and maintaining the expertise of its employees in S&MA disciplines. When requested, the Contractor shall partner with GRC civil service employees by participating in S&MA civil service sponsored professional development activities.

4.3 FLIGHT SYSTEM SAFETY

4.3.1 Safety Compliance

The Contractor shall review, prepare, coordinate comments, and prepare presentation materials relating to Program/Project Safety Compliance Data Packages. The Contractor shall review, evaluate, and perform/generate Hazard Analyses, Fault Tree Analyses (FTA), Safety Analysis Reports (SAR), and Safety Critical Items Lists (CILs) on flight and ground-based components, systems, and facilities, to assure that these comply with NASA safety standards, procedures and requirements.

4.3.2 Hazard Reporting

The Contractor shall perform integration analyses for hazard reports, Safety Data Packages, and Failure Modes and Effects Analysis/Critical Items Lists (FMEA/CILs) to verify that all hazards identified have been analyzed, tested, or controlled. The Contractor shall recommend measures and actions to mitigate the impact and minimize the severity (e.g. likelihood) of hazards identified.

4.3.3 Safety Trade Studies

The Contractor shall perform and assess trade studies relative to design, development, manufacture, test, operation, or mission events to assure compliance with safety requirements and to assure safety risks are adequately identified, characterized, and mitigated.

4.3.4 Safety Assessment

The Contractor shall perform and evaluate independent assessments and analyses; such as, safety risk assessment, safety design assessments, and verifications compliance.

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4.3.5 Failure Reviews

The Contractor shall review and evaluate program failures and anomalies to determine root cause and lessons learned with the intent to provide corrective actions to mitigate or eliminate the problems/causes, and provide data utilizing tools such as Fishbone diagrams, Root Cause Analysis (RCA) Tool, the Lessons Learned Information System (LLIS), Problem Reporting and Corrective and Preventative Action (PRACA), and Incident Reporting Information System (IRIS), so the condition shall not be repeated in the future.

4.3.6 Hazard Analysis

The Contractor shall develop and evaluate hazard/verification matrices and track all hazard controls, verifications, and closures, which includes utilizing tools and techniques such as safety checklists, fault tree analyses, and logic tree assessments to assure hazard analyses are thorough and complete.

4.3.7 Safety Documentation

The Contractor shall prepare, review, and assess System Safety Plans, System Engineering Management Plans, and other program/project documentation/records and logs to assure compliance with applicable Agency, GRC and Program safety requirements.

4.3.8 Risk Trade Studies

The Contractor shall perform and evaluate trade studies relative to technology maturity, design, operations, and mission events to make sure considerations of all safety concerns and risk visibility have been addressed.

4.3.9 Safety Review Participation

The Contractor shall participate in (including making presentations as required) milestone reviews, safety reviews, technical interchange meetings, and readiness reviews to assure compliance with applicable safety requirements and consideration of safety risks.

4.3.10 Changes, Deviations and Waivers

The Contractor shall assess proposed changes, deviations, and waivers to project documentation to assure compliance with safety requirements, as requested. This includes evaluation of the impacts to safety analyses and the effects on program or project risk.

4.3.11 Program/Project Review Board Support

The Contractor shall provide systems safety expertise for program and project Review Boards such as, but not limited to the Configuration Control Boards, Engineering Review Boards, Fracture Control Board, Organization Review Board, and Pre-Ship Review Boards.

4.3.12 Safety Trending

The Contractor shall identify adverse safety trends and promptly notify GRC SMAD on assigned tasks.

4.3.13 Mission Support

The Contractor shall provide real-time safety assessments during pre-launch and launch countdowns and missions, as requested.

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4.3.14 Safety Assessments

The Contractor shall perform safety assessments for any issues that involve one or more of the following:

4.3.14.1 Operation or performance outside the expected performance parameters, or which has not previously been experienced.

4.3.14.2 Discrepancies or non-conformances that affect Configuration, Certification, Mission Success, Safety Critical Functions, Mass in excess of two pounds-mass over the mass allocation (equivalent performances to orbit), and Adverse Problem Trends.

4.3.14.3 Discrepancies or nonconformances that the project determines shall require design element analysis or assistance for resolution

4.3.14.4 Unexplained anomalies or events

4.3.14.5 Limits to hardware life

4.3.14.6 Restricted hardware or software use

4.3.14.7 Impacts to hazard controls

4.3.14.8 Impacts to flight or ground operation procedures that are controlled by the Government

4.3.14.9 Changes to software or hardware configurations that are controlled by the Government

4.3.14.10 Use of hardware that does not meet performance specifications, exceeds certification limits, or surpasses time, age, and cycle life limits (waivers/exceptions)

4.3.14.11 Critical hardware manufacture or repair processes

4.3.15 Safety Review Panel Support

The Contractor shall provide professional level services to the SMAD, Safety Review Panel (SRP), Payload Safety Review Panel (PSRP), and other NASA program-level safety panels. This includes but is not be limited to documentation distribution and review, board establishment and communication, executive secretary function, meeting action item tracking, records retention, and Independent Reviews of Safety Compliance Data Packages.

4.3.16 Maintenance and Development of Safety Metrics

The Contractor shall develop and maintain metrics regarding the System Safety performance of GRC assigned programs, projects, and activities.

4.4 RELIABILITY AND MAINTAINABILITY

4.4.1 Reliability and Maintainability Program

The Contractor shall develop and implement a reliability and maintainability program to assure implementation and verification of reliability and maintainability requirements, and to evaluate characteristics. As part of this program the Contractor shall develop a Reliability and Maintainability Plan.

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4.4.2 Project Reliability and Maintainability Documentation

The Contractor shall review project reliability and maintainability documentation to assure consistency and adequacy with overall project requirements.

4.4.3 Design Guidance/Issue Resolution

The Contractor shall furnish support by providing design guidance, including reviews of design concepts, attending program meetings, and resolving reliability issues.

4.4.4 Reliability and Maintainability Analyses

The Contractor shall conduct reliability and maintainability analyses using appropriate analytical methods after design has commenced. The analysis shall be updated periodically to reflect design changes and support program design reviews.

4.4.5 Milestone Review Support

The Contractor shall participate in project milestone reviews (SRRs, PDRs, CDRs, SARs, DCRs, FRRs, etc.) for the purpose of evaluating the incorporation of reliability and maintainability requirements throughout the life cycle of a project (e.g., design, development, production, testing, and operations).

4.4.6 Reliability, Maintainability, Availability Prediction

The Contractor shall predict system or function reliability, maintainability, and availability characteristics (e.g., failure rates and probabilities or availability rates) based on available design, analysis, or data.

4.4.7 Modeling and Simulation Tools

The Contractor shall make use of reliability modeling and simulation tools, such as RAPTOR, SAPHIRE, and CAFTA, to evaluate system design. The results of this evaluation along with recommendations associated with the system design shall be provided to NASA GRC.

4.4.8 Reports, Studies, and Database Development

The Contractor shall generate reports, providing trade studies, design change improvements, and system/component goals/requirements databases in support of preflight assessment reviews and flight readiness milestone reviews.

4.4.9 Failure Modes and Effects Analyses

The Contractor shall perform FMEA to determine component and system failure mechanisms and their effect(s) on system operation(s), (include development of recommended fixes, changes, and/or methods to eliminate or mitigate the effects and risks).

4.4.10 Critical Items Lists

The Contractor shall develop CILs to identify key items components, and drivers that influence overall operation, maintenance/spares allocations, data, and mission success.

4.4.11 Problem Reporting and Corrective Action

The Contractor shall evaluate Problem Reports, determine if the root cause has been identified and if the corrective action has been tested and verified. The Contractor shall provide reports, determine root causes, and recommend corrective action to the projects.

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4.4.12 Probabilistic Risk Assessments and Plans

The Contractor shall prepare Probabilistic Risk Assessment (PRA) plans for programs and projects. The Contractor shall perform Fault Tree Analyses (FTA) and PRA to identify event trees/scenarios that represent possible failure conditions, accident/failure sequences and failure modes, determine the probability of particular events occurring. The Contractor shall provide recommended actions to eliminate, mitigate, and/or control fault/failure events:

4.4.12.1 The Contractor shall review the PRA results of other Contractors and provide recommendations on the validity of these results.

4.4.12.2 For parts Screening and De-rating Procedures, the Contractor shall support parts engineers and project designer's to recommend procedures to screen, de-rate, upgrade, and test parts and components for flight acceptance

4.4.13 Limited Life Items

The Contractor shall evaluate and verify limited life items to assure design goals and mission requirements.

4.4.14 Availability, Maintainability and Maintenance Concepts

The Contractor shall evaluate and recommend maintainability and maintenance concepts for experiments, facilities, and systems to increase their availability and improve the probability of mission success.

4.5 ELECTRICAL, ELECTRONIC, AND ELECTROMECHANICAL (EEE) PARTS AND COMPLEX ELECTRONICS

4.5.1 EEE Parts Specification and Planning

The Contractor shall provide services to program and project organizations for internal or contracted efforts involving EEE parts and complex electronics in flight hardware, and mission-essential or critical ground support equipment. The Contractor shall assist/support the project development of parts procurement specifications, based on project reliability and assurance requirements (detailed in NASA-HDBK-8739.23), type of mission, and the ability to meet mission environmental conditions. The Contractor shall provide the project with administrative support for parts, (includes parts planning, parts documentation preparation, evaluation of parts supplier proposals, concurrent parts engineering during the design process, parts budget forecasting, and parts presentations at reviews).

4.5.2 Additional EEE Parts Activities

In addition, the Contractor shall:

4.5.2.1 Maintain the parts inventory and characteristics; prepare requirements for parts receiving, handling, storing, kitting, and identification.

4.5.2.2 Prepare the Parts Program Requirements that describe part types and part issues as identified in the parts-design and selection process for a list of preferred parts.

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4.5.2.3 Provide verification during requirements definition phase to ensure that the parts screening, qualification and vendor selection process is compliant with requirements and suitable for use in the flight units.

4.5.2.4 Participate in audits of existing and proposed suppliers to verify compliance to NASA standards.

4.5.2.5 Perform verification of components by name and supplier and verification of data submitted during hardware development for parts qualification, counterfeit parts prevention, screening, EEE parts problem resolution, corrective action and the disposition waivers from parts requirements, risk assessment, and recurrence control.

4.5.2.6 Assist in preparation, analysis and distribution of NASA Advisories (e.g. NASA TWX) and GIDEP ALERTS. Verify as-built configuration parts that are not included in the GIDEP database and coordinate with GRC Engineering to resolve any nonconformance.

4.5.2.7 Provide technical expertise to project/program for EEE part failure analysis of parts that fail during the flight acceptance test procedures and screening.

4.5.2.8 Evaluate electrical stress de-rating analysis and Mean Time Between Failure (MTBF) reliability analysis for flight hardware in conjunction with S&MA flight hardware certification process.

4.5.2.9 Provide reliability analysis tools and perform MTBF analyses. Examples of reliability analysis tools may include, but are not limited to, analytical techniques, papers, spreadsheets, etc.

4.5.2.10 Compare “as-built” configuration to the “as-designed” EEE parts lists and identify risk implications for any non-compliances to the Program and Project managers

4.5.2.11 Support GRC Engineering by verifying that test facilities meet Program requirements.

4.6 QUALITY ASSURANCE

4.6.1 Quality Management Systems, Plans, and Processes

The Contractor shall assist in defining and reviewing quality management systems and quality assurance plans and processes. The Contractor shall verify that designs being supported on an IDIQ task meet the customer’s quality requirements

4.6.2 Additional Quality Assurance Activities- In addition, the Contractor shall:

4.6.2.1 Provide expertise and give advice on matters pertaining to the implementation of NASA Policy Directive NPD 8730.5, NASA Quality Assurance Program Policy.

4.6.2.2 Support projects in establishment of requirements, specifications, and workmanship standards for the Product or Mission Assurance Plan.

4.6.2.3 Evaluate workmanship against the technical standards, specifications, procedures, and control documentation for in-house and contracted processes.

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- 4.6.2.4 Assist in generating Letter of Delegation (LOD), per NPR 8735.2A, Management of Government Quality Assurance Functions for NASA Contracts, to establish quality assurance requirements to be delegated to a non-NASA Federal agency.
- 4.6.2.5 Assist in developing Program/Project Quality Assurance Surveillance Plans (PQASP) per NPR 8735.2A, Management of Government Quality Assurance Functions for NASA Contracts. The purpose of PQASPs is to identify, in a single unified document, all Contractor work operations requiring Government surveillance and the specific method(s) for providing surveillance.
- 4.6.2.6 Assist in developing and maintaining a Qualified Supplier List (QSL).
- 4.6.2.7 Perform inspection and surveillance activities during manufacturing production, testing, and operations to reduce the overall risk to cost, schedule, and mission success.
- 4.6.2.8 Support the project in liaison activities with Contractor(s) and government representatives.
- 4.6.2.9 Support the project in developing project-specific Procurement Quality Assurance (PQA) procedures.
- 4.6.2.10 Perform PQA by conducting Program supplier evaluations, conducting quality management system audits at Program prime Contractor facilities, drafting LODs for Government approval, and defining quality requirements for Program Contractor and subContractor purchases in accordance with NPR 8735.2A, Management of Government Quality Assurance Functions for NASA Contracts.
- 4.6.2.11 Support the project in developing custom-tailored Quality Assurance requirements to be incorporated into Project-written SOWs and Requests for Proposals (RFPs).
- 4.6.2.12 Provide expertise and give advice on matters pertaining to the implementation of AS9100, both within GRC and at Contractor(s)/vendor(s).
- 4.6.2.13 Participate in Material Review Board (MRB) activities, evaluating disposition, and recommended actions.
- 4.6.2.14 Support the project to prepare process control procedures, assembly procedures, test plans, and test procedures.
- 4.6.2.15 Support the project to prepare inspection/verification matrices, inspection reports, problem reports, and nonconformance reports.
- 4.6.2.16 Support the project in identifying and documenting Mandatory Inspection Points (MIPs).
- 4.6.2.17 Perform drawing reviews; develop instructions, and checklists for verifying compliance with NASA requirements.
- 4.6.2.18 Participate in and provide assessment during Program/Project milestone reviews (e.g. PDR, CDR, TRR, SAR). Findings, comments, and recommendations shall be formally documented, such as by Review Item Discrepancy (RID) forms, and then tracked to ensure proper closure.

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- 4.6.2.19 Perform and provide process-proofing audits on Contractor(s) and vendors to validate processes and controls to assure end-item compliance to requirements.
- 4.6.2.20 Perform mission assurance audits and evaluations of Contractor(s) & sub-tier vendors to assure compliance with NASA and industry requirements, such as AS9100.
- 4.6.2.21 Generate audit/survey checklists, findings, and reports. Follow-up on corrective actions to preclude recurrence
- 4.6.2.22 Perform follow-up/surveillance activities relative to problem reports, audit findings, and verify corrective action(s) implementation.
- 4.6.2.23 Monitor problem investigation activities, including analysis, corrective action, and testing as well as final report(s).
- 4.6.2.24 Provide mission assurance expertise in preflight, rework/modifications and integration activities in-house and at other NASA Centers.

4.7 SOFTWARE ASSURANCE

4.7.1 CMMI Level 2 Certification

The Contractor shall be certified to Software Engineering Institute Software Capability Maturity Model Integrated (CMMI) Maturity Level 2 (or higher), in the process of becoming certified, or as a minimum have an established proven software assurance program that is in accordance with Software Engineering Institute Software Maturity Model Requirements. If not, the Contractor shall have an approach defined to achieve a CMMI Maturity Level 2 or equivalent within a year after contract award.

4.7.2 Program/Project Software Assurance (SA) Support

The Contractor shall provide Software Assurance (SA) support to GRC in-house and contracted Programs/Projects in accordance with NASA Software Assurance Standard NASA-STD-8739.8, and NASA-HDBK 8739.23 NASA Complex Electronics Handbook. This includes the assurance disciplines of Software Safety, Software Quality, Software Reliability, and Software Verification and Validation.

4.7.3 General Software Assurance Activities: The Contractor shall perform the following:

4.7.3.1 Conduct the Software Assurance Classification Assessment for each project in accordance with NASA Software Assurance Standard NASA-STD-8739.8.

4.7.3.2 Support the establishment of SA requirements in accordance with applicable NASA/GRC policies, standards, and procedures, and the implementation of these requirements on software development programs/projects.

4.7.3.3 Prepare and evaluate SA Plans according to NASA-STD-8739.8. Establish requirements, testing, and evaluation criteria.

4.7.3.4 Perform in-line work and support the oversight of a Program / Project's management, assurance, and engineering processes. Perform SA surveillance of assigned GRC contracted design, development, and testing activities.

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4.7.3.5 Participate in SA risk identification, analysis, tracking, and control

4.7.3.6 Support institutional software safety related work such as Facility Safety.

4.7.4 Products and Processes Software Quality Assurance

For Products and Processes Software Quality Assurance (PPQA), the Contractor shall:

4.7.4.1 Review and provide assessments of software products and processes (e.g. Software Requirements Specifications, Software Management Plan, Software Development Plan, Software Assurance Plan, Software Safety Plan, Software Test Plans, procedures, processes, reports) for compliance with NASA and GRC policies, procedures, and standards.

4.7.4.2 Conduct formal code walk-through(s) including reports, results, and recommendations, and provide nonconformance and reporting data for software reviews.

4.7.4.3 Support planning, execution, and tracking of audits of software processes and products (Software development folders, Software Requirement traceability, Peer review and Formal Inspection, Software Functional and Physical Configurations) for compliance with applicable plans and to assure project requirements are met.

4.7.4.4 Assure that software quality metrics (e.g. defect metrics) and process (including trending) are in place and are used to ensure the quality, reliability, and safety of the software products being developed. Analyze software quality metrics using data collected by the project and Software Assurance.

4.7.5 Software Safety

For Software Safety, the Contractor shall:

4.7.5.1 Perform tasks to assure that requirements for NASA-STD-8719.13, Software Safety Standard, are implemented.

4.7.5.2 Support the safety analyses performed by the system safety engineers (e.g., system hazard analysis, system fault tree analysis).

4.7.5.3 Evaluate and recommend dispositions of software safety analysis reports.

4.7.5.4 Support interactions with NASA program-level safety panels, such as the ISS Computer Safety Working Group (CSWG), when requested.

4.7.6 Software Reliability

For Software Reliability, the Contractor shall:

4.7.6.1 Evaluate software reliability and maintainability analyses (e.g. system failure mode and effects analysis, fault tolerance and redundancy analysis) to verify their validity and to assure that these analyses have been performed in accordance with established plans and requirements.

4.7.6.2 Perform trend analyses on the software quality metrics.

4.7.7 Software Verification and Validation (SV&V)

For Software Verification and Validation (SV&V), the Contractor shall:

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4.7.7.1 Participate in SV&V activities to assure that these activities occur according to established plans, policies, procedures, and standards.

4.7.7.2 Participate in and provide assessment during Program/Project milestone reviews (e.g. PDR, CDR, TRR).

4.7.7.3 Provide objective evidence to the project and S&MA of the software's readiness for operational release.

4.7.7.4 Conduct Independent Verification and Validation (IV&V) of mission software and operations (e.g. evaluate modeling and simulations tools and processes, evaluate test plans and witness testing, and evaluate data)

4.7.8 GRC Software Assurance Program

The Contractor shall perform the following tasks to support the establishment of GRC software assurance program:

4.7.8.1 Evaluate and provide assessment of applicable NASA/GRC SA policies, procedures, and standards listed in the Applicable Documents and Reference Documents Appendices below.

4.7.8.2 Provide support in the collection of SA metrics and in developing, utilizing, and maintaining SA metric database

4.7.8.3 Provide support in trending analysis

4.7.9 Software Assurance Research Program (SARP)

The Contractor shall provide support to the NASA Software Assurance Research Program by:

4.7.9.1 Participating in writing proposals

4.7.9.2 Participating in the development of software tools and methodologies to support software assurance, software safety, software reliability, software verification and validation

4.7.9.3 Participating in Software Research and Technology Infusions

4.7.10 Mission Operations Support

The Contractor shall provide support to mission operations (i.e., simulations testing, flight readiness, launch and flight operations), as required.

4.8 MATERIALS AND PROCESSES

4.8.1 Material Selection and Control

The Contractor shall support the project in the application and implementation of NASA-STD-6016. Provide guidance as to the selection and control of materials used in flight hardware and aero/space applications. Provide insight into materials hazards, durability and damage modes associated with the use of these materials.

4.8.2 MIUL and MUA Development

The Contractor shall review drawings and associated design documents to assure that materials are properly selected, specified and meet design requirements of the mission and are

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correctly represented on Material Identification and Usage Lists (MIULs). Develop safe and technically sound rationale for Material Usage Agreements (MUAs),

4.8.3 Materials and Processes Technical Information System

The Contractor shall support the project in the use, content and application of the NASA Materials and Processes Technical Information System (MAPTIS).

4.8.4 Materials Guidance

The Contractor shall provide guidance on the implementation and selection of materials compliant to NASA-STD-6001 (includes familiarity with test methods, database and testing sites).

4.8.5 Nondestructive Evaluation

The Contractor shall review and evaluate Nondestructive Evaluation (NDE) testing processes, procedures, and controls as applied to aero/space materials and flight hardware manufacturing. Recommend improvements, as appropriate. Evaluate and assess Non-Destructive Evaluation Plans.

4.8.6 Contamination Control Plans

The Contractor shall establish contamination control needed for processing, fabrication, assembly, and testing of systems for manned flight and ground operations. Evaluate and assess Contamination Control Plans.

4.8.7 Welding Process Implementation

The Contractor shall coordinate the implementation of welding processes to assure that safe and sound weldments are being produced for flight programs, as well as for facilities and ground support equipment.

4.8.8 Data Requirement Deliverables Evaluation

The Contractor shall evaluate Contractor data requirement deliverables, such as Materials and Processes Selection, Control and Implementation Plan, Oxygen Compatibility Assessment, Materials Property Test Plans, Fracture Control Plan, or Manufacturing Plans. Assist/support in preparing or reviewing Statements-of-work for materials and processes data deliverables.

4.8.9 Materials and Processes Audits

The Contractor shall conduct or support Materials and Processes audits of project or Contractor activities to determine extent of compliance to the governing requirements and facilitate improvement in deficient areas.

4.8.10 Materials Requirements and Specifications

The Contractor shall prepare material requirements and specifications in response to project direction.

4.8.11 Materials Testing Guidance

The Contractor shall support the Project in the selection of the most applicable and cost effective tests to verify that selected materials meet mission requirements.

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4.8.12 Special or Critical Process Oversight

The Contractor shall provide support in specification, review and oversight of special and critical processes.

4.9 WELDING/NONDESTRUCTIVE EVALUATION/TEST (NDE/NDT)

4.9.1 NDE/NDT Review and Evaluation

The Contractor shall support the project to review and evaluate Nondestructive Evaluation (NDE) testing processes, procedures, and controls, and recommend improvements to the test methods, as appropriate.

4.9.2 Certified Weld Inspector

The Contractor shall have the capability to supply Certified Welding Inspector (CWI) and all levels of NDE.

4.9.3 Welding Certification and Qualification Program

The Contractor shall coordinate the implementation of GRC Welding Certification and Qualification Program to assure that safe and sound weldments are being produced for flight programs, as well as for facilities and ground support equipment.

4.9.4 Qualification of Welding/Brazing Personnel

The Contractor shall provide expertise to the processes required for the qualification of welding and brazing personnel and review and authorize welding and brazing processes and documentation in accordance with facility policies and procedures, applicable industry codes and specifications, and governing NASA standards.

4.9.5 Welding Expertise

The Contractor shall have expertise to perform testing and analyses of manufacturing techniques, processes, and procedures pertaining to welding in support of the GRC welding program.

4.10 RISK MANAGEMENT

4.10.1 Continuous Risk Management Implementation and Facilitation

The Contractor shall provide risk management facilitation, planning, organization, direction, and expertise for continuous risk management implementation within programs and projects. The Contractor shall coordinate all Continuous Risk Management activities with the Center's Risk Management Officer.

4.10.2 Additional Facilitation Activities

The Contractor shall facilitate the implementation of Risk Management by performing the following:

4.10.2.1 Work with the Chief S&MA Officers to coordinate the assignment of Continuous Risk Management (CRM) trainers and facilitators for projects.

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4.10.2.2 Ensure programs and projects utilize risk-based and risk-informed decision making to continuously assess the acquisition, safety, technical, and programmatic risks.

4.10.2.3 Assist programs and projects in developing, implementing, and updating Risk Management (RM) Plans.

4.10.2.4 Review risk statements to ensure they are correctly written, using Condition; Consequence format.

4.10.2.5 Provide guidance on estimating the likelihood, consequences, and timeframe of the risk.

4.10.2.6 Review the risk mitigations to ensure the mitigation shall actually reduce the likelihood and consequence of the risk occurring.

4.10.2.7 Assure risks are tracked and used to measure the progress of the risk management program.

4.10.2.8 Monitor risk closures and reporting.

4.10.2.9 Assure their respective Project/Element risk information is documented in the respective risk database and kept current.

4.10.2.10 Assist higher level managers in making decisions on significant risk issues, including subordinate and common level risk issues.

4.10.2.11 Assure all appropriate personnel (both government and Contractor) are provided proper RM training.

4.10.2.12 Ensure the project is adhering to a continuous risk management process.

4.10.2.13 Conduct CRM training and Risks Identification Workshops with the projects.

4.10.2.14 Review and assess the effectiveness of the Risk Management process for programs and projects and provide recommendations for improvement.

4.10.2.15 Coordinate the reporting of risk management activities for projects, in support of the monthly risk discipline meetings.

4.10.3 Continuous Risk Management Trainer Certification

The Contractor shall obtain and maintain Continuous Risk Management trainer certification requirements. The Contractor shall research methods, tools, and techniques to enable and improve the continuous risk management process. The Contractor shall maintain the Risk Management Implementation Tool (RMIT) usage and enhancements. The Contractor shall also assist the GRC representative for developments, enhancements, and assessments of Agency Risk Management related policies, standards, and guidelines.

4.10.4 Risk-Based Acquisition Management Implementation

The Contractor shall support Risk Based Acquisition Management (RBAM) implementation into on-going NASA acquisition procedures and processes.

4.10.5 Risk Management Process Integration

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The Contractor shall provide support to integrate risk management, PRA, and hazard data in efforts to provide risk-informed decisions to the projects, and also provide expertise in metric, measurement, and trending of CRM, RBAM, and PRA program/project risk data.

4.11 NASA ADVISORIES AND GOVERNMENT-INDUSTRY DATA EXCHANGE PROGRAM (GIDEP)/ACUTE LAUNCH EMERGENCY RELIABILITY TIP (ALERT) SYSTEM

4.11.1 GIDEP/ALERT System Usage

The Contractor shall use the GIDEP/ALERT system to exchange information both internal and external to NASA.

4.11.2 GIDEP/ALERT File/Information Maintenance

The Contractor shall maintain the GIDEP/ALERT files and related information, and the ALERT distribution list.

4.11.3 ALERT Distribution/Coordination

The Contractor shall review ALERTs for applicability to GRC contracts, distribute ALERTs, and determine adequacy of responses.

4.11.4 GIDEP/ALERT Methodology Compliance

The Contractor shall comply with the established methods to evaluate, initiate, investigate, distribute and respond to ALERTs which apply to GRC and other NASA Centers per the process and requirements of NPR 8735.1, Procedure for Exchanging Parts, Materials, and Safety Problem Data Utilizing the Government Industry Data Exchange and GLP-QE-8735.1, NASA Advisories and Government-Industry Data Exchange Program (GIDEP) / Acute Launch Emergency Reliability Tip (ALERT) System.

4.12 LESSONS LEARNED

4.12.1 Lessons Learned Coordination/Submission/Training

The Contractor shall support the GRC Center Data Manager (CDM) in coordinating lessons learned submission activities between GRC and NASA HQ, advocating the use of, and provide education as required for individuals and organizations as required per NPR 7120.6 Lessons Learned Process.

4.12.2 Review of Lessons Learned

The Contractor shall support the coordination review of approved lessons learned for export control, patent, legal, and public affairs clearance.

4.12.3 Lessons Learned Archive Maintenance

The Contractor shall support maintaining GRC lessons learned archives and metrics.

4.13 INSPECTION, MEASURING, AND TEST EQUIPMENT (IMTE)

4.13.1 The Contractor shall support the effort to control, calibrate, and maintain inspection, measuring, and test equipment (IMTE) that affects quality or safety at GRC, by performing the following:

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- 4.13.1.1 Evaluate the impact on safety and quality of using un-calibrated IMTE.
- 4.13.1.2 Act as a third-party mediator to resolve any IMTE safety and/or quality issue(s) including the issuance of a stop work order or waiver for continued use based on the results of the evaluation.
- 4.13.1.3 Act as the approving authority for calibration interval extension requests beyond 20 percent of the calibration interval.
- 4.13.1.4 Assist in the review of GRC Measuring and Test Equipment Out-of-Tolerance Impact Analysis Reports.
- 4.13.1.5 Audit IMTE processes on a quarterly basis for safety compliance, documentation (e.g., forms, labels, task qualification, and so forth), traceability (e.g., standards, reports, technical data, environment, facility, and so forth), and procurement quality.

4.14 INDEPENDENT ASSESSMENT AND AUDITS

- 4.14.1 The Contractor shall provide programmatic, technical, and process expertise within each S&MA discipline for conducting Independent Assessments (IAs) to enhance the success of Programs and Projects, and the effectiveness of S&MA processes implemented in Programs and Projects.
- 4.14.2 The Contractor shall perform the following as a part of Independent Assessment Activities:
 - 4.14.2.1 Develop and maintain Independent Assurance assessment work plans.
 - 4.14.2.2 Perform assessments in accordance with approved assessment plans. Report significant issues or concerns developed by the assessment immediately to GRC S&MA.
 - 4.14.2.3 Develop report of analysis, observations, findings and recommendations and present report to GRC S&MA for approval.
 - 4.14.2.4 Document findings and supporting objective evidence.
 - 4.14.2.5 Provide briefings on observations, findings, and recommendations to GRC S&MA.
 - 4.14.2.6 Coordinate and perform follow-up on closure of report observations and any assigned actions as required.
 - 4.14.2.7 Participate in Headquarters S&MA led Audits and Reviews, as requested (NPR 8705.6).
 - 4.14.2.8 Assure that audit/review team members have the requisite program/project, subject matter, and auditor experience and competency to participate in program/project audits and review onsite audits and reviews.
 - 4.14.2.9 Perform all tasks in accordance with approved plans/procedures.

4.15 ASSURANCE METHODOLOGIES AND TECHNOLOGIES

- 4.15.1 Advance the State-Of-The-Art Assurance Technologies

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The Contractor shall participate in activities to advance the state-of-the-art assurance methodologies and technologies in support of NASA research and technology initiatives.

4.15.1.1 The Contractor shall conduct or participate in research efforts in new technologies for the purpose of identifying deployable advanced assurance techniques.

4.15.1.2 The Contractor shall also propose concepts for innovative methodologies and technologies.

4.15.1.3 The Contractor shall carry out activities to advance S&MA capabilities in performing assurance functions. These activities include evolving or improving existing assurance and analysis techniques, and proposing and developing new assurance concepts.

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5. CONTRACT ADMINISTRATION AND BUSINESS MANAGEMENT

The Contractor shall provide effective and efficient business processes, administrative and technical program management for effective direction and control of this contract. The Contractor shall provide and use management information systems, which monitor and measure performance, and allow for the planning, scheduling, organizing, controlling, and reporting of all activities required by this contract. These systems shall be utilized to assure accomplishment of program technical and schedule requirements, and cost objectives. As a minimum, the Contractor shall:

- Develop and implement effective, efficient, and responsive management process and systems,
- Institute and maintain effective oversight of all contract activities;
- Ensure effective integration of administrative, business and technical functions,
- Develop and implement effective management approaches to identify, analyze, track, and mitigate contract related risks associated with:
 - Contract transition/phase-in
 - Contract administration
 - Technical performance
 - Work accomplishment
- Develop annual staffing plans vs. projected workloads
- Develop and implement an effective management approach for estimating, projecting, controlling and reporting contract costs;
- Develop and implement an effective management approach for communicating, and documenting contract activity;
- Develop and implement an effective management approach for initial contract staffing and maintaining contract required staffing levels;
- Develop and implement an effective management approach for scheduling, monitoring, and overall contract and task performance;
- Develop and implement an effective management approach for monitoring Government Furnished Property assigned for potential usage by the contract.

5.1 Communications:

The Contractor's team shall initiate and maintain regular and effective written and oral communications with the CO and COTR to discuss a wide range of contract performance issues including but not limited to: process improvements, risks and related issues, corrective actions, recovery plans, and other details of contract operations (Base and IDIQ). The Contractor shall, at the Government's request, document in writing the decisions made during these communications.

5.2 Innovation Plan:

Within 60 days of contract award, an approved Innovation Plan will become a part of the contract. Revised/updated Innovation plans shall be required on an annual basis. The plan shall recommend alternatives to the established procedures and/or organizational support of the contract with the intended impact of reduced costs and/or greater efficiencies in performance of the contract requirements. The plan shall include technical and cost

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information sufficient to enable the Contracting Officer to evaluate the feasibility and impacts. The Contractor may propose changes in other activities that impact performance on its contract, including Government and other Contractor operations, if such changes will optimize cost savings. Innovation Plan review meetings will be held to encourage collaboration with the Contractor, Contracting Officer and Contracting Officer's Representative (COR) to implement any approved innovation approaches. The final approval for any approach lies with the Contracting officer.

5.3 Regulatory Changes:

Changes in regulations and regulatory requirements may change requirements in tasks. The Contractor shall work with NASA CO, and COTR to adjust for any such changes.

5.4 Prioritization of Work:

Due to scheduling needs, the Contractor may have multiple task orders and/or task order proposal requests under way simultaneously. Under such conditions, the Contractor must still complete all orders within the schedule allowed. The Government reserves the right to divert the Contractor to work on task orders of higher priority. In such cases, time extensions shall be granted, via a modification to the task order, for completion of task orders that have been delayed because of Government actions.

6. GENERAL ADMINISTRATIVE REQUIREMENTS

6.1 STAFF TRAINING AND CERTIFICATIONS

This contract requires, in all areas of performance, the appropriate level of formal education, experience, certification, current mandatory training and a detailed knowledge of applicable Federal statutes, executive orders, and federal regulations, as well as state and local statutes and regulations. In addition, a thorough awareness of all relevant NASA and GRC policies and procedural manuals is required. See applicable and reference material in this SOW.

6.2 BASE EFFORT AND IDIQ TECHNICAL REPRESENTATIVES

The GRC COTR will assign Technical Representatives (TRs) for Sections 3.1, 3.2, 3.3, and 4, of this SOW.

6.3 SPECIAL PROJECTS/TASKS

These tasks may include any or all items mentioned in this statement of work which shall be of a temporary nature. They may include tasks performed at GRC or at another NASA Center, HQ, another Federal Agency, or at Contractor's location. Tasks shall be numbered in sequential order in accordance with the NASA FAR Supplement. Special tasks shall be issued by the Contracting Officer. These tasks shall be issued in accordance with the Task Ordering Procedure (NFS 1852.216-80) (OCT 1996). In addition, any scope covered or mentioned in the SOW shall also apply as scope for Special Projects/Tasks. A Technical Representative (TR) may be appointed to specific tasks by the COTR.

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6.4 DELIVERABLES

The Contractor shall prepare and deliver the following as required below. Monthly Reports shall be submitted on or before fifteen (10) calendar days of the subsequent month (unless otherwise specified).

The table in section 6.4.7 summarizes all technical reports specified in this SOW. **Unless otherwise specified in the contract, all reports to the COTR and Contracting Officer shall be submitted as follows: an electronic copy sent via encrypted email.**

6.4.1 Weekly Progress Report

The Contractor shall submit informal progress reports for the individual awarded task orders, and the status of all base effort.

6.4.2 Monthly Technical Activity Report

The Contractor shall include a summary of technical activity including significant progress, status of milestones, accomplishments, problems (i.e., major issues, schedule impacts, etc.), and future plans. These reports shall be submitted in electronic form to the COTR for review and comment by NASA. .

6.4.3 Task Order Status Report

Within 10 working days after the close of the Contractor's accounting month, the Contractor shall submit a Task Order Status Report for open tasks containing, as a minimum, the following by task:

6.4.3.1 Task name

6.4.3.2 Actions taken during the month

6.4.3.3 Planned actions

6.4.3.4 Problems encountered

6.4.3.5 Summary of tasks completed and pending

6.4.4 Contractor Financial Management Reports

The Contractor shall prepare and distribute NASA Form 533M entitled "Monthly Contractor Financial Management Report" in accordance with the instructions set forth on the reverse side of the form and in the NASA Handbook "Procedures for Contractor Reporting of Correlated Cost and Performance Data" (NPR 9501.2, Current Revision is Rev E).

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6.4.5 Financial Status

Within 60 working days after contract completion, the Contractor shall submit for the contracting officer's approval a final Financial Status Report in the same format as a 533M. All figures reported are the actual and final figures.

6.4.6 Organizational Conflicts of Interest (OCI)

The Contractor shall submit an OCI Avoidance plan to the CO for approval within 30 days of contract award pursuant to NFS 1852.209-71 Limitation of Future Contracting, NFS 1852.237-72 Access to Sensitive Information and NFS 1852.237-73 Release of Sensitive Information

6.4.7 Reports and Deliverables Table

The table below summarizes all technical reports specified in this SOW.

Title	Frequency	SOW Reference	Recipient	Format
Weekly Progress Reports	Weekly as required by individual task orders and base work	6.4.1	COTR/TRs	See 6.4
Monthly Technical Activity Report	Monthly	6.4.2	COTR and CO	See 6.4
Program Status Report	Monthly Within 10 operating days after close of contractor's accounting period	6.4.3	COTR	See 6.4
Contractor Financial Management Report	Monthly	6.4.4	CO, COTR, Cost Accountant,	See 6.4, Hard Copy Required for Cost Accountant
Financial Status	One-time Due within 20 operating days of final contract completion	6.4.5	CO, COTR, Cost Accountant,	See 6.4, Hard Copy Required for Cost Accountant
Innovation Plan	Once annually	5.2	CO/COTR	See 6.4
Organizational Conflict of Interest Avoidance Plan	One time, due within 30 days after contract award	6.4.6	CO/COTR	See 6.4
Environmental site assessments	Intermittent, upon		COTR/TRs	See 6.4

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	request			
Industrial hygiene sampling reports	Intermittent, upon request		COTR/TRs	See 6.4
Health physics decommissioning plans	Intermittent, upon request		COTR/TRs	See 6.4
Audit reports	Intermittent, upon request		COTR/TRs	See 6.4
Chemical sampling and analysis reports	Intermittent, upon request		COTR/TRs	See 6.4
Environmental Sampling Work Plans	Intermittent, upon request		COTR/TRs	See 6.4
Sustainability and other environmental studies	Intermittent, upon request		COTR/TRs	See 6.4
Environmental Auditing	Intermittent, upon request		COTR/TRs	See 6.4
Safety Engineering Analysis	Intermittent, upon request		COTR/TRs	See 6.4
Safety Regulatory/Program Reviews	Intermittent, upon request		COTR/TRs	See 6.4
Safety Facilities Assessments	Intermittent, upon request		COTR/TRs	See 6.4
Facilities Safety Inspection Reports	Intermittent, upon request		COTR/TRs	See 6.4
Responses to notices of violation	Intermittent, upon request		COTR/TRs	See 6.4
Regulatory analyses	Intermittent, upon request		COTR/TRs	See 6.4

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6.5 APPENDICES

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Appendix-A: Acronyms

The following is a list of acronyms used in this SOW.

AA	Asbestos Abatement
ADP	Automated Data Processing
AHJ	Authority Having Jurisdiction
AIHA	American Industrial Hygiene Association
AIRFA	American Indian Religious Freedom Act
ALERT	Acute Launch Emergency Reliability Tip
ARPA	Archaeological Resources Protection Act
AST	Aboveground Storage Tanks
ASTM	American Society for Testing and Materials
BMS	Business Management System
BUSTR	Bureau of Underground Storage Tank Regulations
CAA	Clean Air Act
CDM	Center Data Manager
CDR	Critical Design Review
CERCLA Act	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
CHEMEX	Chemical Inventory and Exchange Program
CIL	Critical Items List
CO	Contracting Officer
CoF	Construction of Facilities
COTR	Contracting Officer's Technical Representative
CPAR	Corrective and Preventive Action Reporting System
CPG	Comprehensive Procurement Guidelines
CRM	Continuous Risk Management
CSD	Computer Support Division
CWI	Certified Welding Inspector
DCR	Design Certification Review
EEE	Electrical, Electronic, and Electromechanical
EEP	Energy Efficiency Panel
EET	Energy Efficiency Team
EHS	Environmental, Health, and Safety
EMB	Environmental Management Board
EMS	Environmental Management Systems
EPA	Environmental Protection Agency
EPCRA	Emergency Planning & Community Right-To-Know Act
FAR	Federal Acquisition Regulation
FRR	Flight Readiness Review
FMEA	Failure Modes and Effects Analysis
FTA	Fault Tree Analyses
GEPM	Glenn Environmental Programs Manual
GIDEP	Government-Industry Data Exchange Program
GIS	Geographic Information System

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GOHPM	Glenn Occupational Health Programs Manual
GPS	Global Positioning System
GRC	Glenn Research Center (Includes Lewis Field and Plum Brook Station)
GSM	Glenn Safety Manual
HaSP	Health and Safety Plan
HazOps	Hazardous Operations
HOP	Hazardous Operating Permit
HP	Health Physics
IDEAL	Integrated Data Evaluation and Analysis Library
IH	Industrial Hygiene
IMTE	Instruments, Measurements, and Test Equipment
IRIS	Incident Reporting and Information System
IV&V	Independent Verification & Validation
JHA	Job Hazard Analysis
LDE	Lifting Devices and Equipment
LF	Lewis Field
LLIS	Lessons Learned Information System
LO/TO	Lockout/Tagout
LOD	Letter of Delegation
M&P	Materials and Processes
MAPTIS	Materials and Processes Technical Information System
MIP	Mandatory Inspection Points
MIUL	Material Identification and Usage Lists
MRB	Material Review Board
MTBF	Mean Time Between Failures
MUA	Material Usage Agreements
NAGPRA	Native American Graves Protection and Repatriation Act
NASA	National Aeronautics and Space Administration
NCS	National Consensus Standard
NDE	Nondestructive Evaluation
NDT	Nondestructive Testing
NEPA	National Environmental Policy Act
NETS	NASA Environmental Tracking System
NHB	NASA Handbook
NHPA	National Historic Preservation Act
NIST	National Institute of Standards & Technology
NPD	NASA Procedural Document
NPR	NASA Procedural Requirement
NVLAP	National Voluntary Laboratory Accreditation Program
OAC	Ohio Administrative Code
OPIM	Other Potentially Infectious Material
OSHA	Occupational Safety and Health Administration
PBS	Plum Brook Station
PDR	Preliminary Design Review
PPE	Personal Protective Equipment
PPQA	Products and Processes Quality Assurance
PQA	Procurement Quality Assurance
PQASP	Program/Project Quality Assurance Surveillance Plans

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PRA	Probabilistic Risk Assessment
PRACA	Problem Reporting and Corrective and Preventative Action
PRCS	Permit-Required Confined Space
PSRP	Payload Safety Review Panel
PV/S	Pressure Vessel and Pressurized System
RAM	Reliability And Maintainability
RBAM	Risk-Based Acquisition Management
RCA	Root Cause Analysis
RCRA	Resource Conservation and Recovery Act
RFP	Request for Proposal
RGE	Radiation-Generating Equipment
RID	Review Item Discrepancy
S&MA	Safety and Mission Assurance
SA	Software Assurance
SAR	Safety Analysis Report
SAR	System Acceptance Review
SARA	Superfund Amendments and Reauthorization Act
SHED	Safety and Health Division
SHPO	State Historic Preservation Office
SIN	Special Item Number
SMAD	Safety and Mission Assurance Directorate
SMSR	Safety and Mission Success Review
SOP	Standard Operating Procedure
SOW	Statement of Work
SPCC	Spill Prevention Control and Countermeasures
SRP	Safety Review Panel
SRR	System Requirements Review
SV&V	Software Verification & Validation
SWP3	Storm Water Pollution Prevention Plan
TCLP	Toxicity Characteristic Leaching Procedure
TSCA	Toxic Substances Control Act
TSD	Treatment Storage And Disposal
USEPA	U. S. Environmental Protection Agency
UST	Underground Storage Tanks
WBS	Work Breakdown Structure

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Appendix-B: Applicable Documents

GRC Program Manuals

The GRC Program Manuals are available on the web at the following address:

6.5.1 Glenn Safety Manual (GSM)

<http://smad-ext.grc.nasa.gov/shed/pub/gsm/gsm-manual.pdf>

6.5.2 Glenn Occupational Health Programs Manual (GOHPM)

<http://smad-ext.grc.nasa.gov/shed/pub/ohpm/ohpm-manual.pdf>

6.5.3 Glenn Environmental Programs Manual (GEPM)

<http://www.grc.nasa.gov/WWW/FTD/EEMO/documents/epm-TOC.pdf>

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Appendix-C: Reference Documents

The Contractor shall follow and incorporate all Federal Regulations and Laws, NASA Policy Directives (NPD), NASA Procedural Requirements (NPR), and GRC Procedural Requirements and Directives (GLPR and GLID) into all deliverables, as applicable. For the Safety, Occupational Health and Environmental disciplines, these references are identified in the “reference section” of each chapter in the manuals called out in Appendix B of this document. Supplements or amendments to listed publications from any organizational level may be issued during the life of the contract. The Contractor shall follow all existing and new laws and regulations that are implemented during this contract.

Federal Regulations

Federal Regulation	United States Code (U.S.C)
American Indian Religious Freedom Act (AIRFA)	42 U.S. Code [U.S.C.] 1996 et seq.
Archaeological Resources Protection Act of 1979 (ARPA)	16 U.S.C. 470aa-mm et seq.
Archeological and Historic Preservation Act of 1974	16 U.S.C. 469-469c-2
Legacy Resource Protection Program Act	
National Historic Preservation Act (NHPA)	16 U.S.C. 470 et seq.
Native American Graves Protection and Repatriation Act (NAGPRA)	25 U.S.C. 3001 et seq.)
Bald Eagle Protection Act, June 8, 1940, as amended 1959, 1962	16 U.S.C. §§ 668-668d
Clean Air Act	42 U.S.C. 7401 et seq.
Clean Water Act	33 U.S.C. 1251 et seq.
Coastal Zone Management Act of 1972	16 U.S.C. 1451 et seq.
Comprehensive Environmental Response, Compensation, and Liability Act	42 U.S.C. 9601 et seq.
Emergency Planning & Community Right-To-Know Act (EPCRA)	42 U.S.C. 11001 et seq.
Endangered Species Act of 1973	16 U.S.C. 1531 et seq.
Federal Insecticide, Fungicide and Rodenticide Act	7 U.S.C. 136 et seq.

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Fish and Wildlife Coordination Act	16 U.S.C. 661-666c
Historic Sites Act of 1935	16 U.S.C. 461 et seq.
Marine Mammal Protection Act	16 U.S.C. 1361 et seq.
Migratory Bird Treaty Act	16 U.S.C. 703 et seq.
National Environmental Policy Act of 1969 (NEPA)	42 U.S.C. 4321 et seq.
National Historic Preservation Act	16 U.S.C. 470 et seq.
National Wildlife Refuge System Administration Act of 1966	PL 89-669; 16 U.S.C. 668dd- 668ee
Occupational Safety and Health Act of 1970	
Pollution Prevention Act	42 U.S.C. 13101 et seq.
Resource Conservation and Recovery Act	42 U.S.C. 6901 et seq.
River and Harbors Act	33 U.S.C. 403 et seq.
Safe Drinking Water Act	42 U.S.C. 300f et seq.)
Superfund Amendments and Reauthorization Act (SARA), Title III, Sections 311, 312, and 313	
Toxic Substances Control Act	15 U.S.C. 2601 et seq.)
<u>Uses of recycling revenue</u>	Public Law (P.L.) 103-329, Section 608.

Federal Guidelines

- 6.5.4 Advisory Council on Historic Preservation (Council) Memo, 3 July 1991, Relationship between
- 6.5.5 Section 106 of the NHPA and the NAGPRA
- 6.5.6 National Register Bulletins (multiple)
- 6.5.7 Secretary of the Interiors' Standards and Guidelines for Archaeology and Historic Preservation.
- 6.5.8 FAR 52 Use of Recovered Materials
- 6.5.9 Recovered Materials Advisory Notice

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Codes of Federal Regulations (CFR)

Code of Federal Regulations (CFR)	Title
36 CFR Part 63	Determination of Eligibility for Inclusion on the National Register of Historic Places
36 CFR Part 60	National Register of Historic Places (National Register)
36 CFR Part 65	National Historic Landmarks Program
32 CFR Part 229	Protection of Archaeological Resources
36 CFR Part 800	Protection of Historic Properties
36 CFR Part 78	Waiver of Federal Agency Responsibilities under Section 110 of the NHPA
40 CFR	Protection of the Environment

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Executive Orders (EO)

Executive Order number	Date	Title
12829	06 January 1993	NATIONAL INDUSTRIAL SECURITY PROGRAM
11514	05 March 1970	Protection and Enhancement of Environmental Quality
11593		Protection and Enhancement of the Cultural Environment
11988	24 May 1977	Floodplain Management
11990	24 May 1977	Protection of Wetlands
13112	03 February 1999	Invasive Species
11514	05 March 1970	Protection and Enhancement of Environmental Quality
12088	13 October 1978	Federal Compliance with Pollution Control Standards
12114	04 January 1979	Environmental Effects Abroad of Major Federal Actions
12843	21 April 1993	Procurement Requirements and Policies for Federal Agencies for Ozone-Depleting Substances
12898	11 February 1994	Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations
12902	8 March 1994	Energy Efficiency and Water Conservation at Federal Facilities
13006	21 May 1996	Locating Federal Facilities on Historic Properties in our Nation's Central Cities
13007	24 March 1996	Indian Sacred Sites
13089	11 June 1998	Coral Reef Protection
13101	14 September 1998	Greening the Government through Waste Prevention, Recycling, and Federal Acquisition
13123	4 June 1999	Greening the Government through Efficient Energy Management
13134	12 August 1999	Developing and Promoting Biobased and Bioenergy

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13141	16 November 1999	Environmental Review of Trade Agreements
13148	21 April 2000	Greening the Government through Leadership in Environmental Management
13149	21 April 2000	Greening the Government through Federal Fleet and Transportation Efficiency
13175	6 November 2000	Consultation and Coordination with Indian Tribal Governments
13186	10 January 2001	Responsibilities of Federal Agencies To Protect Migratory Birds
13287	March 3, 2003	Preserve America
13423	January 24, 2007	Strengthening Federal Environmental, Energy, and Transportation Management
13514		Federal Leadership in Environmental, Energy, and Economic Performance

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NASA Policy Directives (NPD)

NASA Policy Directive (NPD)	Title
8500.1	NASA Environmental Management (Revalidated 4/27/04)
8553.1	Sustainable Acquisition Program and Plan for Environmentally Preferable Products
8570.1	Energy Efficiency and Water Conservation w/Change 1 (3/30/04)
8580.1	Implementing The National Environmental Policy Act And Executive Order 12114
8530.1	Sustainable Acquisition Requirements for Environmentally Preferable Products
8820.C	Design and Construction of Facilities
8570.1	Energy Efficiency and Water Conservation
8700.1	NASA Policy for Safety and Mission Success
8720.1	NASA Reliability and Maintainability (R&M) Program Policy
8730.2	NASA Parts Policy
8730.5	NASA Quality Assurance Program Policy

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NASA Procedural Requirements (NPR)

NASA Procedural Requirements (NPR)	Title
7120.10	Technical Standards for NASA Programs and Projects
7120.5	NASA Space Flight Program and Project Management Requirements
7123.1	NASA Systems Engineering Processes and Requirements
7150.2	NASA Software Engineering Requirements
8000.4	Agency Risk Management Procedural Requirements
8621.1	NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping
8705.2	Human-Rating Requirements for Space Systems
8705.5	Probabilistic Risk Assessment (PRA) Procedures for NASA Programs and Projects
8705.6	Safety and Mission Assurance Audits, Reviews, and Assessments
8715.3	NASA General Safety Program Requirements
8715.5	Range Flight Safety Program
8715.6	NASA Procedural Requirements for Limiting Orbital Debris
8715.7	Expendable Launch Vehicle Payload Safety Program
8735.1	Procedures for Exchanging Parts, Materials, and Safety Problem Data Utilizing the Government-Industry Data Exchange Program and NASA Advisories
8715.2	NASA Emergency Preparedness Plan Procedural Requirements
8580.1	Implementing the National Environmental Policy Act (42 United States Code (U.S.C.) 4321–4345)
8735.2A	Management of Government Quality Assurance Functions for NASA Contracts
7120.6	Lessons Learned Process

NASA Standards (STDs)

NASA Standards (NASA STDs)	Title
NASA-STD-4003	Electrical Bonding for NASA Launch Vehicles, Spacecraft, Payloads, and Flight Equipment

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NASA-STD-5001	Structural Design and Test Factors of Safety for Space-Flight Hardware
NASA-STD-(I)-5005	Standard for the Design and Fabrication of Ground Support Equipment”
NASA-STD-6016	Standard Materials And Processes Requirements For Spacecraft
NASA-STD-8719.13	NASA Software Safety Standard
NASA-STD-8729.1	Planning, Developing, and Managing an Effective Reliability and Maintainability Program
NASA-STD-8739.8	NASA Software Assurance Standard

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GRC Directives (GLID)

GRC Directive (GLID)	Title
8730.5A	Glenn Research Center Business Management System (BMS) Quality System Manual
1410.2	Glenn Documentation Management
1420.1	Forms Management Program
GLP-FD0-1000.6	Project Management Process
GLWI-Q-5600.1D	Statement of Work Concurrence, Revision D

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GRC Procedural Requirements (GLPR)

GRC Procedurals Requirements (GLPR)	Title
5137.1	Performance-Based Acquisition
5335.1	Foreign Object Debris
5340.1	Control of Non-conforming Product
7120.5.30	Space Assurance Requirements (and applicable documents listed within)
8000.1	Risk Management
8700.1	Product Assurance – Scientific Research
8700.4	Product Assurance
8710.1	Certification & Qualification of NDT Examination Personnel
8730.6	Control of Inspection, Measuring, and Test Equipment
8739.1	Software Assurance
1270.1	Corrective and Preventive Action
1280.1	GRC Management Review
1410.1	Glenn Directives Management
1410.3	Issuing and Controlling Lower Level Documents
1440.1	Records Management
1720.1	GRC Center Mishap Preparedness and Contingency Plan
3410.1	On-the-Job Training Documentation
7120.14	GRC Deviation/Waiver Process
7123.22	GRC Verification and Validation Procedure
7123.33	GRC Risk Management Process
7123.34	GRC Configuration and Data Management
8040.1	GRC Configuration Management & Data Management
8553.1C	Glenn Research Center Environmental Management System Manual
9980.1	Internal Audits

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GRC Handbooks and other Reference Documents

GRC Handbooks and Other Reference Documents	Title
GLHB-QE-8730.1	EEE and Mechanical Parts Management
GLM-QE-8715.1	Battery Safety and Design Manual for Payloads
GLM-QE-8730.1	Parts De-rating
GLM-QE-8730.2	GRC Welding Manual
GLP-QE-8715.1	Program/Project/Subproject System Safety
GLP-QE-8720.1	Reliability, Availability, and Maintainability Assurance
GLP-QE-8730.4	Electrical, Electronic, and Electromechanical (EEE) Parts Assurance
GLP-QE-8730.8	Materials and Processes
GLP-QE-8735.1	Government Industry Data Exchange Program (GIDEP) & NASA Advisories
GLP-QE-8735.2	Requirements for Establishing Government Mandatory Inspection Points
GLP-QE-8750.1	Software Assurance
GLWI-QE-8715.2	Shuttle/ISS Payload Safety Data Package Preparation
GLWI-QE-8715.3	Hazard Analysis Preparation
GLWI-QE-8715.4	Shuttle/ISS Payload Safety Data Package Review
GLWI-QE-8715.5	Independent Safety Verifications Review
GLWI-QE-8720.2	Failure Modes and Effects Analysis (FMEA), Critical Items List (CIL), and Fault Tree Analysis (FTA)
GLWI-QE-8720.3	Reliability Prediction/Maintainability Assessment/Availability Analyses
GLWI-QE-8720.4	Probabilistic Design Analysis (PDA)
GLWI-QE-8720.5	Preparation of the Limited-Life Items Plan
GLWI-QE-8720.6	Probabilistic Risk Assessment (PRA)
GLWI-QE-8720.7	High Level Probabilistic Risk Assessment (PRA)

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GLWI-QE-8730.10	Materials Usage Agreement (MUA)
GLWI-QE-8730.17	Visual Weld Inspection
GLWI-QE-8730.18	Waiver Process for In Situ Calibration at Glenn Research Center
GLWI-QE-8730.21	Visible Liquid Penetrant Inspection of Materials and Components – Solvent Removable Process
GLWI-QE-8730.22	Fluorescent Liquid Penetrant Inspection of Materials and Components – Solvent Removable Process
GLWI-QE-8730.23	Review of Fastener Control Plans for Programs and Projects
GLWI-QE-8730.6	Design for Radiation
GLWI-QE-8730.9	Materials and Processes Certification for Space Programs and Projects
GLWI-QE-8750.2	Software Assurance: Software Risk Analysis
GLWI-QE-8750.3	Software Assurance: Software Verification & Validation
GLWI-QE-8750.4	Software Assurance: Document Review
GLWI-QE-8750.5	Software Assurance: Test Verification
GLWI-QE-8750.6	Software Assurance: Configuration Management Audits
GLP-FD0-1000.6	Project Management Process
GLP-QE-8700.3	Space Product Assurance
GLP-QE-8700.4	Lessons Learned Information System
GLP-QE-8730.8	Materials and Processes
GLP-QE-8735.1	Government Industry Data Exchange Program (GIDEP) & NASA Advisories
GLWI-Q-5600.1D	Statement of Work Concurrence, Revision D
C-278	Organizational File Plan and Records List
C-260a	Waste Disposal Request
C-150	Environmental Checklist
C-8095	SOW Requirements Review & Concurrence
HDBK 8739.23	NASA Complex Electronics Handbook
NASA TM 4322	NASA Preferred Reliability Practices for Design and Test
NPSL	NASA Parts Selection List

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NSTS 1700.7	ISS Addendum: Safety Policy and Requirements for Payloads Using the International Space Station
NSTS/ISS 13830	Payload Safety Review and Data Submittal Requirements for Payloads Using the Space Shuttle and International Space Station
SSP 30309	Safety Analysis and Risk Assessment Requirements Document (for the International Space Station)
SSP 50021	Safety Requirements Document for International Space Station
GLP-QS-1100.2	SHED Area Clearance Procedure
GLP-QS-1100.2	Safety, Health and Environmental Division Calibration of Measuring and Testing Equipment (CMTE)
GLWI-QS-1410.1	Safety, Health and Environmental Chapter Format, Revision, and Review