

SECTION C. DESCRIPTION/SPECIFICATIONS/STATEMENT OF WORK

The contractor shall provide the item or services specified in Section B in accordance with the following: Safety and Mission Assurance Support Services II (S-MASS II)

C.1 BACKGROUND

The Kennedy Space Center (KSC) Safety and Mission Assurance (SMA) Directorate supports the KSC Development and Operations activities which support NASA Programs and Projects active at KSC. Additionally, KSC SMA provides all government SMA in support of the KSC Institution.

The effort described in this Statement of Work (SOW) provides mission assurance, engineering, and risk assessment in the disciplines of safety, reliability, and quality within KSC and at all KSC responsible sites (e.g., facilities assigned to KSC at Vandenberg Air Force Base, Dryden Flight Research Center, etc.).

C.2 OBJECTIVE

This contract provides for continuity of services to KSC SMA Directorate in the aforementioned areas. The Government maintains responsibility for all SMA policies and decisions. The contractor shall provide services and products that support accomplishment of those policies and decisions as defined in this SOW.

C.3 SCOPE

- (a) This effort includes the review of work done by other contractors and NASA organizations and applies to current and future programs and projects.
- (b) The contractor shall have the capability to subcontract out unique services or expertise as may be required to complete S-MASS II requirements.

Note: Functions and 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 will 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. Specific exceptions to this approval restriction will be directed by the Government in writing on a case-by-case basis.

C.4 DATA REQUIREMENTS

The Data Requirements List (DRL) and the Data Requirements Descriptions (DRDs), found in Section J are part of this SOW. In addition to the data deliverables described in Section J, the contractor shall manage all documentation and data produced in performance of this contract (e.g., assessments, evaluations, reports, presentations, processes, plans, reviews, and statuses) in accordance with the requirements of this SOW.

C.5 ADMINISTRATIVE

- (a) Place of Performance: The contractor will be in close proximity to the KSC SMA office they are supporting. However, performance may include off-site travel to KSC responsible sites.

- (b) Information Technology (IT) Security: The contractor shall comply with NPR 2810.1, Security of Information Technology. NASA IT Security personnel will perform the penetration testing requirements of NPR 2810.1.
- (c) Organizational Conflict of Interest (OCI) Avoidance Plan: When accessing sensitive or non public information or using subject matter expertise, the contractor will mitigate organizational conflicts of interest, maintain appropriate firewalls within the organization and insure that the contractor provides unbiased, impartial advice in accordance with its OCI Avoidance Plan.
- (d) Safety and Health Plan: The contractor shall develop, update and implement a Safety and Health Plan in compliance with NPR 8715.3, Appendix E.

C.6 CONTRACTOR MANAGEMENT RESPONSIBILITIES

The contractor will manage and administer all contract activity. The contractor will provide and maintain management interfaces to KSC SMA, the contracting officer, Contracting Officer Technical Representative (COTR), and technical management. The contractor will report formally as required in the contract, and shall respond to technical management queries related to contracted activities.

- (a) The contractor shall develop and implement management functions to ensure that all contracted activities are accomplished in accordance with contract terms and conditions (DRD 01). The contractor shall provide and maintain management systems for the planning, organization, control, and reporting of all activities required by this contract. These systems shall assure accomplishment of program technical and schedule requirements, and cost objectives.
- (b) The contractor will provide a Risk Management Plan detailing the overall management system and organization for accomplishing the requirements of this contract (DRD 01).
- (c) The contractor will provide an Annual Operating Plan in accordance with DRD 02.
- (d) The contractor shall integrate all tasks and elements of the contract to facilitate cross department communications, common processes and tools across appropriate support areas, effective measurement of performance, and identification of initiatives to improve overall safety or mission assurance for human spaceflight.
- (e) The contractor will provide an Integrated Technical Management Report for review of Contract progress in accordance the DRD 05 monthly.
- (f) Monthly Financial Management Reports conforming to NPR 9501.2D, NASA Contractor Financial Management Reporting, (533Q, 533M) will be provided in accordance with DRD 03.

C.7 WORK CONTENT

This section details the work required by the contractor under this Contract. Many tasks identified below are tied to launch schedules, external requirements or unforeseen SMA issues that may arise at any time. The NASA contracting officer and COTR are responsible for monitoring and prioritizing the work associated with this Contract.

C.7.1 INTEGRATION

C.7.1.1 PROGRAM INTEGRATION

- (a) The contractor shall provide overall SMA program integration for all contract related functions of SMA program/project management. This includes interface with all organizations (internal and external) required to support overall SMA program coordination and policy development. This support crosses all programs/projects and disciplines to assure that all SMA issues and concerns are identified and addressed.
- (b) The contractor shall assist in the development of integrated SMA schedules, resources, and related milestones. The contractor shall provide integrated status of program/project SMA products, processes, and milestones.
- (c) The contractor shall assist in planning, coordinating inputs, and highlight for resolution program/project issues and concerns affecting more than one SMA discipline.
- (d) The contractor shall participate in programmatic boards and milestone reviews from a SMA perspective. The contractor shall coordinate the review and evaluation of new, existing or changes to existing hardware, software, and operational requirements for SMA programmatic impacts.
- (e) The contractor shall develop integrated presentation packages and supporting documentation and data for programmatic SMA issues using Microsoft Office Products. The contractor shall assist in the development and integration of technical review comments for institutional safety documentation for KSC programs.

C.7.1.2 TECHNICAL AND ORGANIZATIONAL INTEGRATION

- (a) The contractor shall assure technical and organizational integration for all contract related functions of SMA activities across all disciplines is accomplished and ensure any issues and concerns which are identified are adequately reviewed and resolved in a manner acceptable to those disciplines. Interface with internal and external organizations as required assuring the technical and organizational integration of SMA activities across all disciplines and across all programs/projects (DRD 05).
- (b) The contractor shall provide support for management of organizational issues to include resource management and workforce analyses (DRD 03, 04, and 05).
- (c) The contractor shall provide recommendations for the establishment or revision of SMA policies and requirements through analyses and evaluation of all levels of policy or program documentation. In addition, the contractor shall coordinate SMA policy inputs and highlight for resolution of issues and concerns affecting more than one SMA discipline.
- (d) The contractor shall assist in the development of integrated SMA technical and organizational analyses and assessments. In addition, the contractor shall provide integrated technical and organizational products, processes, and milestones, and coordinate technical and

organizational inputs and highlight for resolving issues and concerns affecting more than one SMA discipline.

- (e) The contractor shall integrate expertise and support development of SMA assessment strategies, tools and techniques, and conduct assessments and provide reports to NASA identifying products and processes needing effectiveness and efficiency improvement in the implementation of SMA requirements. Moreover, the contractor shall analyze those processes and recommend specific improvements.
- (f) The contractor shall coordinate the review and evaluation of new, existing or changes to existing hardware, software, and processes for SMA technical and organizational impacts. The contractor shall develop and present integrated presentation packages and supporting documentation for technical and organizational SMA issues.
- (g) The contractor will flow down NASA Headquarters and Program requirements into NASA KSC SMA operating plans, procedures and work instructions.
- (h) The contractor will provide administrative support for SMA boards, panels, committees and independent assessment activities. Administrative support will include providing technical writing expertise.

C.7.1.3 SMA POLICY DEVELOPMENT SUPPORT

- (a) The contractor shall support the KSC SMA Integration Office, which provides NASA SMA policy and requirements expertise within KSC SMA Directorate and all directorates across the Center.
- (b) The contractor shall support the KSC SMA Integration Office and act as a liaison to the 45th Space Wing Safety Office for collaboration on development of safety policies, requirements, procedures, or agreements, as necessary.
- (c) The contractor shall provide expertise to assist the SMA Integration Office with developing, writing, and reviewing Agency policy and requirements. The contractor shall ensure requirements from NASA Headquarters and the Office of Safety and Mission Assurance (OSMA) flow down into implementation through procedures.
- (d) The contractor shall research, review, and analyze SMA policy and requirements across KSC.
- (e) The contractor shall support the SMA Integration Office by managing SMA customer agreements, including the Annual Operating Agreement, Memorandums of Agreements and Joint Operating Procedures shared with the Air Force, and other Agency delegations to KSC.

C.7.1.3.1 NASA KSC SMA POLICY ACTIVITIES

- (a) Perform assessments of SMA policy as requested.
- (b) Perform a review of SMA documents (policy, requirements, processes, plans, etc.) to ensure they are accurate and current with appropriate flow down to programs/projects.
- (c) Integrate comments from document reviews, coordinate changes with affected organizations, and revise documents as required.
- (d) Update and maintain the current KSC SMA Documentation tree.
- (e) Review and provide guidance on process/procedure development or updates as requested.
- (f) Review and coordinate changes to OSMA Technical Standards.
- (g) Perform update of any 45th Space Wing Safety and NASA KSC SMA joint operating procedures, agreements or requirements.

- (h) Perform integration and review of existing and future Program SMA documents.

C.7.1.3.2 KNPR 8715.3, KSC SAFETY PRACTICES PROCEDURAL REQUIREMENTS ACTIVITIES

- (a) Incorporate change requests and updates due to changes in high level documents.
- (b) Review changes for accuracy, coordinate changes with affected organizations (using KSC Action Item Tracking System), and revise documents as required.
- (c) Obtain required signatures and submit changes to Technical Documentation Librarian for release.
- (d) Develop a plan to the current procedure to process changes to the KNPR 8715.3 to improve efficiency of personnel and/or processes and timeliness for the release of approved changes.

C.7.1.4 DATABASE DEVELOPMENT AND UTILIZATION

- (a) The contractor shall assist in the development of computer databases utilizing commercially available software for performing analyses required in support of safety, reliability, human factors, and quality engineering functions for KSC SMA Directorate.
- (b) The contractor shall review, access and utilize major databases which support SMA. Databases include, but are not limited to, Government-Industry Data Exchange Program (GIDEP) alerts, Non Conformance Management systems and the Incident Reporting Information System (IRIS).

C.7.2 SAFETY, RELIABILITY, AND MAINTAINABILITY

C.7.2.1 PROGRAM RELATED LEVEL RISK ASSESSMENTS

- (a) The contractor shall conduct and review SMA related risk assessments for new facilities, projects or processes or changes to existing facilities, projects or processes. The contractor shall conduct and review SMA related risk assessments concerning launch services providers' engineering, manufacturing/production, Ground Support Equipment (GSE), Government Furnished Equipment (GFE), ground processing and launch vehicle assembly, test, integration (including spacecraft), launch, landing, and recovery operations.
- (b) The contractor shall support safety and reliability risk assessments and presentations for Launch Readiness Reviews, Flight Readiness Reviews, Pre-Launch Assessment Reviews and other flow processing reviews requiring safety and reliability involvement, including, but not limited to, providing hazard reports and Critical Item List status. The contractor shall also support SMA management flow review activities and daily SMA engineering, operational status reviews.
- (c) The contractor shall provide safety and reliability support for programmatic boards to which NASA/KSC provides input or is a member; collect and/or provide impact assessments, coordinate safety and reliability inputs and track/status actions through closure; and report potential safety and reliability items associated with programmatic actions/activities, and assist in resolving safety and reliability issues.
- (d) The contractor shall support NASA/KSC participation in key processing activities during major integrated KSC/Cape Canaveral Air Force Station (CCAFS)/Dryden Flight Research Center (DFRC)/Vandenberg Air Force Base (VAFB) (and any launch site utilized by NASA KSC)

operations. This includes launch countdowns, holds and scrubs. The contractor shall assess launch risks issues associated with flight and ground systems, interim problem reports, problem reports, and unexplained anomalies.

- (e) The contractor shall evaluate hardware and software changes processed during the flow for safety and reliability risks. Review and assess closure rationale for selected In-Flight Anomalies and unexplained anomalies. The contractor shall prepare risk assessments to include safety and reliability assessment reports of flow processing activities/problems.

C.7.2.2 SYSTEM SAFETY ENGINEERING/ANALYSIS AND INSTITUTIONAL SAFETY

- (a) The contractor shall support safety participation in Preliminary Design Reviews, Critical Design Reviews, facility/hardware/software acceptance reviews, as well as design reviews of KSC ground support equipment used to process flight hardware at other launch and landing facilities.
- (b) The contractor shall assist the development of safety engineering-related documentation for KSC programs and processes, and review programmatic safety requirements documents for changes to policy and provide impact assessments and recommendations.
- (c) The contractor shall review, assess and provide recommendations for SMA related waivers or deviations.
- (d) The contractor shall integrate into the flight hardware processing at KSC through insight or oversight of both KSC contractors and customers.
- (e) The contractor shall conduct safety analyses and assessments of selected design, testing, operational or flow processing problems involving safety issues, and prepare reports of findings. These assessments may include hazard analyses, hazard worksheets, fault trees, probabilistic risk assessments and hazard reports. The contractor shall provide safety expertise and technical support to selected investigation boards.
- (f) The contractor shall review and evaluate existing, new, or revised KSC hazard reports prior to NASA/KSC Safety approval to ensure the correct engineering technical data and risk assessment have been provided and prepare KSC hazard reports or updates in accordance with policy/regulations as requested. The contractor shall also maintain status of hazard reports and updates in progress and prepare and support processing of Configuration Control Board (CCB) Directives and Change Requests for all KSC hazard reports.
- (g) The contractor shall review all ground support equipment safety analysis reports and associated procedural hazard reports to ensure the correct engineering technical data and risk assessment have been provided. In addition, the contractor shall participate in the Ground Readiness Review Programs, develop review item dispositions as required, and participate in associated safety analysis review boards and assist in conversion of selected safety analysis reports procedural hazard reports to KSC hazard reports.
- (h) The contractor shall review System Assurance Analyses (SAAs), Ground Phase Safety Review Safety Packages, Missile System Payload Safety Packages, and safety and reliability assessments submitted by operational contractors and prepare technical critique for safety impact. The contractor shall also review CILs and assess impact on KSC and review launch services providers and related spacecraft hazard reports. The contractor shall support SAAs and or safety and reliability assessments Table Top Reviews (TTRs).
- (i) The contractor shall review all proposed ground system maintenance and operations specification requirements changes and selected flight file maintenance and operational specification requirement changes affecting maintenance and operational safety, prepare assessment of safety impact, and support KSC Level III Board meetings.

- (j) The contractor shall support the planning for, and introduction of selected hardware/software systems into the KSC flow process, and review trade studies, technical reports, requirements documentation, hazard analyses, and provide safety impact assessments.
- (k) The contractor shall support KSC Level II and III boards and board meetings. In addition, the contractor shall review and evaluate safety impacts of proposed board directives and provide summary assessments of the findings.
- (l) The contractor shall provide operational and technical support to Safety and Engineering Review Panels (SERPs) for existing and future Programs. Primary activity includes reviewing products submitted to the Panels for approval and providing recommendations for acceptance/rejection based on technical assessments. Additional activities include assisting in the disposition and documentation of Panel agenda items, tracking action item closure status, and tracking/statusing of hazard reports and CILs. The contractor shall also assist in ensuring KSC SERP approved safety documentation, hazard reports and CILs are processed through the appropriate Level III and II approval process.
- (m) The contractor shall provide safety expertise and support development of SMA assessment strategies, tools, lessons learned, and techniques. The contractor shall also evaluate KSC systems (hardware/software) and processes, identify safety areas needing effectiveness and efficiency improvements, and analyze those processes and recommend specific improvements.
- (n) The contractor shall support development of innovative and emerging SMA technical/management processes and products, for application to KSC design, operational, and maintenance activities.
- (o) The contractor shall manage, operate, and maintain an electronic and hardcopy repository for safety engineering documentation reviewed or generated during the performance of this contract.
- (p) The contractor shall support specialized engineering areas such as the pressure vessel certification, propellants, ordnance, both ionizing and non-ionizing radiation, and cryogenics.
- (q) The contractor shall support the review and assessment of procedures that govern the processing flight hardware.
- (r) The contractor shall support a wide range of traditional institutional safety areas such as, but not limited to, the OSHA Voluntary Protection Program (VPP) for civil servants, OSHA compliance/facility inspections, railroad safety, construction safety, aircraft safety, high pressure safety, explosives, mishap investigation, job hazard analysis and safety awareness products. The contractor shall support compliance activities with 29CFR1910, Occupational Safety and Health Standards and 29CFR1926, Safety and Health Standards for Construction.
- (s) The contractor shall support the SMA functions related to the NASA Safety Reporting System (NSRS), the KSC Opportunity for Improvement Program (OFI), and support activities of the KSC Ombuds Program.
- (t) The contractor shall develop safety metrics and report trends and summary results.
- (u) The contractor shall perform operational safety inspections and assessments and report results.
- (v) The contractor shall support the KSC Lifting Device and Equipment Manager (LDEM) and ensure requirements of NASA-STD-8719.9, Standard for Lifting Devices and Equipment are understood and applied across program lines and in all facets of KSC functional control areas, including Government and contractor organizations. Support to the LDEM will include, but not limited to, performing annual suspended load crane inspections. LDE assessments, review of contractor operator certification and training programs and maintaining and updating the KSC LDE Community website.

C.7.2.3 RELIABILITY AND MAINTAINABILITY ENGINEERING ANALYSIS

- (a) The contractor shall support reliability and maintainability participation in scheduled technical reviews such as System Requirements Review, System Definition Review, Preliminary Design Review, Critical Design Review, facility/hardware/ software acceptance reviews, as well as design reviews and assigned KSC/CCAFS/DFRC/VAFB (and any future launch site utilized by the NASA Launch Services Program) GSE used to process flight hardware.
- (b) The contractor shall assist in the development of reliability and maintainability engineering-related documents for KSC programs and process and to ensure these documents comply with NASA Agency-level Programs/Projects, and KSC policies and requirements. The contractor shall also review programmatic reliability and maintainability requirements documents for changes to policy and provide impact assessments and recommendations.
- (c) The contractor shall conduct reliability and maintainability analyses and assessments of selected design, operational or flow processing problems involving reliability and maintainability issues, and prepare reports on findings, and provide recommendations for improvement. The contractor shall prepare reliability and maintainability documentation for these assessments, including criticality assessments, Failure Modes and Effects Analyzes (FMEAs), CILs, quality and quantitative Fault Tree Analysis, and reliability and maintainability prediction/analysis.
- (d) The contractor shall prepare or review SAAs, Safety and Reliability Assessments (SRAs), FMEAs, Process Failure Modes and Effects Analyzes (PFMEA) and CILs submitted by operational contractors and prepare technical critique for reliability and maintainability impact. The contractor shall support SAA, SRA TTRs.
- (e) The contractor shall review and develop maintenance requirements and assess adequacy of tests and inspections performed in those areas critical to reliability and maintainability. In addition, the contractor shall perform selected Reliability-Centered Maintenance (RCM) and Maintenance Concept studies, including equipment repair time, mean down time, mean time between maintenance, equipment availability, and spares analysis.
- (f) The contractor shall provide reliability and maintainability expertise and support development of SMA assessment strategies, tools, and techniques, and evaluate KSC/CCAFS/DFRC/VAFB (and any future launch site utilized by the NASA Launch Services Program) and assigned VAFB systems (hardware/software) and processes, identifying reliability and maintainability areas needing effective and efficiency improvements. The contractor shall analyze those processes and recommend specific improvements.
- (g) The contractor shall support development of innovative and emerging SMA technical/management processes for application to KSC design, operational, and maintenance activities.
- (h) The contractor shall manage, operate, and maintain an electronic and hardcopy repository for reliability and maintainability engineering documentation reviewed or generated during the performance of this contract.
- (i) The contractor shall prepare or review the Probabilistic Risk Assessment (PRA).
- (j) The contractor shall perform or review reliability and maintainability trade-off studies and analysis.
- (k) The contractor shall review the reliability test program.
- (l) The contractor shall provide guidance to KSC programs/projects in Electronic, Electrical, Electromechanical (EEE) parts selection, procurement, application, and testing.

C.7.3 QUALITY PROGRAM

C.7.3.1 PROGRAM RELATED LEVEL RISK ASSESSMENTS

- (a) The contractor shall support quality assessments and presentations for Launch Readiness Reviews, Flight Readiness Reviews, Pre-launch Readiness Reviews, and other flow processing reviews requiring quality involvement, including providing status of corrective action, open work and work deferral. The contractor shall also support SMA management flow review activities, and daily SMA engineering, operational status reviews.
- (b) The contractor shall provide quality support for programmatic boards to which NASA/KSC provides input or is a member, collect and/or provide impact assessments, coordinate quality inputs and track status of KSC actions through closure, and report potential quality items associated with programmatic actions/activities and assist in resolving quality issues.
- (c) The contractor shall integrate into the flight hardware processing at KSC/VAFB through insight or oversight of both KSC contractors and customers.

C.7.3.2 KENNEDY SPACE CENTER QUALITY REQUIREMENTS/ASSESSMENTS

- (a) The contractor shall use NASA regulations, policies, directives and other guidance to assist in the development of quality-engineering related documentation reviewed or generated during the performance of this contract.
- (b) The contractor shall provide quality expertise and support development of SMA assessment strategies, tools, and techniques such as quality sampling, inspections, surveillance, audits, statistical process control, trending and forecasting. The contractor shall evaluate KSC and assigned CCAFS/VAFB and any future launch site utilized by the NASA Launch Services Program systems (hardware/software) and processes. This will include launch services providers' design, manufacturing/production, integration, and launch site facilities. Identify quality areas needing effectiveness and efficiency improvements. Analyze these processes or changes to existing processes and recommend specific improvement.
- (c) The contractor shall support development of innovative and emerging SMA technical/management processes and products for application to KSC design, operational, and maintenance activities.
- (d) The contractor shall manage, operate, and maintain an electronic and hardcopy repository for quality engineering documentation.
- (e) The contractor shall perform reviews of program and project requirements and evaluate against Quality Requirements (NASA, SSP, ISS, LSP, Constellation, and AF Range Safety).
- (f) The contractor shall coordinate and facilitate technical resolution of quality issues within KSC SMA and other affected parties including other KSC Directorates and AF Range Safety.
- (g) The contractor shall develop quality metrics for programs/projects and perform trending analysis and recommended actions for approval by Government personnel.
- (h) The contractor shall assist NASA in the area of Foreign Object Debris/Damage (FOD) prevention through activities aimed at increasing FOD awareness at KSC, and assessments of FOD metrics. The contractor shall assist NASA with interpreting FOD metrics to identify strengths and weaknesses of various contractors' FOD programs to be used in assessing said contractors' performance. The contractor shall interface with internal and external organizations as required to accomplish the above named requirements to help ensure a successful FOD prevention program at KSC.

C.7.3.3 PROBLEM REPORTING AND CORRECTIVE ACTION EVALUATION

- (a) The contractor shall provide status of major problems/concerns for KSC management attention, including assessment of failures, schedule slips, workmanship and planning problems, and deferred work. The contractor shall provide a daily status update of the most current problems and concerns.
- (b) The contractor shall recommend candidates for corrective action and additional troubleshooting or analysis actions to include, but not limited to, oil analyses, material failure analysis or non-destructive testing. A timely response is expected of the contractor upon receipt of a Government request for additional assistance with troubleshooting or analysis needs.

C.7.3.4 FIELD OPERATION ASSESSMENT

- (a) The contractor shall input measures, publish selected reports, analyze results, and recommend appropriate remedial/process analysis actions associated with measurement indicator data.
- (b) The contractor shall support measurement of performance and trend KSC/VAFB operational activities including launch services providers' design, manufacturing/production, integration and launch site facilities; and procurement assurance such as receipt inspection and field verification.
- (c) The contractor shall assist in the assessment of selected contractor analysis programs and support the development of capabilities to meet NASA requirements.
- (d) The contractor shall support quality participation in selected pretest/pretask readiness activities, including test readiness review boards, operational readiness inspections, etc.
- (e) The contractor shall provide the expertise necessary to actively participate in flight hardware/software and associated GSE and Government Furnished Equipment (GFE) problem investigations. Evaluate failures to assure the probable causes and impacts of recurrence control are adequate.
- (f) The contractor shall perform evaluations of operation's requirements and conditions based on selected SMA analyses to assure retention of acceptance rationale.
- (g) The contractor shall review selected engineering changes, waivers, deviations, modifications, and field actions to assist in determining compliance with SMA requirements.
- (h) The contractor shall perform quality inspections of hardware, perform receiving inspections and source inspections and prepare supplier evaluations.

C.7.4 HUMAN FACTORS ENGINEERING

The contractor shall conduct analyses that identify sources of human error such as to evaluate the visual and physical accessibility provisions, skill level requirements, interpretation of fault indications, handling provisions, safety concerns (weight, touch temperatures, labeling, strength requirements), communication requirements, and environmental impacts (noise, lighting, special clothing, etc.) and opportunities for improvement for ground support equipment and flight hardware processing in both the processing task itself and the instructions for conducting the task. The human factors analysis applies to resolution of problem reports and mishap investigations.

C.7.5 SMA ENHANCEMENTS

C.7.5.1 PROCESS ANALYSIS

- (a) The contractor shall assist in establishing criteria for identifying KSC processes including launch services providers' design, manufacturing/production, integration and launch site operations at off-site facilities needing analysis. The criteria shall consider analyses objectives, pass/fail criteria, analysis methods, frequency, and detail of process analysis.
- (b) The contractor shall develop the requirements for a KSC SMA performance measurement system. Requirements are subject to Government approval. This system includes selecting the indicators used to measure analyzed processes, determine data collection methods for established indicators, and accomplish results analyses.

C.7.5.2 SOFTWARE ASSURANCE

- (a) The contractor shall provide software assurance support in accordance with the program software assurance plan. These plans cover the entire software lifecycle and identify the procedures, process, deliverables, tools and techniques used in the software assurance discipline.
- (b) The contractor shall provide software assurance status reports to the customer SMA Manager.
- (c) The contractor shall provide technical software assurance support to the KSC Software Assurance Discipline Lead. Technical support includes tasks such as supporting the creation of KSC Software Assurance documents, reviewing and consultation of technical issues, participate in Software Assurance and Classification Assessments, and KSC and NASA Agency integration support.

C.7.5.3 SOFTWARE SAFETY

- (a) The contractor shall provide software safety support to programs in accordance with the program software safety plan. These programs cover the entire software lifecycle and identify the procedures, processes, deliverables, tools and techniques used in the software safety discipline.
- (b) The contractor shall provide software safety status reports as part of the Integrated Technical Management Report. (DRD 05).
- (c) The contractor shall provide technical software safety support to the KSC Software Assurance Discipline Lead. Technical support includes tasks such as supporting the creation of KSC Software Safety documents, participate in Software Safety critical evaluations and review hazard analyses for software safety compliance.
- (d) The contractor shall perform Software Safety Analyses per KNPR 8750.1 (KSC Software Assurance Procedure Requirements).

C.7.5.4 SURVEYS AND AUDITS

- (a) The contractor shall support the development and maintenance of requirements and related documentation for KSC SMA survey and audit programs.
- (b) The contractor shall support SMA survey and audit activities. This includes evaluation of operations, products, and processes to identify candidate areas for survey and audit activities, identifying and organizing process audits and surveys to be accomplished, and participating in

performance of SMA surveys and audits to identify efficiencies and improvements in operations, products, and processes.

- (c) The contractor shall provide expertise and support development of SMA assessment strategies, tools, and techniques. Evaluate survey and audit activities and processes; identify areas needing effectiveness and efficiency improvements, and recommend specific improvements.

C.7.6 TRAINING DEVELOPMENT

The contractor shall support development of training and qualification requirements for NASA and NASA contractor SMA personnel.

C.7.7 RANGE SAFETY

The contractor shall provide SMA technical support to the NASA Range Safety Program at KSC. The support will include the following tasks:

- (a) Development, implementation and/or enforcement of NASA Range Safety Policy. NASA Range Safety Policy is subject to Government approval. This is to be accomplished via the technical evaluation of range safety policy and requirements in support of program and safety reviews that lead to on-console support for flight vehicle programs and projects. The contractor will also perform an evaluation of range safety variances, reviewing range safety risk assessments and providing recommendations to KSC and Agency Range Safety Managers.
- (b) Support NASA Range Safety in providing risk assessment evaluation at KSC for aeronautical and space flight activities at KSC. Support risk assessment processes in flight testing and/or launch operations at Eastern and Western Test Ranges. The contractor shall participate in Range Safety Panels and development, maintenance, and updating of the Shuttle Launch and Landing Implementation Plans. The contractor shall use current, validated, widely accepted risk assessment tools and common criteria for all NASA Centers and Programs. The contractor shall support S&MA with on-console support for NASA LSP missions at the Eastern and Western Test Ranges and provide technical expertise for evaluating and providing recommendations for any FTS requirement variances to EWR 127-1, Eastern and Western Range Safety Requirements; AFSPCMAN 91-710, Range Safety User Requirements and NPR 8715.5 Rev A, NASA Range Safety Program.
- (c) The contractor shall review, update and provide qualified instructors (as necessary) for the suite of range safety program courses developed for the NASA range safety program.. This task applies to the existing Range Safety Orientation, Flight Safety Analysis, Flight Safety Systems and Range Safety Operations courses. Contractor personnel must have the knowledge, skills and experience necessary to provide the updates and instruction, and must be familiar with DoD and NASA launch range operations. The contractor must have experience and be proficient at operating the range safety display equipment at Wallops Flight Facility. The range safety program function is responsible for updating the material in all modules, and course updates will be provided to the NSTC for instruction purposes. The contractor is responsible for the review and update of previously developed courses.
- (d) The contractor shall perform range safety related portions of independent assessments/audits at NASA Centers involved in flight-testing and/or launch operations.
- (e) The contractor shall provide continued support of the development of the joint Air Force Space Command and Federal Aviation Administration range safety requirements. This includes participation in weekly telecons and review/comments activities. The focus is to monitor this activity and voice NASA concerns for changes or additional requirements that may jeopardize or

negatively affect NASA programs, and inform NASA Range Safety when Government engagement is required.

- (f) The contractor shall review and update any NASA range safety Memorandum of Understanding (MOU), Memorandum of Agreement (MOA), Joint Operating Procedure (JOP) policy or requirements. This includes the researching, writing and/or updating of any documents or agreements required to support the range safety program.
- (g) The contractor shall provide oversight and guidance for development of common tools that can be used in support of Range Safety Analysis or Operations.
- (h) The contractor shall be responsible for production of the Range Safety Report (DRD 05). This annual report will be in an electronic format capable of being uploaded to appropriate websites by NASA KSC personnel.
- (i) The contractor shall support Range Safety Systems Development. This will include providing technical review and interface with programs developing new range safety systems such as the Enhanced Flight Termination System, the Autonomous Flight Safety System, Space Based Demonstration and Certification Program and any other new development that may have range safety system implications. This includes participation in teleconferences, meetings and facilitating discussions with the 45th and 30th Space Wings and NASA HQ as required.
- (j) The contractor shall facilitate and aid in the establishment of Unmanned Aircraft Systems (UAS) requirements, processes and procedures with the Eastern Range to accommodate future UAS activity at KSC. This includes assisting the 45th Space Wing in development of a UAS Range Safety Requirements document and KSC development of a Flight Certification Approval Process and a Concept of Operations/Support Plan for UASs. This includes coordination with WFF and DFRC for consistency across NASA programs.
- (k) The contractor shall ensure technical competency and excellence throughout the NASA Range Safety Program by remaining involved in the range safety community via support of technical interchange meetings, forums and conferences with other NASA Centers, Government agencies and commercial enterprise. This includes participating in the Range Commander's Council and sub-groups as a minimum.

Note: Many of the tasks identified in this sub-section are required to meet the objectives of the range safety program and are not tied to any specific timeline or deliverable. Many are based on launch schedules, program requirements, NASA Range Safety needs and other range safety related emerging processes that occur continuously throughout a given year. The NASA Range Safety Manager, through the COTR, is responsible to monitor workload and prioritize work associated with this Section. There will be less involvement in the lower level tasks, in some cases.

C.7.8 INDEPENDENT ASSESSMENTS

- (a) The contractor shall conduct Independent Assessments to provide programmatic, technical, and process expertise within each SMA discipline to enhance the success existing and future Programs, Expendable Launch Vehicle (ELV), Range Safety, and KSC Institutional facilities and processes. All deliverables will be in accordance with DRD 08.
- (b) Assessments may be confined to matters at KSC, or performed jointly with Johnson Space Center, Marshall Space Flight Center or other NASA Centers.
- (c) Assessments shall be performed in accordance with KDP-P-1453, SMA Independent Assessment Process. This process utilizes an Independent Assessment Plan, which contains the nature of the assessment, background information, assessment approach, reference documents, personnel assignments, and schedule.

- (d) The contractor shall work independently or as part of a Government/contractor team to accomplish the assessments.
- (e) The contractor shall perform Independent Assessments, which are wide and varied. Listed below is a sample of subject matter which the contractor may be tasked to assess:
 - (1) Hazards, failures, and/or deficiencies evaluations.
 - (2) Weaknesses in KSC processes, procedures, and facilities.
 - (3) Measuring the effectiveness of SMA processes and procedures that directly support KSC programs.
 - (4) Review and evaluate Work Authorization Documents (WADs) to assure compliance with quality requirements.
 - (5) Review and evaluate FMEA/CILs.
 - (6) Review and evaluate Hazard Analyses, Hazard Reports, Fault Tree Analyzes, PFMEA, and Ground Operations Risk Assessments.
 - (7) Participate in and assist NASA Mishap Investigation Boards and prepare root cause analysis when required.
 - (8) Review NASA contractor mishap reports to ensure proposed corrective actions are completed.
 - (9) Independently evaluate engineering and operations issues to assure risks are identified and controlled and develop and evaluate alternative solutions.
 - (10) Participate in SMA audits and document findings and corrective actions.
 - (11) Analyze SMA performance of audits; evaluate audit findings, and follow-up on responses and actions.
 - (12) Perform independent safety risk assessments.
 - (13) Provide SMA support to Boards and Panels that support launch decision reviews.

C.7.9 METROLOGY

The Metrology (science of measurement) Program at KSC is delegated by OSMA as the NASA Met/Cal Program Center. Delegated responsibilities include development of policy and procedural requirements; issuance of guidance documents; and deployment of tools/resources facilitating Center Metrology and Calibration Program implementation across NASA. This program supports SMA, other Directorates, and NASA HQ. The contractor shall provide expertise in metrology calibration and measurement science. Metrology support will include the following:

C.7.9.1 KSC METROLOGY AND CALIBRATION SUPPORT ACTIVITIES

- (a) Develop/Edit/Revise KSC Met/Cal documentation (i.e., KNPR 8730.1).
- (b) Propose/Manage/Report on Agency-funded, KSC-led Met/Cal Projects.
- (c) Develop/assess measurement processes as requested and provide written results.
- (d) Provide training to KSC elements for measurement quality assurance, measurement uncertainty analysis, measurement decision, upon request.
- (e) Integrate Met/Cal requirements into future KSC program documents.

C.7.9.2 NASA OSMA METROLOGY AND CALIBRATION SUPPORT ACTIVITIES

- (a) Perform reviews of industry/Government metrology requirement standards as requested and report results.
- (b) Develop and deliver local and NASA-wide guidance standards for metrology as requested.
- (c) Develop, deliver, and teach measurement quality assurance, measurement uncertainty, and measurement decision risk courses as requested.
- (d) Support and coordinate efforts with the NASA Programmable Josephson Array Voltage Standard as requested, to include
 - (1) Research efforts with National Institute of Standards and Technology (NIST) and NASA
 - (2) NASA-wide Measurement Assurance Programs (MAP)

C.7.10 EXPENDABLE LAUNCH VEHICLE (ELV) PAYLOAD SMA PROGRAM

The contractor shall support NASA ELV Payload SMA Program by providing assistance in the development of Program requirements, processes, operations, and documents and assisting in their implementation, coordination and compliance. This is an Agency-wide program focusing on ensuring the safety of personnel and the protection of resources. It involves developing and ensuring compliance with Program requirements that address safety, design, processing, and operations for NASA payloads scheduled for ELV flight.

C.7.10.1 TECHNICAL PROGRAMMATIC SUPPORT

- (a) Support Program development concepts, processes and related implementation activities.
- (b) Develop or support the development of ELV Payload Safety Programmatic documents as requested (e.g. policy letters, guidelines, handbooks, process flow charts, presentations, approval letters, mission unique programmatic safety plans).
- (c) Support and coordinate telephone conferences, face-to-face meetings, workshops, and conferences.
- (d) Support research and any testing performed in developing new technical safety requirements

C.7.10.2 TECHNICAL PROGRAM COMPLIANCE SUPPORT

Provide support to ELV Payload Safety Manager ensuring ELV Payload Safety and Mission Assurance Program requirements (NPR 8715.7 Expendable Launch Vehicle Payload Safety Program and NASA-STD-8719.2X NASA Expendable Launch Vehicle Payload Safety Requirements) are complied with through performance of the following:

- (a) Technical Independent Engineering Assessments.
- (b) Technical Engineering Audits.
- (c) Technical Engineering Inspections.
- (d) Technical Engineering Analysis.
- (e) Other Technical Engineering Reviews of spacecraft or GSE, hardware, software, processing and launch facilities, operations and processes.

C.7.10.3 TRAINING

- (a) Research and recommend training for ELV payload project managers, ELV Payload Engineers and Managers, and Safety and Mission Assurance personnel.
- (b) Develop and maintain ELV Payload Safety and Mission Assurance training classes and ensure eventual implementation.

C.7.11 INFORMATION TECHNOLOGY

- (a) The contractor shall provide expertise in the design, development, publishing and maintenance of a variety of web pages using Commercial Off-the-Shelf (COTS) tools (e.g. Macromedia suite of tools, Microsoft SharePoint) in support of KSC SMA. Expertise in the conceptualization, development and publishing of web graphics, to include interactive graphic aids to web navigation are considered essential.
- (b) The contractor shall provide expert database development requirements, conceptualization and requirements consolidation among varied, but related customers within KSC SMA. Additional expertise related to combining database development with web publishing to enable efficient and unique Graphical User Interface (GUI) development, refinement and optimization of the database data entry experience is required.
- (c) The contractor shall provide expertise in the administration of existing databases (Database Administration, DBA) used in SMA operations at KSC. Expertise shall extend to all Microsoft database products (e.g. MS Access, MS SQL Server), and other Structured Query Language (SQL) products employing American National Standards Institute (ANSI) SQL. This expertise shall include database security, database optimization, backup and restore, and consulting on database revisions and improvements contemplated over the life of the contract. This function is additional and separate from the capability outlined in Section 7.2.2, System Safety Engineering/ Analysis and Institutional Safety.
- (d) The contractor shall provide expertise in the administration of all KSC SMA software tools (e.g. PTC RELEX). Expertise shall include general configuration of the software, user management and general software tool knowledge.

(e)

C.7.12 Miscellaneous Studies

The contractor shall have the ability to acquire unique and specialized skills for support of finite time period special actions, investigations, or studies as identified by the customer. Typically these skills would be classified under the existing labor codes and will be the more experienced types within those labor codes.

C.8 DELIVERABLES

C.8.1 WEEKLY ACTIVITY REPORTS

The contractor shall provide weekly activity reports in accordance with DRD 06 to KSC technical management, reporting actual and potential problems and progress toward meeting contract requirements.

C.8.2 ASSESSMENT AND EVALUATION REPORTS

The contractor shall provide Assessment and Evaluation Reports, when tasked, in accordance with DRD 08. These Assessment and Evaluation Reports may include but not limited to:

- (a) Range Safety Independent Assessment Reports.
- (b) Independent Assessment Plans (for assigned assessments).
- (c) Independent Assessment Reports and Briefings (of the findings and conclusions of assigned assessments).
- (d) Assessments of Prime Contractor Risk Analysis and Risk Documentation (e.g. – Failure Mode Effects Analysis, Hazard Analysis, Fault Tree Analysis , System Assurance Analysis, Probabilistic Risk Assessment).
- (e) KSC Calibration Lab Surveillance Reports results.
- (f) Calibration Assessments Reports results.
- (g) Measurement Process Assessments Reports.
- (h) Quality Process Assessments Reports.
- (i) Evaluation Reports detailing quality requirements, plans and procedures.
- (j) Construction Plan Evaluation Reports.
- (k) Safety and Health Evaluation Reports.
- (l) Corrective Action Assessments.
- (m) Evaluation of Program/Project plans, procedures, requirements, requirement changes.
- (n) Lifting Device and Equipment Assessments.

C.8 DELIVERABLES (cont'd)

C.8.3 KSC SMA DOCUMENTS

The contractor shall provide plans, procedures, briefing materials, analysis reports and other documents, when tasked, in accordance with DRD 09. This documentation may include but not limited to:

- (a) SMA Flight Readiness Review packages (Safety Assurance Readiness Review (SARR), Safety & Mission Success Review (SMSR), Flight Readiness Review (FRR), Launch Readiness Review (LRR), etc.).
- (b) Updated Range Safety related JOPs, agreements, policies, requirements or processes.
- (c) Development, maintenance and updating of Shuttle Launch and Landing Implementation Plans.
- (d) Range Safety training updates to the four established courses.
- (e) Reports of metrology requirement standard reviews.
- (f) Reports of quality requirements and standard reviews.
- (g) Construction Site Inspection Reports.
- (h) Audit Reports and briefing detailing audit results.
- (i) Risk Analysis Reports (FMEA, Hazard Analysis, FTA, PRA).
- (j) Explosive Safety inspection reports.
- (k) Lifting Equipment inspection reports.
- (l) Metric reports of safety data.
- (m) Trend analysis of safety hazards, mishaps, explosives and construction accidents.
- (n) Metric reports and Trend Analysis of quality data.
- (o) Mishap corrective action tracking reports.
- (p) Mishap investigation reports.

(End of text)