

ATTACHMENT J-3

INSTALLATION-PROVIDED PROPERTY AND SERVICES

Marshall Space Flight Center (MSFC)

The Government will provide the use of the following property and services to all MSFC on-site personnel under this contract as necessary. These items include the following:

a. Information Technology Services

1. MSFC IT services and products shall be provided by or through the appropriately chartered Center organizations. In accordance with NASA's decision to outsource specific services, organizations shall use Agency wide contracts. MSFC shall comply with applicable Agency and Government IT standards and specifications. General principles are outlined in NPR 2800.1 and NPD 2810.1; base lined and emerging IT standards, architectures, and product recommendations are included on the NASA CIO home page at: <http://www.hq.nasa.gov/office/codea/codeao/> .

2. Computer workstations (one seat license per person under MSFC's Outsourcing Desktop Initiative for NASA (ODIN) contract and accountable to the ODIN contract) and associated maintenance (general and specialized) shall be provided for each MSFC on-site Contractor employee.

b. Printers, plotters, and scanners

1. Application software

2. Specialized Commercial-Off-The-Shelf (COTS) software as required to meet specific MSFC program/project objectives

3. Document Reproduction Equipment and Reproduction Services

4. Adequate work space and appropriate office furniture including technical work rooms, conference rooms, and storage areas

5. Custodial and maintenance services

6. Taxi service

7. Telecommunication devices: The Government anticipates no specific requirement for telecommunications devices (e.g., cellular phones, pagers, and personal data assistants) beyond that of managerial / administrative functions for normal business operations, and will not provide such devices. However, in the event telecommunications devices are required to access NASA information technology (IT) systems or services (e.g., email), those devices shall be provided by the Government after obtaining Contracting Officer and COTR approval).

8. The contractor assumes user responsibilities, as outlined in Clause G.9, List of Installation-Accountable Government Property, for property made available to the contractor as Installation – Accountable property for use in the performance of contract requirements.

Michoud Assembly Facility (MAF)

a. The Upper Stage Production Contractor shall operate under the following assumptions at MAF:

1. The existing or future Base Operation contractor will provide all facility maintenance requirements such as utilities, phones, roads, security. Any required tenant rates required at MAF will be paid internally within NASA and are not part of this contract.

2. The Upper Stage Production Contractor shall operate all equipment required to manufacture the Upper Stage.

3. NASA/MAF Center Operating Officer will establish a process for usage and priority of common areas and equipment.

4. The Government will provide for maintenance of common equipment.

5. The Government will provide for the maintenance and operation of barges for transportation of the Upper Stage Element and Integrated Test Articles to test and launch sites.

6. The Upper Stage Production Contractor will support the Government in obtaining environmental remediation and permits provided for site specific work required in the performance of this contract.

7. The Upper Stage Production Contractor will support the Government in obtaining unique process permits (specific to building Upper Stage unique hardware such as foam spraying).

b. The Government will provide the use of the following property and services to all MAF on-site personnel under this contract as necessary. These items include the following:

1. The Government will provide a local area network for connectivity.

2. Computer workstations (one seat license per person under MSFC's Outsourcing Desktop Initiative for NASA (ODIN) contract and accountable to the ODIN contract) and associated maintenance (general and specialized) shall be provided for each MAF on-site Contractor employee. The following information is provided regarding MAF connectivity:

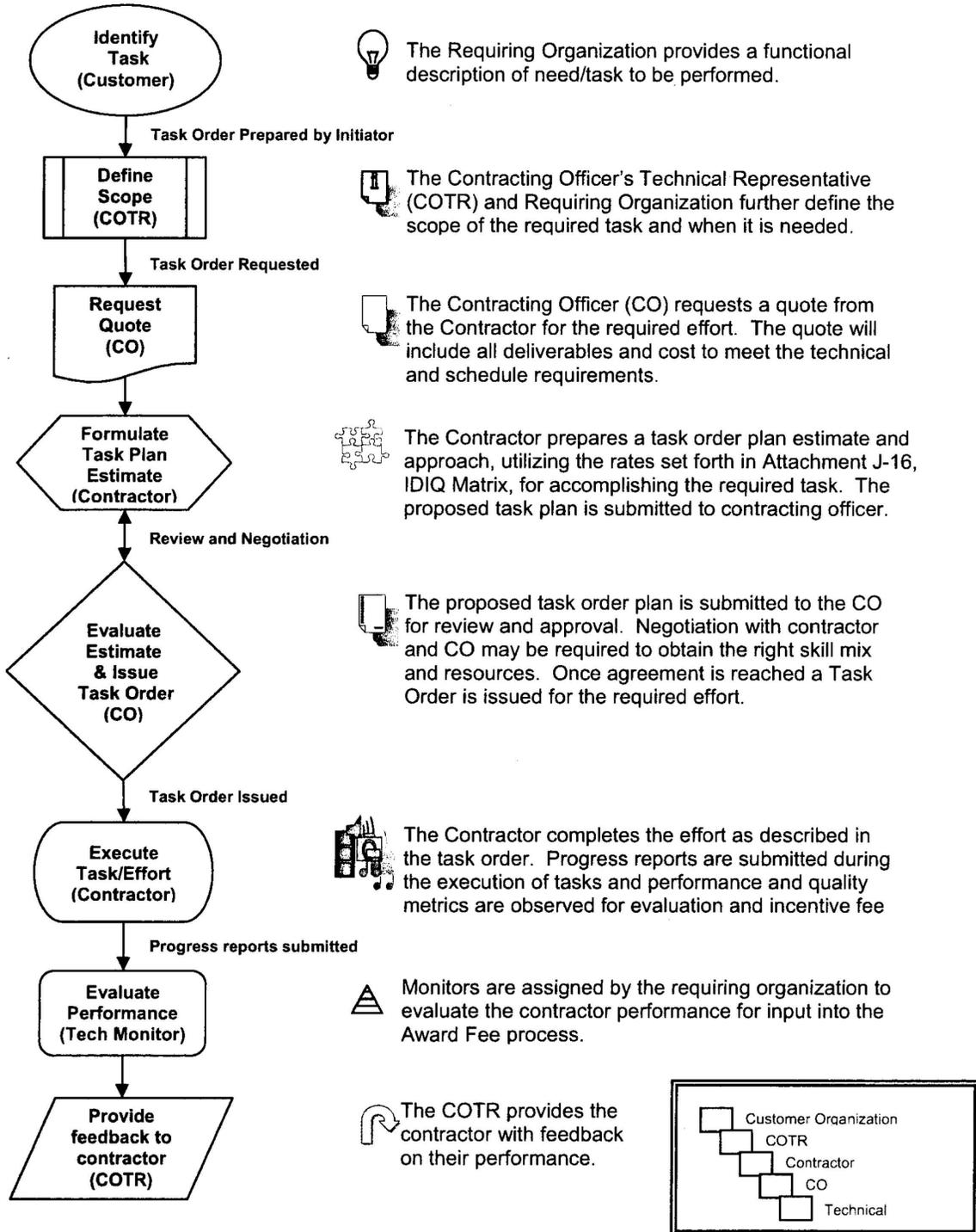
- backbone.
- a. The WAN connection is an OC3 (155Mbps)
 - b. Standard Internet Protocol (SIP)/Premium Internet Protocol (PIP) routed data services are provisioned via the OC3.
 - c. Operation coverage is 24x7.
 - d. The current wireless installed equipment supports WEP encryption and the wireless users are authenticated via the IDS (NT Domain Accounts). It is expected that users will be authenticated against an agency active directory (AD) or lightweight directory access protocol (LDAP). These services are centrally hosted by the NASA Data Center (NDC) at MSFC.

3. Printers, plotters, and scanners
4. Application software
5. Specialized Commercial-Off-The-Shelf (COTS) software as required to meet specific MSFC program/project objectives
6. Document Reproduction Equipment and Reproduction Services
7. Adequate work space and appropriate office furniture including technical work rooms, conference rooms, and storage areas
8. Custodial and maintenance services
9. On-site transportation
10. Telecommunication devices: The Government anticipates no specific requirement for telecommunications devices (e.g., cellular phones, pagers, and personal data assistants) beyond that of managerial / administrative functions for normal business operations, and will not provide such devices. However, in the event telecommunications devices are required to access NASA information technology (IT) systems or services (e.g., email), those devices shall be provided by the Government after obtaining Contracting Officer and COTR written approval).
11. The contractor assumes user responsibilities, as outlined in Clause G.9, List of Installation-Accountable Government Property and Services, for property made available to the contractor as Installation –Accountable property for use in the performance of contract requirements.

[END OF ATTACHMENT]

ATTACHMENT J-4

IDIQ TASK ORDER PROCESS FLOW CHART



[END OF ATTACHMENT]

2 Pages removed for the following reason: (b)(4)

ATTACHMENT J-6

APPLICABLE REGULATIONS, PROCEDURES, AND DOCUMENTS

The documents listed herein contain specifications to which the Contractor's work must conform. The Contractor shall comply with all the requirements of these documents and all revisions thereto. Current versions shall be utilized, unless authorization to use obsolete versions has been properly documented. This listing is not intended to relieve the Contractor of its responsibility for identification of applicable regulations and procedures and compliance therewith when performing work.

The Contractor shall utilize all NASA, MSFC, and MAF Directives and Standards as applicable. Applicable regulations, procedures, and documents have been provided electronically with this RFP. Current versions shall be utilized, unless authorization to use obsolete versions has been properly documented. In the event of a conflict between documents, the order of precedence is as follows:

- NASA Documents
- Constellation Program / Project Documents
- NASA Center Level Documents
- Other Government Agency Documents
- Industry Standards

Items listed in the Applicable Guidance and Informational Documents will contain some items that have been determined as export controlled documents. These documents are so marked and anyone with access to the documents must comply with the export control law. This includes both control and disclosure of any said documents. Other documents and data listed may not contain any restrictions; however, before the release of any information or data, the Contractor shall make a determination as to the applicability of U.S. export control laws and regulations.

NASA and MSFC Directives can be found at the following URL:
<https://repository.msfc.nasa.gov/directives>

NASA and MSFC Standards can be found at the following URL:
<http://standards.nasa.gov>

Upper Stage Element Documents	
USO-CLV-MA-25000	Upper Stage Element Management Plan
USO-CLV-MA-25001	Upper Stage Element Development Plan
USO-CLV-OP-25600	Upper Stage Element Operations Concept Document
USO-CLV-SE-25703	Upper Stage Verification and Validation Plan
USO-CLV-SE-25704-1C	Upper Stage Element Design Definition Document
USO-CLV-SE-25707	Upper Stage System Engineering Management Plan
USO-CLV-SE-25710	Upper Stage Element Requirement Document
USO-CLV-SMA-25800	Upper Stage Quality Plan
USO-CLV-MA-25005	Ares I Crew Launch Vehicle (CLV) Upper Stage (US) Element Data Management Process
Constellation Documents	
CxP-70000	Constellation Architecture Requirements Document (CARD)
CxP 70022	Constellation Command, Control, Communication and Information (C3I) Interoperability Standards Book (5 Parts)
CXP 70023	Constellation Program Design Specification for Natural Environments (DSNE)
CXP-70024	Constellation Human System Integration Requirements (HSIR)
CXP- 70036	Constellation Environmental Qualification and Acceptance Testing Requirements (CEQATR) Document
CXP-70044	Constellation Program Natural Environment Definition for Design (NEDD)
CXP 70050	Constellation Power Quality Standard (Parts 1 and 2)
CXP 70080	Electromagnetic Environmental Effects (E3) Requirements
CXP-72034	CLV Systems Requirement Document (SRD)
CXP-72036	First Stage (FS) to Upper Stage (US) IRD
CXP-72038	USE to Upper Stage (US) IRD
CXP 72053	EEE Parts Management and Control Plan for the CLV
CXP-72067	System Structural Dynamics, Loads and Models Data Book
CXP-72068	Thermal Environments Data Book
CXP 72070	Integrated Vehicle Design Definition Document
CXP 72121	CLV Ground Support Equipment Requirements Document

NASA Standards Documents	
GRAM-99	Global Reference Atmospheric Model
NAS 412 (1997)	Foreign Object Damage/Foreign Object Debris (FOD) Prevention
NASA-STD-4003	Electrical Bonding for NASA Launch Vehicles, Spacecraft, Payloads, and Flight Equipment
NASA-STD-5001	Structural Design and Test Factors of Safety for Space Flight Hardware
NASA-STD-5002	Loads Analyses of Spacecraft and Payloads
NASA-STD-5005B	NASA Standard for Ground Support Equipment
NASA-STD-5006 (1999)	General Fusion Welding Requirements for Aerospace Materials Used in Flight Hardware
NASA-STD-5007	General Fracture Control Requirements for Manned Space Flight Systems
NASA-STD-5009	Nondestructive Evaluation (NDE) Requirements for Fracture Control Programs
NASA-STD-5012	Strength and Life Assessment Requirements for Liquid Fueled Space Propulsion Systems
NASA-STD-5017	Design and Development Requirements for Mechanisms, Sections 1-4
NASA-STD-5019	Fracture Control Requirements
NASA-STD-6001	Flammability, Odor, Offgassing, and Compatibility Requirements and Test Procedures for Materials in Environments That Support Combustion
NASA-STD-6016	Standard Manned Spacecraft Requirements for Materials and Processes
NASA-STD-7001	Payload Vibroacoustic Test Criteria
NASA-STD-7002A	Payload Test Requirements
NASA-STD-7003	Pyroshock Test Criteria
NASA-STD-8719.7	Facility System Safety Guidebook (BASE + Chapter 7 + Appendix D)
NASA-STD-8719.9	Standard for Lifting Devices and Equipment
NASA-STD-8719.11	Safety Standard for Fire Protection
NASA-STD-8719.13	Software Safety Standard (SWE-023)
NASA-STD-8739.1	Workmanship Standard for Staking and Conformal Coating of Printed Wiring Boards and Electronic Assemblies
NASA-STD-8739.2	Workmanship Standard for Surface Mount Technology
NASA-STD-8739.3	Soldered Electrical Connections
NASA-STD-8739.4	Crimping, Interconnecting Cables, Harnesses and Wiring
NASA-STD-8739.5	Fiber Optic Terminations, Cable Assemblies, and Installation (BASE + Appendix A)
NASA-STD-8739.8	NASA Software Assurance Standard (Chapter 6 and 7) with change 1

NASA Technical Memorandum 102179	Selection of Wires and Circuit Protection Devices for STS Orbiter Vehicle Payload Electrical
NASA TP-2003-210788	Meteoroid/Debris Shielding, 2003, Section 2 for describing the MMOD risk assessment process using Bumper code
NPD 1001.0	NASA Strategic Plan
NPD 1490.1G	NASA Printing, Duplicating, and Copy Mgmt
NPD 2820.1C	NASA Software Policies
NPD 8700.1C	NASA Policy for Safety and Mission Success
NPD 8710.5	NASA Safety Policy for Pressure Vessels and Pressurized Systems
NPD 8720.1B	NASA Reliability and Maintainability (R&M) Program Policy (revalidated 4/28/04)
NPD 8730.1B	NASA Metrology and Calibration
NPD 8730.2B	NASA Parts Policy (revalidated 4/29/04)
NPD 8730.5	NASA Quality Assurance Program Policy
NPR 1441.1D	NASA Record Retention Schedules
NPR 1600.1	NASA Security Program Procedural Requirements
NPR 1620.3	Physical Security Regulation Requirements for NASA Facilities
NPR 2810.1A	Security of Information Technology
NPR 4100.1D	NASA Materials Inventory Management Manual
NPR 4200.1F	NASA Equipment Management Procedural Manual
NPR 5100.4B	FAR Supplement Part 18-45
NPR 6000.1G	Requirements for Packaging, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components
NPR 7120.5C	NASA Program and Project Management Processes and Requirements
NPR 7150.2	NASA Software Engineering Requirements (all shall statements/the compliance matrix only, excluding the software safety requirement)
NPR 8621.1B	NASA Proc Regulation for Mishap and Close Call Reporting
NPR 8705.2A	Human Rating Requirements for Space Systems.
NPR 8705.6	Safety and MA Audits
NPR 8715.3 (A)	NASA General Safety Program Requirements
NPR 8715.5	Range Safety Program
NPR 9501.2D	NASA Contractor Financial Management Reporting
NSS 1740.12	Safety Standard for Explosives, Pyrotechnics and Propellants
NSTS 08307	Space Shuttle Criteria for Preloaded Bolts
TT-I-735A	Isopropyl Alcohol

MSFC Standards Documents	
MSFC-DWG-20M02540	Assessment of Flexible Lines for Flow Induced Vibration NOTE: This is a MSFC Control Document. To receive information on this document please contact: Marshall Space Flight Center Documentation Repository - 256-544-4490
MSFC-HDBK-505B	Structural Strength Program Requirements
MSFC-HDBK-1453	Fracture Control Program Requirements
MSFC-PROC-404A	Procedure Gases, Drying and Preservation, Cleanliness Level and Inspection
MSFC-PROC-1721	Tape Lift Particle Counting Procedure
MSFC-PROC-1831	Procedure The Analysis of Nonvolatile Residue Content
MSFC-RQMT-2918B	Requirements for Electrostatic Discharge Control
MSFC-SPEC-164B	Specification for Cleanliness of Components for Use in Oxygen, Fuel and Pneumatic Systems (and associated Children documents as specified in Attachment J-3, Applicable, Guidance, and Informational Documents List)
MSFC-SPEC-250A	Protective Finishes for Space Vehicle Structures and Associated Flight Equipment, General Specification For
MSFC-SPEC-445A	Requirements for Adhesive Bonding, Process and Inspection
MSFC-SPEC-708	Identification Markers for Space Systems Electrical Harnesses
MSFC-SSCP-5-7	MSFC Space Shuttle Contingency Plan
MSFC-STD-481	Radiographic inspection and acceptance standards for fusion welded joints in Stainless Steel and heat resistant steel
MSFC-STD-486B	Standard, Threaded Fasteners, Torque Limits for
MSFC-STD-506C	Material and Process Control Standard
MSFC-STD-509	Lubricant Selection
MSFC-STD-557A	Threaded Fasteners, 6AL-4V Titanium Alloy, Usage Criteria for Spacecraft Applications
MSFC-STD-2594C	MSFC Fastener Management and Control Practices
MSFC-STD-2903B	MSFC Tailoring Guide for NASA-STD-8739.3, Workmanship Standard for Soldered Electrical Connections
MSFC-STD-2904C	MSFC Tailoring Guide for NASA-STD-8739.2, Workmanship Standard for Surface Mount Technology
MSFC-STD-2905C	MSFC Tailoring Guide for NASA-STD-8739.4, Crimping, Interconnecting Cables, Harness, and Wiring
MSFC-STD-2907A	Workmanship Standard for Printed Wiring Boards
MSFC-STD-3012	EEE Parts Management and Control for MSFC Space Flight Hardware

MSFC-STD-3029A	Guidelines for the Selection of Metallic Materials for Stress Corrosion Cracking Resistance in Sodium Chloride Environments
MSFC-STD-3425	Design Standard for Rigid Printed Circuit Boards and Assemblies
KSC Standards Documents	
KNPR 8715.3 Rev B-2	KSC Ground Safety Requirements Document
KSC-C-123H	Cleanliness Levels, Cleaning Protection, and Inspection Procedures for Parts, Field Parts, Assemblies, Sub Systems, and Systems for Fluid Use in Support Equipment
KSC-E-165D	Electrical Ground Support Equipment, Fabrication, Specification for
KSC-SPEC-E-0031A	Cables, Electrical, General Specification for
KSC-STD-E-0004	Pneumatic and Hydraulic Mechanical Components, Electrical Design, Standard for (ITAR Controlled)
JSC Standards Documents	
ORDEM 2000	Orbital Debris Engineering Model (ORDEM 2000)
SE-S-0073 G CN 78 thru 84 May 27, 1999	Fluid Procurement and Use Control, Space Shuttle
SN-C-0005D	Contamination Control Requirements for the Space Shuttle Program
SW-E-0002	Space Shuttle Ground Support Equipment General Design Requirements
JPR 8080.5	JSC Design and Procedural Standards
JPR 8080.5, E-6	JSC Design and Procedural Standard E-6, Corona Suppression
JPR 8080.5, E-7	JSC Design and Procedural Standards, Section E-7, Electrical Components – Restrictions on Use
JPR 8080.5, M/S-11	JSC Design and Procedural Standards, Section M/S-11, Meteoroid and Orbital Debris Protection Levels for Structures
JPR 8080.5, E-14	JSC Design and Procedural Standard, E-14, Electrical Wire Harness Acceptance Testing
JPR 8080.5, E-24	JSC Design and Procedural Standard, E-24, Electrical Wire and Cable Acceptance Test
JSC 27862	Post-Mission Disposal of Upper Stages
JSC 49774A	Standard Manned Spacecraft Requirements for Materials and Processes
JSC 62809C	NASA Human Rated Spacecraft Pyrotechnic Specification
JSC-SPEC-C-20	Specification for High Purity Water
Industry Standards Documents	
AIAA S-081A	AIAA Standard for Space Systems - Composite Over wrapped Pressure Vessels
AIAA-S-080	AIAA Standard for Space Systems - Metallic Pressure Vessels, Pressurized Structures, and Pressure Components

AMSE Y14.41	Digital Product Definition Data Practices
*ANSI Z136.1	American National Standard for the Safe Use of Lasers
*ANSI Z136.2	Safe Use of Optical Communication Systems Utilizing Laser Diode and LED Sources
*ANSI Z136.6-2000	American National Standard for the Safe Use of Lasers (Outdoors)
ANSI/NFPA-101	NFPA Life Safety Code
ASME Pressure Vessel Code, Section IX Procedures	ASME Boiler and Pressure Vessel Code, Section IX: Welding and Brazing Qualifications
ASTM-E-1417	Standard Practice for Liquid Penetrant Testing
ASTM-E-1742	Standard Practice for Radiographic Examination
ASTM-F-312	Standard Methods for Microscopical Sizing and Counting Particles from Aerospace Fluids and Membrane Films
CFR 49, Parts 100-185,	Code of Federal Regulations - Transportation
DOT/FAA/AR-MMPDS-01	Metallic Materials Properties Development and Standardization (MMPDS)
IEEE C95.1-2005	Safe Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields 30 KHz to 100 GHz
IPC-2221A	Generic Standard on Printed Board Design
IPC-2222	Sectional Design Standard for Rigid Organic Printed Boards
IPC-6011	Generic Performance Specification For Printed Wiring Boards
IPC-6012B	Qualification and Performance Specification for Rigid Printed Boards
IPC-A-610D	Acceptability of Electronic Assemblies, Performance Class 3
IPC-J-STD-001CS	Space Applications Electronic Hardware Addendum to Requirements for Soldered Electrical and Electronic Assemblies
NFPA 50	Bulk Oxygen Systems at Consumer Sites
*NFPA-70H	National Electrical Code
SAE-AS-1933	Age Control for Hose Containing Age-Sensitive Elastometric Material
SAE-AS-50861	Wire, Electric, Polyvinyl Chloride Insulated Copper or Copper Alloy
MIL Standards Documents	
MIL-B-5087 NOW MIL-STD-464	Bonding, Electrical and Lightning Protection for Aerospace Systems
MIL-C-22992	Connectors, Plugs and Receptacles, Electrical, Waterproof, Quick Disconnect, Heavy Duty Type, General Specification for (BASE + 6 amendments + 1 Supplement SUPERCEDED by ???)
MIL-DTL-5015	Connectors, Electrical, Circular Threaded, AN Type, General Specification for (BASE + Supplement)
MIL-DTL-16878	Wire, Electrical, Insulated, General Specification for (BASE + 1 Amendment + 1 Supplement)

MIL-DTL-38999	Connectors, Electrical, Circular, Miniature, High Density, Quick Disconnect (Bayonet, Threaded, and Breech Coupling), Environment Resistant, Removable Crimp and Hermetic Solder Contacts, General Specification for (BASE + 3 Amendments + 1 Supplement)
MIL-HDBK-5D	Metallic Materials and Elements for Aerospace Vehicle Structures (Vol. 1 (change 3) Vol. 2 (change 3))
MIL-HDBK-5E Vol. 1	Metallic Materials and Elements for Aerospace Vehicle Structures ((change 2) Vol. 2 (change 2))
MIL-HDBK-23A	Structural Sandwich Composites (Not. Of change and Not of CANCELED)
MIL-HDBK-5961	List of Standard Semiconductor Devices (No Rev and Rev A CANCELED)
MIL-P-26536D	Hydrazine (BASE + 1 Amendment)
MIL-P-26539D	Nitrogen Tetroxide (BASE + 2 Amendments)
MIL-P-27404B	Monomethylhydrazine
MIL-PRF-25508	Performance Specification Propellant, Oxygen
MIL-PRF-27201	Performance Specification Propellant, Hydrogen
MIL-PRF-27407	Performance Specification Propellant Pressurizing Agent, Helium
MIL-STD-129N 15 May 1997	Marking for Shipment and Storage
MIL-STD-130F (1), 2 July	Identification and Marking of U.S. Military Property (1984 BASE + 2 Notices Notice 1 is July 2 1984)
MIL-STD-453C	Inspection, Radiographic (BASE + Notice + Cancel)
MIL-STD-461E	Requirements for the Control of Electromagnetic Interference (EMI) Characteristics of Subsystems and Equipment
MIL-STD-464A	Electromagnetic Environmental Effects Requirements for Systems
MIL-STD-794B	Parts and Equipment, Procedure for Packaging and Packing of
MIL-STD-889B	Dissimilar Metals (Chg 3 (1993))
MIL-STD-1246	Count Method PRODUCT CLEANLINESS LEVELS AND CONTAMINATION CONTROL PROGRAM (BASE + 3 Notices + Cancel)
MIL-STD-1472B, 31 December 1974	Department of Defense Design Criteria Standard, Human Engineering (BASE + 2 Notices , BASE is Dec 1974)
MIL-STD-1522A	Standard General Requirements for Safe Design and Operation of Pressurized Missile and Space Systems (BASE + 2 Notice +1 Validation)
MIL-STD-1523	Age Controls of Age Sensitive Elastometric Materials (BASE + 2 Cancellations)
MIL-STD-1541A	Electromagnetic Compatibility Requirements for Space Systems
MIL-STD-1576	Electro Explosive Subsystem Safety Requirements and Test Methods for Space Systems (BASE + Note of Validation)

MIL-STD-1774	Process for Cleaning Hydrazine Systems and Components (BASE + Validation +Cancellation)
MIL-T-8606C	Tubing Steel, Corrosion Resistant (BASE + 2 Amendments + 4 Notes of Validation)
MIL-W-5086	Wire, Electric, Polyvinyl Chloride Insulated, Copper or Copper Alloy (REV C BASE + Supplement + Amendment + Cancellation)
MIL-W-22759	Wire, Electrical, Fluoropolymer-Insulated Copper or Copper Alloy (REV E BASE + Supplement + 2 Amendments + Cancellation)
ML0303-0014	Electrical Wire Harnesses and Coaxial Cables, Installation Requirements for Electromagnetic Compatibility
MIL-STD-1553B	Digital Time Division Command/Response Multiplex Data Bus
MIL-H-83282C	Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Based, Metric, NATO Code #H-537
MPD 8720.1	MSFC Reliability and Maintainability Program for Space Systems
MPR 1280.2	Process Control
MPR 8060.1F	Flight Systems Design/Development Control

NOTE (*) Standard must be purchased

Miscellaneous Documents	
29 CFR 1910	Department of Labor; Occupational Safety and Health Administration Standards for General Industry
40 CFR	Environmental Protections
42 USC 2451	The National Aeronautics and Space Act of 1958 as amended
NFPA Standards	National Fire Codes

OMB CIRCULARS	
Circular A-130	Management of Federal Information Resources

NASA DOCUMENTATION	
48 CFR Chapter 1	Federal Acquisition Regulations
48 CFR Chapter 18	(NASA/FAR Supplement)
1001.0 (NPD)	NASA Strategic Plan
1441.1 (NPR)	NASA Records Retention Schedules
1490.1 (NPD)	NASA Printing, Duplicating, and Copying Management
1600.1 (NPR)	NASA Security Program Procedural Requirements
1620.3 (NPR)	Physical Security Requirements for NASA Facilities and Property
2810.1 (NPR)	Security of Information Technology
4100.1 (NPR)	NASA Materials Inventory Management Manual
4200.1 (NPR)	NASA Equipment Management Manual
5100.4 (NPR)	Federal Acquisition Regulation Supplement, (NASA/FAR Supplement) Part 18-45 and latest revisions thereto
7120.5 (NPR)	NASA Program and Project Management Processes and Requirement
8621.1 (NPR)	NASA Procedural Requirements for Mishap and Close Reporting, Investigating, and Recordkeeping
8700.1 (NPD)	NASA Policy for Safety and Mission Success
8705.2 (NPR)	Human Rating Requirements for Space Systems
8705.6 (NPR)	Safety and Mission Assurance Audits, Reviews and Assessments
8715.3 (NPR)	NASA General Safety Program Requirements
9501.2 (NPR)	NASA Contractor Financial Management Reporting

MSFC DOCUMENTATION	
1040.3 (MPD)	MSFC Emergency Program
1040.3 (MPR)	MSFC Emergency Plan
1100.1 (MPR)	MSFC Organizational Manual
1280.1 (MPD)	Marshall Management Manual
1280.2 (MWI)	MSFC Customer Feedback System
1280.3 (MWI)	MSFC Corrective/Preventative Action Notification System
1280.4 (MWI)	MSFC Quality System Deficiency Notification System
1280.4 (MPR)	MSFC Corrective Action System
1280.6 (MPR)	Internal Quality Audits
1280.5 (MWI)	MSFC ALERT Processing

1371.1 (MPR)	Procedural Requirements for Processing Foreign Visitor Requests
1380.1(MPR)	Acceptance of Gifts to MSFC
1380.1 (MWI)	Handling of Freedom of Information Act Requests
1380.1 (MPD)	Release of Information to News and Information Media
1380.2 (MPR)	Center Public Exhibits and Requirements Process
1380.2 (MPD)	Coordination of Activities for Visitors to MSFC
1380.3 (MWI)	Center Mementos
1410.1 (MPR)	Document an Data Control for Organizational Issuances
1440.2 (MPR)	MSFC Records Management Program
1450.1 (MWI)	Handling of Congressional Inquires
1490.1 (MPR)	Printing, Reproduction, and Self-Service Copying Services
1500.1 (MWI)	Special Events Coordination
1520.1 (MWI)	Graphic and Publication Production Services
1551.1 (MPR)	Mail Management & Distribution
1600.1 (MPR)	MSFC Security Procedural Requirements
1700.2 (MWI)	System Safety Program
1700.3 (MWI)	NASA Safety Reporting System Corrective Action Process
1800.1 (MPR)	Blood-borne Pathogens
1800.1 (MPD)	MSFC Smoking Policy
1810.1 (MPR)	MSFC Occupational Medicine
1840.1 (MPR)	MSFC Confined Space Entries
1840.1 (MPD)	MSFC Environmental Health Program
1840.2 (MPD)	MSFC Hearing Conservation Program
1840.2 (MPR)	MSFC Hazard Communication Program
1840.3 (MPR)	MSFC Hazardous Chemicals in Laboratories Protection Program
1860.1 (MPR)	Radiation Safety Procedural Requirements
1860.1 (MPD)	Laser Safety
1860.2 (MPD)	Radiation Safety Program
2190.1 (MPD)	MSFC Export Control Program
2210.1 (MPD)	Documentation Input and Output of the MSFC Documentation Repository
2500.1 (MPR)	Marshall Telecommunications and Audio Visual Services
2810.1 (MPD)	Security of Information Technology
3410.1 (MPR)	Training
3410.1 (MWI)	Personnel Certification Program
3940.1 (MPR)	Welfare and Charity Campaigns and Privately-Sponsored On-the-Job Solicitations
4000.2 (MPR)	Property Management
4200.1 (MWI)	Equipment Control
4520.1 (MWI)	Receiving
6700.1 (MPR)	Vehicle and Motor Pool Operations
8500.1 (MPR)	MSFC Environmental Management Program
8550.5 (MWI)	Chemical Management
8621.1 (MWI)	Close Call and Mishap Reporting and Investigation Program
8715.1 (MPR)	Marshall Safety, Health and Environmental (SHE) Program
8715.3 (MWI)	Hazard Identification and Warning System
8715.9 (MWI)	Occupational Safety Requirements for MSFC Contractors
8715.11 (MWI)	Fire Protection
8715.15 (MWI)	Ground Operations Safety Assessment and Risk Mitigation Program

The following Organizational Issuances are provided for information purposes only.

Organizational Issuances	
CS20-OWI-001	Developing Information Products
CS20-OWI-002	Procedure for Responding to Media Queries
CS20-OWI-003	Press Conference/Press Briefings
CS20-OWI-004	Media Contingency Planning
CS20-OWI-005	Management Reports
CS20-OWI-006	Customer Feedback Process
CS20-OWI-007	Media Visits
CS20-OWI-008	Operation of MSFC Newsroom and Remote News Center
CS20-OWI-009	Space Shuttle Launch Support
CS20-OWI-010	Exhibits Operations and Maintenance
CS20-OWI-011	Handling Public Inquires Requests
CS20-OWI-012	Historical Function
CS20-OWI-013	Employee Communications
CS30-OWI-008	Handling Official Public Speaking Engagements by Marshall Space Flight Center Personnel
MSFC-SSCP-5-77	Space Shuttle Contingency Plan Office of Strategic Communications

[END OF ATTACHMENT]

ATTACHMENT J-7**WORK BREAKDOWN STRUCTURE**

The following WBS numbers and categories are provided as reference for proposal development. After contract award, the Contractor shall work with NASA to align all skills / workforce to ensure an optimized team and efficient integration with the NASA Upper Stage IPTs.

WBS Number	Description
136905.08.05.01	Element Management
136905.08.05.02	Integrated Upper Stage
136905.08.05.03	Structures & Thermal
136905.08.05.04	Main Propulsion System
136905.08.05.05	Upper Stage Reaction Control System
136905.08.05.06	First Stage Reaction Control System
136905.08.05.07	Thrust Vector Control System
136905.08.05.08	Avionics
136905.08.05.09	Flight Software
136905.08.05.10	Integrated Test
136905.08.05.11	Logistics Support Infrastructure
136905.08.05.12	Manufacturing & Assembly
<p>NOTE 1: All S&MA tasks are implemented under the Integrated Upper Stage WBS Number</p> <p>NOTE 2: All Upper Stage Umbilical Tasks are implemented under the Integrated Upper Stage WBS Number</p>	

Table J-7-1**[END OF ATTACHMENT]**

ATTACHMENT J-8**ARES I / UPPER STAGE MILESTONES**

This attachment shall be used by the Contractor to develop an integrated contractor schedule to manage the day to day functions as required to meet the Upper Stage requirements and milestones. The Contractor shall work with NASA to align all tasks and activities to ensure an efficient integration with the Upper Stage Integrated Master Schedule.

Upper Stage Element Milestones	Date
Upper Stage PDR	May 2008
Upper Stage CDR	November 2009
MPTA Test Activation	September 2010
Upper Stage GVT Test Activation	November 2011
Ares 2 Mission	September 2012
Upper Stage DCR	December 2012
Orion 3 Mission	March 2013
Orion 4 Mission (IOC)	October 2013
Orion 5 Mission	March 2014
Orion 6 Mission	September 2014
Orion 7 Mission	March 2015
Orion 8 Mission	September 2015
Orion 9 Mission	March 2016
Orion 10 Mission	September 2016

Table J-8-1**[END OF ATTACHMENT]**

ATTACHMENT J-9

INTEGRATED COLLABORATIVE ENVIRONMENT (ICE) OPERATING ENVIRONMENT

SECTION I

Background/Overview

The Integrated Collaborative Environment (ICE) is a major tool for NASA's Exploration Systems Mission Directorate (ESMD) programmatic management activities and allows identification, collection, analyses, and dissemination of data and information associated with the Agency's goals and mission. ICE provides a secure data repository with the necessary access control for data protection in conjunction with a collaborative environment. This enables real time decision-making relative to program and project deliverables. ICE is an integral component for decision support throughout the program and projects' life cycles and is based on the availability of needed information to team members involved in decision making. The ESMD programs and projects will use ICE to facilitate effective feedback, efficient change management and rapid change propagation. ICE will also support a wide variety of other uses. Some of these include: support for management reviews, support for minor and major design reviews, linking users of the tools, support to team meetings, issue recording, etc.

NASA is responsible for implementing ICE and has done so using a suite of commercial-off-the-shelf licensed software tools as the core elements of the solution. NASA's ICE operates as an extranet environment that is physically separate from any other non-ESMD network and is dedicated to the ESMD programs and projects. The ESMD Chief Information Officer (CIO) organization manages authorization and authentication. Access control policies are developed and maintained by the ESMD CIO organization and can be applied at the individual object level. All NASA sites and Contractors are expected to request and implement ICE licenses and to use the system as a collaboration tool with the ESMD program and projects and as a source of all relevant data. The ESMD program and projects will provide access and Contractor training personnel to a limited set of users from the Contractor. The Contractor must assess their participation to determine the number of personnel who will need access. As guidance, any individual that contributes to the process of defining, collaborating, reviewing, and delivering contributions to the Upper Stage Project will need an ICE license. This includes both inter-company and intra-company collaborative activities. Additionally, other users may include many of the following persons involved in collaboration with other project element organizations, such as:

- a. Procurement & Supplier Management Personnel
- b. Engineers
- c. IT Personnel
- d. Manufacturing & Assembly Personnel
- e. Administration
- f. Simulation, Testing & Analysis Engineers

ICE will provide virtual meeting and real time information sharing activities via an on line meeting tool.

The ICE Program Office is currently building a capability to create a fully distributed information environment which will enable the ESMD programs and projects to reach data objects at Contractor and NASA sites and interrogate them. Upon identifying information required to support actions, access to the data will be available to all who have the correct access controls. Data with restricted rights markings will be access controlled and disseminated in accordance with the contractually established agreements. ICE will use several levels of access controls to ensure security of sensitive data.

SECTION II

ESMD ICE Data Requirements

The Contractor shall comply with the following requirements for making their data a part of the Integrated Collaborative Environment:

Data Access Requirements: The Contractor shall deliver the data to ESMD using one of the following two options:

- a. Use the ESMD ICE directly to develop and manage Contractor data. The Contractor personnel will be provided licenses and access to the ICE environment and will do their day-to-day work in the ICE environment. (This option is intended for companies which do not have an existing set of tools and infrastructure.)
- b. Provide access to the Contractor's data through the internet using JMS and SOAP protocol. Authentication will be X.509 based and information will reside within the Contractor's native systems. ICE access will be accomplished through the use of a credentialing mechanism mutually agreed upon by the Contractor and NASA. As stated previously, several levels of access controls will be used for security of sensitive data. As part of this architecture, ICE will communicate with the Contractor's Information Technology (IT) systems via an

integration broker (i.e. middleware technology)-to-integration broker communication using JMS/SOAP.

The following is meant to be a representative, but not complete, list of the interactions which can occur between NASA's ICE and the Contractor's IT environment:

1. Services that update ICE with new/updated files, objects, and application activity.
2. Services that participate in, publish, and subscribe broker service.
3. Services that have a set of events that the integration broker responds to.

The Contractor shall work with NASA to develop a directory structure that addresses the needs of NASA program and project integration. This directory structure shall be documented in the Contractor Configuration Management Plan. To ensure its integration across all of ESMD, the Configuration Management Plan shall be reviewed and approved by the Constellation Program Office and the ESMD CIO, as well as by the ELO and Upper Stage Office.

Data Exchange Requirements:

Send and receive JMS/SOAP messages to ICE to keep aware of local activity.

- a. JMS/SOAP messages would include, but are not limited to:
 1. ID of object (e.g. file name)
 2. Name of object (e.g. Avionics Package)
 3. Version of object (e.g. Rev A)
 4. State of object as defined by ICE Program Office (e.g. In Work, Released, etc)
 5. Type of object (e.g. CAD File)
 6. Security profile of object (e.g. Classified, Unclassified)
 7. Association categories for object product structure
 - a) Used on (e.g. Part, Model, WBS)
 - b) Uses (e.g. Part, Model, WBS)
 - c) Described by
 - d) Describes
 - e) Analyzed by
 - f) Analyzes

b. Translate native CAD geometry (e.g. Unigraphics) into ProductView format for visualization purposes.

c. All objects must have an association to the Upper Stage WBS.

d. Objects must have an association to a part (if appropriate).

e. To provide separate instances of classified (if necessary) and unclassified information.

f. Update ICE meta data and content when changed and in accordance with the associated business process. The meta data structure and associated data field attributes should meet NASA data archival requirements depending upon the NASA Center where the data will be stored.

g. Required objects that must be synchronized within ICE include, but are not limited to:

1. Parts
2. Bills of materials
3. Software
4. Manufacturing plans
5. Generic documents
6. 3-D Models
7. Test data (Estimated, Calculated)
8. Analysis Data (Engineering, Hardware / Software integration, Interoperability)
9. Trade studies
10. Specifications
11. Technical assessments
12. Test plans
13. Test results for modeling and simulation

h. Documentation of modeling and simulation run

1. Description
2. Software
3. Models
4. Constraints
5. H/W, S/W, Operating System (O/S)

i. Measures of Performance, Measures of Effectiveness

j. Unified Modeling Language (UML) diagrams

k. Component reliability/maintainability data

l. Interface specifications and procedures

- m. Properties data for interfaces
 - 1. Mechanical
 - 2. Physical
 - 3. Electrical
 - 4. Functional
- n. Technical Performance Measures
- o. Follow the ESMD CIO organization naming conventions
- p. Only the ESMD CIO organization can authorize the removal of ESMD data once it is released.
- q. Formats used on ICE include, but are not limited to;
 - 1. Microsoft Office® (Word, Excel, PowerPoint, Visio, Project)
 - 2. Rational Rose UML Models
 - 3. ASCII Text Data
 - 4. Adobe Acrobat PDF
 - 5. JPEG
 - 6. MPEG
 - 7. AVI
 - 8. HTML
 - 9. RTF
 - 10. XML
 - 11. GIF

Note: The ESMD CIO organization will specify the version of these applications separately and Contractors will be given six months to move to those versions.

The ESMD CIO organization will participate with the NASA sites and/or Contractors to coordinate and establish the integration with the Integrated Collaborative Environment.

ICE Tools:

The ICE Architecture does not require the Contractor to use any particular set of tools; however, there are always questions as to what tools make up ICE. The following is provided to the Contractor for informational purposes:

- a. Systems Engineering – Cradle
- b. Product Life Cycle Management – Windchill
 - 1. CAD Data Management
 - 2. Configuration Management
 - 3. Data Management

4. Product Structure
 5. Document Management
 6. Project Collaboration
- c. Risk Management – Active Risk Manager (ARM)
 - d. Earned Value Management – Primavera and wInsight
 - e. Integrated Master Schedule/Integrated Master Plan – Primavera
 - f. MCAD – Pro/Engineer®

Licenses for Applications:

With minor exceptions, the Contractor should utilize the licenses provided as part of the ODIN desktop services contract at each NASA facility where applicable. If additional licenses are required, the contractor is responsible for obtaining a wavier from the Office of the CIO before acquiring and deploying their own licenses for the applications listed in item q noted above.

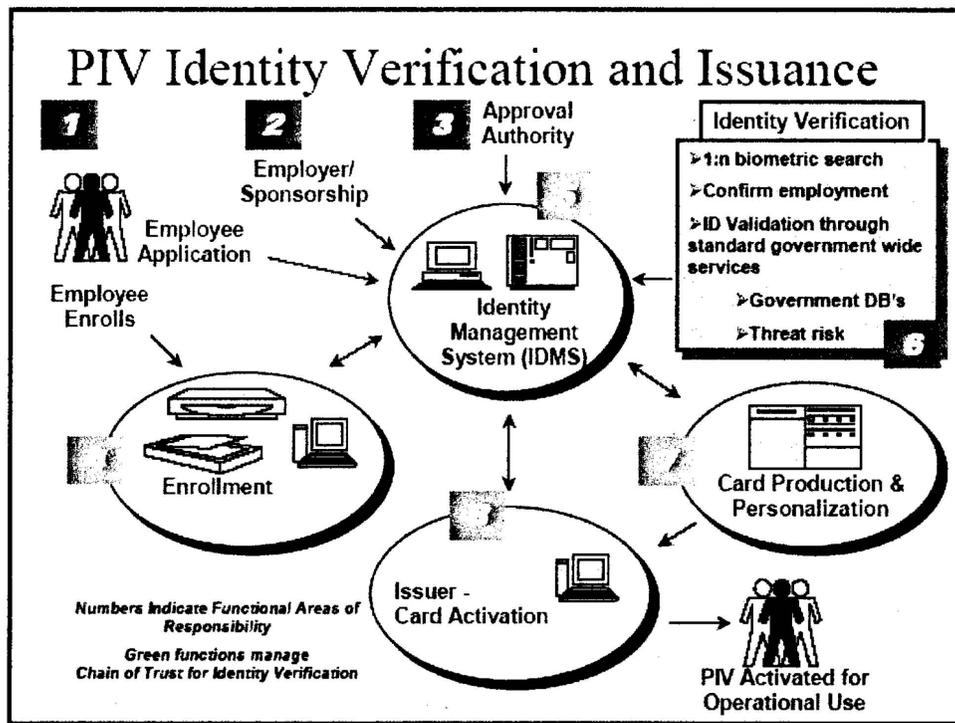
[END OF ATTACHMENT]

ATTACHMENT J-10

PERSONAL IDENTITY VERIFICATION PROCEDURES

PIV Card Issuance Procedures (in accordance with FAR Clause 52.204-9, Personal Identity Verification of Contractor Personnel, and Clause G11, Personal Identity Verification of Contractor Personnel):

Picture J-10-1 graphically displays the following procedure for the issuance of a PIV credential.



Picture J-10-1

The following steps describe the procedures for the NASA Personal Identity Verification Card Issuance (PCI) of a PIV credential:

Step 1:

The Contractor's Corporate Security Officer (CSO), Program Manager (PM), or Facility Security Officer (FSO) submits a formal letter that provides a list of contract employees (applicant) names requesting access to the NASA Contracting Officer's Technical Representative (COTR). In the case of a foreign national applicant, approval through the NASA Foreign National Management System (NFNMS) must be obtained for the visit or assignment before any processing for a PIV credential can take place. Further, if the foreign national is not under a contract where a COTR has been officially designated, the foreign

national will provide the information directly to their visit/assignment host, and the host sponsor will fulfill the duties of the COTR mentioned herein. In each case, the letter shall provide notification of the contract or foreign national employee's (hereafter the "applicant") full name (first, middle and last), social security number (SSN) or NASA Foreign National Management System Visitor Number if the foreign national does not have a SSN, and date of birth. If the contract employee has a current satisfactorily completed National Agency Check with Inquiries (NACI) or an equivalent or higher degree of background investigation, the letter shall indicate the type of investigation, the agency completing the investigation, and date the investigation was completed. Also, the letter must specify the risk/sensitivity level associated with the position in which each applicant will be working (NPR 1600.1, §4.5 is germane) Further, the letter shall also acknowledge that contract employees may be denied access to NASA information or information systems based on an unsatisfactory background investigation/adjudication.

After reviewing the letter for completeness and concurring with the risk/sensitivity levels, the COTR/host must forward the letter to the Center Chief of Security (CCS). The CCS shall review the OPM databases (e.g., DCII, PIP, et al.), and take appropriate steps to validate the applicant's investigation status. Requirements for a NACI or other investigation shall be initiated only if necessary.

Applicants who do not currently possess the required level of background investigation shall be directed to the e-QIP web site to complete the necessary background investigation forms online. The CCS shall provide to the COTR/host information and instructions on how to access the e-QIP for each contract or foreign national employee requiring access

Step 2

Upon acceptance of the letter/background information, the applicant will be advised that in order to complete the investigative process, he or she must appear in-person before the authorized PIV registrar and submit two forms of identity source documents in original form. The identity source documents must come from the list of acceptable documents included in Form I-9, Employment Eligibility Verification, one which must be a Federal¹ or State issued picture identification. Fingerprints will be taken at this time. The applicant must appear **no later than** the entry on duty date.

When the applicant appears, the registrar will electronically scan the submitted documents; any document that appears invalid will be rejected by the registrar. The registrar will capture electronically both a facial image and fingerprints of the applicant. The information submitted by the applicant will be

¹ A non-PIV government identification badge, including the NASA Photo Identification Badge, **MAY NOT BE USED** for the original issuance of a PIV vetted credential.

used to create or update the applicant identity record in the Identity Management System (IDMS).

Step 3:

Upon the applicant's completion of the investigative document, the CCS reviews the information, and resolves discrepancies with the applicant as necessary. When the applicant has appeared in person and completed fingerprints, the package is electronically submitted to initiate the NACI. The CCS includes a request for feedback on the NAC portion of the NACI at the time the request is submitted.

Step 4

Prior to authorizing physical access of a contractor employee to a federally-controlled facility or access to a Federal information system, the CCS will ensure a National Crime Information Center (NCIC) with an Interstate Identification Index check is/has been performed. In the case of a foreign national, a national check of the Bureau of Immigration and Customs Enforcement (BICE) database will be performed for each applicant. If this process yields negative information, the CCS will immediately notify the COTR/host of the determination regarding access made by the CCS.

Step 5

Upon receipt of the completed NAC, the CCS will update IDMS from the NAC portion of the NACI and indicate the result of the suitability determination. If an unsatisfactory suitability determination is rendered, the COTR will advise the contractor that the employee is being denied physical access to all federally-controlled facilities and Federal information systems.

Based on a favorable NAC and NCIC/III or BICE check, the CCS will authorize the issuance of a PIV federal credential in the Physical Access Control System (PACS) database. The CCS, based on information provided by the COTR/host, will determine what physical access the applicant should be granted once the PIV issues the credential.

Step 6:

Using the information provided by the applicant during his or her in-person appearance, the PIV card production facility creates and instantiates the approved PIV card for the applicant with an activation date commensurate with the applicant's start date.

Step 7:

The applicant proceeds to the credential issuance facility to begin processing for receipt of his/her federal credential.

The applicant provides to the credential issuing operator proof of identity with documentation that meets the requirements of FIPS 201 (DHS Employment Eligibility Verification (Form I-9) documents. These documents **must** be the same documents submitted for registration.

The credential issuing operator will verify that the facial image, and optionally reference finger print, matches the enrollment data used to produce the card. Upon verification of identity, the operator will locate the employee's record in the PACS database, and modify the record to indicate the PIV card has been issued. The applicant will select a PIN for use with his or her new PIV card. Although root data is inaccessible to the operator, certain fields (hair color, eye color, et al.) may be modified to more accurately record the employee's information.

The applicant proceeds to a kiosk or other workstation to complete activation of the PIV card using the initial PIN entered at card issuance.

ALTERNATIVE FOR APPLICANTS WHO DO NOT HAVE A COMPLETED AND ADJUDICATED NAC AT THE TIME OF ENTRANCE ON DUTY

Steps 1 through 4 shall be accomplished for all applicants in accordance with the process described above. If the applicant is unable to appear in person until the time of entry on duty, or does not, for any other reason, have a completed and adjudicated NAC portion of the NACI at the time of entrance on duty, the following interim procedures shall apply.

1. If the documents required to submit the NACI have not been completed prior to EOD, the applicant will be instructed to complete all remaining requirements for submission of the investigation request. This includes presentation of I-9 documents and completion of fingerprints, if not already accomplished. If the applicant fails to complete these activities as prescribed in NPR 1600.1 (Chapters 3 & 4), it may be considered as failure to meet the conditions required for physical access to a federally-controlled facility or access to a Federal information system, and result in denial of such access.

2. Based on favorable results of the NCIC, the applicant shall be issued a temporary NASA identification card for a period not-to-exceed six months. If at the end of the six month period the NAC results have not been

returned, the agency will at that time make a determination if an additional extension will be granted for the temporary identification card.

3. Upon return of the completed NAC, the process will continue from Step 5.

[END OF ATTACHMENT]

ATTACHMENT J-11

GOVERNMENT-FURNISHED PROPERTY

Government Furnished Property Identified in RFP Attachment L-5:

Part Number	Nomenclature	Comments	Qty	Need Date
Glenn Research Center (GRC)				
N/A	GRC 333 Power System Facility, TVC Test Lab	1-axis test rig, 2-axis test rig	1	11/2/2009 thru 3/1/2010
Marshall Space Flight Center (MSFC)				
N/A	MSFC 4436 Hardware Simulation Laboratory	Systems Integration of Avionics software and hardware.		[4]
N/A	MSFC 4476 Marshall Avionics Systems Test bed	Avionics System Test Bed		[4]
N/A	MSFC 4522 Test Facility 500 (TF500)	Multi-use test facility		[4]
N/A	MSFC 4530 Test Facility 300 (TF 300)	Cryogenic flow testing		[4]
N/A	MSFC 4550 Structural Dynamic Test Facility	Mated Vertical Ground Vibration Test (MVGVT) of CLV-Upper Stage		[4]
N/A	MSFC 4554 Hot Gas Test Facility (HGF)	TPS development and testing		[4]
N/A	MSFC 4555 Materials Environment Test Facility	Bi-axial load testing of structural components		[4]
N/A	MSFC 4572 Propulsion and Structural Test Facility	Hazardous, pressurized margin testing of US pressure vessel components		[4]
N/A	MSFC 4612 Materials and Processes Laboratory	Materials and process development. Materials Diagnostics Facility-		[4]
N/A	MSFC 4619 Structures & Mechanics Lab	Structural dynamic testing. Environment Test Facility, component thermal/vacuum testing for avionics, MPS Thermo-mechanical/heat treatment processing facility		[4]
N/A	MSFC 4623 Materials Combustion Research	Material testing of hardware systems including structural, mechanical and electronic applications.		[4]
N/A	MSFC 4626 LH2 Cold Flow Facility	MPS testing – cryogenic cold flow		[4]
N/A	MSFC 4628 Hydrogen Test Facility	Material testing of hardware systems including structural, mechanical and electronic applications.		[4]
N/A	MSFC 4656 Hydraulic Equipment Development Facility	Actuator Lab-Systems integration and testing of Avionics software and hardware.		[4]
N/A	MSFC 4670 Advanced Engine Test Facility	Element Level testing for MPTA, MPS systems		[4]
N/A	MSFC 4699 Cryogenic Structural Test Facility	Cryogenic structural testing		[4]
N/A	MSFC 4702 Non-Destructive Evaluation Facility	X-Ray Facility, Ultrasonic, Eddy current facilities-NDE evaluation of CLV hardware and space components.		[4]
N/A	MSFC 4705 Multi-purpose High Bay	Machine shop, sheet metal shop, welding and cleaning		[4]

Part Number	Nomenclature	Comments	Qty	Need Date
N/A	MSFC 4707 National Center for Advanced Manufacturing	Computer Tomography Lab- NDE evaluation of CLV hardware and space components – Upper Stage. NCAM Facilities-support for potential first flight and test article – Upper Stage SOFI (Spray On Foam Insulation) facilities, plus ancillary labs for manufacture of first articles – Upper Stage		[4]
N/A	MSFC 4711 Development Processes Lab	Manufacturing process development-Upper Stage Engine. Laser Shearography-NDE evaluation of CLV hardware and space components-Upper Stage. X-ray cell-welding inspection, proof testing, composite inspection, etc. for CLV hardware and space components –Upper Stage. Themography and acoustic emission lab-welding inspection, proof testing, composite inspection, etc. for CLV hardware and space components-Upper Stage.		[4]
N/A	MSFC 4755 Space Station Development Laboratory	Selected facility for CLV welding stations for Upper Stage structural components.		[4]
N/A	MSFC 4760 Surface Treatment Facility	US manufacturing development and test article fabrication		[4]
N/A	MSFC 4765 TPS Development Facility	Thermal Protection System formulation and spray development.		[4]
N/A	MSFC 4540 Test Facility 116 (TF 116)	Component testing Upper Stage.		[4]
Stennis Space Center (SSC)				
	SSC Test Stand B-2	Upper Stage MPTA and Green Run Testing		[4]
Michoud Assembly Facility (See Table L-5-3)				
	MAF 103	Manufacturing and Assembly building, main building	1	8/31/2007 thru 12/31/2016
	MAF 110	Manufacturing and Assembly building, high bay	1	8/31/2007 thru 12/31/2016
	MAF 114	Manufacturing and Assembly building, high bay	1	8/31/2007 thru 12/31/2016
	MAF 420	Final Assembly and TPS	1	8/31/2007 thru 12/31/2016
	MAF 451	Proof Testing	1	8/31/2007 thru 12/31/2016
	MAF 101/102 Office Buildings	Office and support space	1	8/31/2007 thru 12/31/2016
	MAF 220 Shipping and Receiving	Shipping and receiving docks and storage	1	8/31/2007 thru 12/31/2016

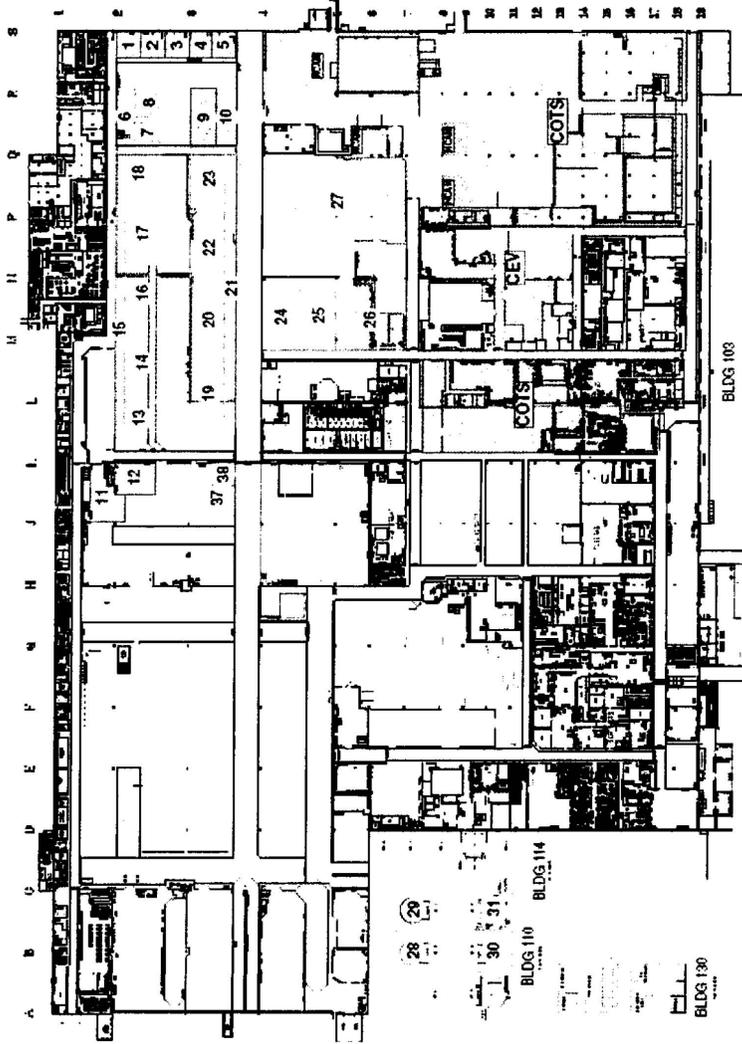
Additional Government Furnished Property Needed:

NASA /MAF Tool Number	Nomenclature	Tool Name	Qty	Site	Program Need Date
T36S0091 [5]	Straddle Carrier, ET	Straddle Carrier	1 ea	MAF	6/10/2007 thru 12/31/2016
T40S0409 [5]	ET motor assist 90 degree turnover fixture	Dome Manipulator Unit 1	1 ea	MAF	7/8/2007 thru 12/31/2016
F78-4355 [5]	ET motor assist 90 degree turnover fixture	Control System - Main	1 ea	MAF	7/8/2007 thru 12/31/2016
T03A5368	ET LO2/LH2 Barrel Panel Weld Station	Longitudinal SR-FSW	1 ea	MAF	7/8/2007 thru 12/31/2016
NA	Vertical Tack Weld Area, LOX/LH2 Tank	MAF Building 114, Cell L	1 bldg	MAF	7/8/2007 thru 12/31/2016
TBD	Propellant for FS RCS Thrusters [7]	Hydrazine	5356 lbs	MSFC	12/7/2009
TBD	Iridium based Catalyst for FS RCS Thrusters [7]	S-405	34 lbs	MSFC	6/16/2009

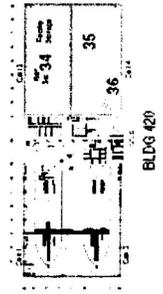
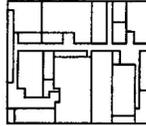
Notes:

- 1) Assume all NASA-MSFC/MAF development tooling and support equipment will be provided for CLIN 3 and CLIN 5 production. If the item(s) are not available then any rate tooling or handling fixtures required will be addressed via IDIQ task orders.
- 2) For all buildings and areas defined within RFP Attachment L-5, it is assumed that the ancillary equipment will also be available for those buildings and areas, i.e. lifts, overhead cranes, etc. Some of this ancillary equipment was addressed on the updated MAF GFP list provided 04/04/07.
- 3) The proposal J-11/J-12 GFE/GFP list will be reviewed after ATP as we become more familiar with MAF and the existing equipment so we can further reduce equipment costs through reuse.
- 4) Test facility usage at MSFC is assumed to be support to NASA controlled development and qualification testing only, plus any required anomaly testing required during the sustaining portion of the program. [4]
- 5) These ET tooling items were also addressed in the MAF GFP list provided on 4/4/07. [5]
- 6) We plan to fully utilize IT services as described in Attachment J-3, Installation-Provided Property and Services. This includes but is not limited to: computer workstations, application software, specialized COTS, network, etc.
- 7) Propellant and Catalyst for FS RCS Engines required for qualification and acceptance testing and CLIN 5 Production assumed to be available from NASA Development procurement. [7]

□	CLV-Major Structural - 33,380 sq. ft. (Bldg. 103)
□	CLV-Final Assembly - 146,002 sq. ft. (Bldg. 103)
Floor Space Total = 179,382 sq. ft. (Bldg. 103)	
1	CLV-RWT #1, Table #1
2	CLV-RWT #1, Table #2
3	CLV-RWT Staging
4	CLV-RWT #2, Table #1
5	CLV-RWT #2, Table #2
6	CLV-Major Weld and Slesh Baffle Staging
7	CLV-LOX, Major Weld
8	CLV-Roll Ring Install & Break-Over
9	CLV-LH2 Major Weld
10	CLV-Major Weld Staging
11	CLV-Flange Drill
12	CLV-Flange Trim
13	CLV Assy-J2, 120x60ft.
14	CLV Assy-LOX, 120x60ft.
15	CLV Assy-Staging Area
16	CLV Assy-LH2 Tank, 120x60ft.
17	CLV Assy-Thrust Structure, 90x60ft.
18	CLV Assy-Slesh Baffle, 105x77ft.
19	CLV Assy-Alt Skirt, 120x60ft.
20	CLV Assy-RCS, 120x60ft.
21	CLV Assy-Staging Area
22	CLV Assy-MPS, 120x60ft.
23	CLV Assy-Inertank, 120x60ft.
24	CLV Assy-Interstage, 120x60ft.
25	CLV Assy-TVC, 120x60ft.
26	CLV Assy-Instrument Unit, 120x120ft.
27	CLV Assy-Possible Horizontal Integration
28	CLV - SOFI Application, BLDG 110 Cell B
29	CLV Assy-Stack, BLDG 110 Cell C
30	CLV - Internal Clean, BLDG 110 Cell E
31	CLV - LOX Proof Test, BLDG 110 Cell F
32	CLV - External Prime, BLDG 131 Cell P
33	CLV - Proof Test, BLDG 451 & 452
34	CLV - TPS, BLDG 420 Cell 3
35	CLV - Integration & Check-out, BLDG 420 Cell 4
36	CLV - System Tunnel, BLDG 420 Cell 4
37	CLV - Vertical 5 Axis Gantry, 40x60ft.
38	CLV - Horizontal Machining Center 5 Axis, 40x60ft.



Area	Area
NCAM	4,400 sq. ft.
COTS	215,500 sq. ft.
CEV	34,000 sq. ft.
Updated 3/15/2007	



[END OF ATTACHMENT]

ATTACHMENT J-12

GOVERNMENT-FURNISHED EQUIPMENTGovernment-Furnished Equipment Identified in RFP Attachment L-5:

Part Number	Nomenclature	Comments	Qty	Need Date
TBD	Upper Stage J2X Engine	Acquired via CLV Upper Stage Engine Element. Mass Simulator for GVTA and Ares 2.	10	12/1/2009 GVTA 7/1/2011 Ares 2 10/1/2011 Orion 3 10/10/2012 Orion 4 3/1/2013 Orion 5 9/3/2013 Orion 6 3/3/2014 Orion 7 9/2/2014 Orion 8 2/2/2015 Orion 9 8/21/2015 Orion 10
TBD	Integrated IU with Avionics and supporting hardware	Avionics and associated hardware installed into the Upper Stage Instrument Unit. Mass Simulators for GVTA	10	10/1/2010 GVTA 7/15/2011 Ares 2 4/5/2012 Orion 3 9/25/2012 Orion 4 3/11/2013 Orion 5 8/14/2013 Orion 6 1/29/2014 Orion 7 8/1/2014 Orion 8 1/30/2015 Orion 9 7/21/2015 Orion 10
N/A	2195 Al-Li Ingots / Plate: ingot size 16"x60"x132", provided in un-scalped and cropped condition.	Raw material provided to support DDT&E phase of program. All AL-Li material required to support production shall be the responsibility of the Contractor		8/31/2007
	- Thin Plate Ingots		40	
	- Thick Plate Ingots		7	
	- Thick Plate 1.575"x 132"x 248" (T3M4)		76	
	- Thick Plate 1.575"x 132"x 185" (T3M4)		71	
	- Thick Plate 1.85" x 132" x 185" (T3M4)		8	
	- Thick Plate 1.85" x 100" x 185" (T3M4)		2	
	- Thick Plate 1.85" x 132" x 248" (T3M4)		35	
	- Thin Plate 0.4" x 98" x 220" (OM)		12	
	- Thin Plate .32-.4"x 98" x 220" (OM)		84	
	- Thin Plate 0.75" x 116" x 250" (T3M2)		2	
	-Thin Plate 0.75" x 116" x 250" (OM or T3M2)		18	
TBD	Booster Separation Motors	Acquired via CLV First Stage Element. Mass Simulator for GVTA.	40	6/3/2009 GVTA 10/19/2011 Ares 2 4/25/2012 Orion 3 10/3/2012 Orion 4 4/9/2013 Orion 5 10/1/2013 Orion 6 4/1/2014 Orion 7 10/1/2014 Orion 8 4/1/2015 Orion 9 10/1/2015 Orion 10

Part Number	Nomenclature	Comments	Qty	Need Date
TBD	Pyrotechnic devices common with the First Stage Element including: - Explosive transfer lines of various lengths and associated manifolds - RSS safe and arm devices -RSS linear shape charge - RSS delays	All pyrotechnic hardware is assumed to be GFE per Section L, Attachment L-5 except the SOW 5.3 SCI Ullage items and First Stage separation ring.	TBR	9/28/2009 Qual 4/18/2011 Ares 2 7/18/2011 Orion 3 3/19/2012 Orion 4 10/19/2012 Orion 5 4/19/2013 Orion 6 10/15/2013 Orion 7 3/10/2014 Orion 8 8/11/2014 Orion 9 3/2/2015 Orion 10
TBD	Upper Stage Test Flight Units Development Flight Instrumentation		TBR	4/18/2011 Ares 2 7/18/2011 Orion 3 3/19/2012 Orion 4
TBD	Command Receiver Decoder		TBR	4/18/2011 Ares 2 7/18/2011 Orion 3 3/19/2012 Orion 4

Additional Government-Furnished Equipment Needed

NASA/M AF Property Number	Nomenclature	Qty	Unit of Measure	Program Need Date
TBD	Cameras GVTA is mass simulator	1	EA	7/30/2009 GVTA 2/24/2011 Ares 2 11/7/2011 Orion 3 5/4/2012 Orion 4 10/19/2012 Orion 5 4/19/2013 Orion 6 10/15/2013 Orion 7 3/10/2014 Orion 8 8/11/2014 Orion 9 3/2/2015 Orion 10
TBD	IR Cameras GVTA is mass simulator	1	EA	7/30/2009 GVTA 2/24/2011 Ares 2 11/7/2011 Orion 3 5/4/2012 Orion 4 10/19/2012 Orion 5 4/19/2013 Orion 6 10/15/2013 Orion 7 3/10/2014 Orion 8 8/11/2014 Orion 9 3/2/2015 Orion 10
TBD	Separation Video System Cabeling GVTA is mass simulator	1	EA	7/30/2009 GVTA 2/24/2011 Ares 2 11/7/2011 Orion 3 5/4/2012 Orion 4 10/19/2012 Orion 5 4/19/2013 Orion 6 10/15/2013 Orion 7 3/10/2014 Orion 8 8/11/2014 Orion 9 3/2/2015 Orion 10

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NASA/M AF Property Number	Nomenclature	Qty	Unit of Measure	Program Need Date
TBD	MPS Flight Instrumentation	AR	EA	7/7/2009 MPTA 7/7/2009 Qual 2/24/2011 Ares 2 9/27/2011 Orion 3 4/5/2012 Orion 4 10/18/2012 Orion 5 4/18/2013 Orion 6 10/18/2013 Orion 7 4/18/2014 Orion 8 10/20/2014 Orion 9 4/20/2015 Orion 10
TBD	All Non-Sealing and Sealing disconnects (HD-300, HV-200, HV-300, OD-300, OV-200, OV-300, HD-200, HP-100, OD-200, OP-100, P-100, P-900)	1	EA	7/7/2009 MPTA 7/7/2009 Qual 2/24/2011 Ares 2 9/27/2011 Orion 3 4/5/2012 Orion 4 10/18/2012 Orion 5 4/18/2013 Orion 6 10/18/2013 Orion 7 4/18/2014 Orion 8 10/20/2014 Orion 9 4/20/2015 Orion 10
TBD	Purge (G-9 Interface)	1	EA	7/7/2009 MPTA 7/7/2009 Qual 2/24/2011 Ares 2 9/27/2011 Orion 3 4/5/2012 Orion 4 10/18/2012 Orion 5 4/18/2013 Orion 6 10/18/2013 Orion 7 4/18/2014 Orion 8 10/20/2014 Orion 9 4/20/2015 Orion 10
TBD	Filters & Screens (HF-050)	1	EA	7/7/2009 MPTA 7/7/2009 Qual 2/24/2011 Ares 2 9/27/2011 Orion 3 4/5/2012 Orion 4 10/18/2012 Orion 5 4/18/2013 Orion 6 10/18/2013 Orion 7 4/18/2014 Orion 8 10/20/2014 Orion 9 4/20/2015 Orion 10
TBD	Integrated cabling GVTA is mass simulator	AR	EA	10/1/2010 GVTA 7/15/2011 Ares 2 4/5/2012 Orion 3 9/25/2012 Orion 4 3/11/2013 Orion 5 8/14/2013 Orion 6 1/29/2014 Orion 7 8/1/2014 Orion 8 1/30/2015 Orion 9 7/21/2015 Orion 11

NASA/M AF Property Number	Nomenclature	Qty	Unit of Measure	Program Need Date
TBD	Distributed Avionics Not installed in IU including Antennas, Sensors, Controllers, Batteries, etc GVTA is mass simulator	AR	EA	10/1/2010 GVTA 7/15/2011 Ares 2 4/5/2012 Orion 3 9/25/2012 Orion 4 3/11/2013 Orion 5 8/14/2013 Orion 6 1/29/2014 Orion 7 8/1/2014 Orion 8 1/30/2015 Orion 9 7/21/2015 Orion 12

Notes:

1. Quantities and Need Dates listed are for DDT&E and CLIN 3 only and do not reflect CLIN 5 Options.

[END OF ATTACHMENT]

ATTACHMENT J-13

SAFETY HEALTH MANAGEMENT IMPLEMENTATION GUIDE AND ASSESSMENT MATRIX

Score	Commitment and Involvement (Element 1)		Worksite System and Analysis (Element 2)	Hazard Prevention and Control (Element 3)	Safety and Health Training (Element 4)
	A. Management	B. Employee			
10	Benchmarking indicates "best in Class." In areas of visible management leadership, responsibility/accountability, meaningful metrics, and incentive/recognition systems.	Employees fully involved, safety committees functioning well, is a complete behavior process functioning at least one year, employees involved in process planning and risk assessment.	All sub-elements fully in place and functioning well for at least one year.	All programs and sub-elements fully functioning for one year, strong professional support.	All training processes functioning, all levels of personnel trained to identified needs, management training ongoing.
9	All sub-elements are in place and functioning well, but have as yet to reach full maturity.	All processes functioning but for limited time, employees involved to great extent.	All sub-elements in place, employees actively participating.	All programs and sub-elements in place and functioning.	All training processes established, management initial training complete.
8	One sub-element not fully in place but all are being implemented.	Most processes in place, employee involvement growing.	All sub-elements functioning, employee participation growing.	At least five sub-elements functioning and one in final stage of implementation.	Most personnel trained to identified needs, training recordkeeping and recall system functioning.
7	Two sub-elements not fully implemented. Implementation in process on all elements. Employee participation and commitment widespread.	Process activities expanding through organization. Committees and teams functioning.	At least five sub-elements functioning and remainder established.	At least four sub-elements functioning, remaining two developing.	Management and supervisor training in process specialized training in process.
6	All sub-elements in process or in place. Strong management leadership and commitment begun, metric systems in place, resourcing appropriate.	Employee representatives functioning, joint committees functioning, participating in risk assessment and accident investigation.	At least four sub-elements functioning and remaining three in process, employee participation beginning to spread through organization.	Medical and safety programs strengthening, emergency preparedness program established and exercised.	Management training in process developed, supervisor training developed, training recordkeeping and recall system developed.
5	Management commitment and leadership accepted by workers, worker participation and commitment begun, metric system.	Employee representatives appointed/elected, committees beginning to perform functions (investigation, analysis, process improvement).	All sub-elements established, employees beginning to participate.	Rules written, medical and safety programs developing Personal Protective Equipment adequate.	Training template completed for all personnel, training needs identified, process development begun, recordkeeping and recall system being developed.
4	Management commitment and leadership flowing down to workers, metric systems being developed, incentive/recognition system in process.	All processes being established, involvement and awareness enhancement growing.	At least five sub-elements initiated including self-assessment, hazard reporting, and mishap close call investigations.	Rules in process, emergency preparedness program being developed.	Training development in process, specialized training established, mandatory training in process
3	Generally good management commitment and leadership, implementation plans approved for all elements.	All process needs identified, awareness and involvement enhancement activities begun.	Job Hazard analysis established, investigations strengthened and include employees.	Medical program initiated safety and health program initiated.	Training needs evaluation complete, training templates in process, recordkeeping and recall system needs to be established
2	Management exhibits some aspects of leadership, accountability systems not well defined, employee participation framework defined, limited metrics.	Committees established, little activity, employee involvement beginning, awareness of process started.	Plans established to implement all sub-elements, at least two sub-elements beginning to function.	Personal protective equipment requirements established and being enforced, plans developed for other elements.	Training needs evaluation begun, training template forms developed.
1	Sub-elements have not been established to any significant extent, management leadership is lacking, little or no employee participation.	No committees, little or no employee involvement, no process, little process planning.	Two or fewer sub-elements established, no self-inspection, shallow accident investigation process.	Few or no programs or sub-elements established, few written rules, limited enforcement.	Training needs not established, no management training, limited or no supervisor training.

The MSFC Environmental Engineering and Occupational Health Office performs periodic environmental compliance inspections to assess contractor performance relative to

the provisions of DRD 1145SA-SHP. These findings are provided to MSFC senior management. In incidences of non-compliance, the contractor is liable for all clean-up expenses and all applicable fines.

**SAFETY PERFORMANCE EVALUATION SUMMARY
EVALUATION CRITERIA AND PERFORMANCE RECOGNITION**

Evaluation Criteria

- Management Commitment and Employee Involvement
- System and Worksite Hazard Analysis
- Hazard Prevention and Control
- Safety and Health Training

Score	≥ 36 points (Annual Score)	≥ 28 points (Annual Score)	≤ 16 points (Quarterly Score)
LTC (Lost Time Case Report)	<p align="center">and</p> <p>≤ 50% of the LTC Rate for the applicable SIC rate</p> <p>Exception: Contractors with less than 100 employees located onsite MSFC shall have no lost time injuries during the past year</p>	<p align="center">and</p> <p>less than the applicable SIC rate</p> <p>Exception: Contractors with less than 100 employees located onsite MSFC shall have no more than one lost time injury during the past year.</p>	<p align="center">or</p> <p>more than the applicable SIC rate</p> <p>Exception: Contractors with less than 100 employees located onsite MSFC. A Level III rating will be given when greater than two lost time injuries are reported during the past year.</p>
Grade Levels	I	II	III
Recognition	Formal award publicly recognized. Appropriate Past Performance referrals provided.	Formal letter of commendation – will impact contract evaluation and past performance. (Score must either be the same score or higher from the last evaluation.)	Formal letter expressing concern. Corrective Action Plan requested. Data placed in Past Performance Database. Failure to improve could result in Contract Options not being exercised.

NOTE: If the contractor's safety performance evaluation does not fall within one of the above categories, no recognition will be provided.

DEDUCTIONS

RFP NNM07181505R

Any failure to report the items in Clause H.7 paragraph (f) will be noted during the performance evaluation process.

[END OF ATTACHMENT]

ATTACHMENT J-18**ACRONYM LIST**

A&S	Avionics and Software
ACO	Administrative Contracting Officer
ADFT	Ascent Development Flight Test
AF	Award Fee
AIT	Analytical Integration Team
ALERTS	Acute Launch Emergency Reliability Tips
Al-Li	Aluminum-Lithium
ANSI	American National Standards Institute
AOE	Areas of Emphasis
ARC	Ames Research Center
ARM	Active Risk Manager
ASM	Acquisition Strategy Meeting
ATP	Authority to Proceed
BDM	Booster Deceleration Motors
BIS	Bureau of Industry and Security
BSM	Booster Separation Motors
BUR	Bottom Up Review
C/O	Checkout
CAD	Computer Aided Design
CADRe	Cost Analysis Data Requirement
CaLV	Cargo Launch Vehicle
CCI	Consolidated Contract Initiative
CDR	Critical Design Review
CER	Cost Estimating Relationship
CEV	Crew Exploration Vehicle
CFR	Code Federal Regulation
CG	Center of Gravity
CITSP	Contract Information Technology Security Program
CLIN	Contract Line Item Number
CM / DM	Configuration Management / Data Management
CO	Contracting Officer
CoF	Construction of Facilities
COTR	Contracting Officer's Technical Representative
COTS	Commercial-Off-the-Shelf
Cp	Process Capability Index
CPAF	Cost Plus Award Fee
CPI	Cost Performance Indicator
CPIF	Cost Plus Incentive Fee
Cpk	Process Capability Index ('equivalent')

CPR	Contract Performance Report
CPR	Cost Performance Report
CSCI	Computer Software Configuration Item
CWC	Collaborative Work Commitment
CxP	Constellation Program
CY	Calendar Year
DAC	Design Analysis Cycle
DCAA	Defense Contract Audit Agency
DCMA	Defense Contract Management Agency
DCMC	Defense Contract Management Command
DCR	Design Certification Review
DDD	Design Definition Databook
DDMS	Design and Data Management System
DDT&E	Design, Development, Test & Evaluation
DIWG	Design Integrated Working Group
DoD	Department of Defense
DOF	Degree of Freedom
DOT	Department of Transportation
DPD	Data Procurement Document
DRD	Data Requirement Document
EAC	Estimate at Complete
EAR	Export Administration Regulation
ECP	Engineering Change Proposal
ECS	Environment Control System
EDI	Electronic Data Interchange
EDS	Earth Departure Stage
EDU	Engineering Development Unit
EIA	Electronic Industries Alliance
EIS	Environmental Impact Statement
EIT	Electronic and Information Technology
ELO	Exploration Launch Office
ERD	Element Requirements Document
ESAS	Exploration Systems Architecture Study
ESMD	Exploration Systems Mission Directorate
ET	External Tank
EVMS	Earned Value Management System
FAR	Federal Acquisition Regulation
FAR	Federal Aviation Regulation
FC	Fingerprint Card
FCA	Full Cost Adjustment
FESM	Failure Effects Software – MSFC
FMEA	Failure Mode Effects Analysis
FPIF	Fixed Price Incentive Fee
FRR	Flight Readiness Review
FSRCS	First Stage Reaction Control System

FTA	Fault Tree Analysis
FY	Fiscal Year
GFE	Government Furnished Equipment
GFP	Government Furnished Property
GH2	Gaseous Hydrogen
Ghe	Gaseous Helium
GMIPs	Government Mandatory Inspection Points
GN&C	Guidance, Navigation & Control
Gn2	Gaseous Nitrogen
GOX	Gaseous Oxygen
GRC	Glenn Research Center
GSE	Ground Support Equipment
GVT	Ground Vibration Test
GVTA	Ground Vibration Test Article
HBCU	Historically Black Colleges and Universities
HCA	Head of Contracting Activity
HFTA	Hot Fire Test Article
HQ	Headquarters
HUBZone	Historically Under-Utilized Business Zone
IBR	Integrated Baseline Review
ICDR	Incremental Critical Design Review
ICE	Integrated Collaborative Environment
IDIQ	Indefinite Delivery Indefinite Quantity
IF	Incentive Fee
IGCE	Independent Government Cost Estimate
ILS	Integrated Logistics System
IMS	Integrated Master Schedule
IPO	Industrial Property Officer
IPPD	Integrated Product and Process Development
IPT	Integrated Product Team
IRMA	Integrated Risk Management Application
ISS	International Space Station
IT	Information Technology
ITAR	International Traffic in Arms Regulations
ITF	Integrated Test Facility
ITSRCD	IT Security Requirements Compliance Document
IU	Instrument Unit
IUAC	Instrument Unit Avionics Contractor
JSC	Johnson Space Center
KSC	Kennedy Space Center
LaRC	Langley Research Center
lbf	pound force
lbm	pound mass
LH2	Liquid Hydrogen
LOM	Loss of Mission

LOV	Loss of Vehicle
LOX	Liquid Oxygen
LSA	Logistics Support Analysis
LSAM	Lunar Surface Access Module
LSI	Logistics Support Infrastructure
LTIR	Lost-Time Incident Rate
M&A	Manufacture and Assembly
MAF	Michoud Assembly Facility
MAPTIS	Materials and Process Technical Information System
MBP	Master Buy Plan
MGSE	Mechanical Ground Support Equipment
MIS	Management Information System
MIUL	Material Identification and Usage List
MPR	MSFC Procedural Requirements
MPS	Main Propulsion System
MPTA	Main Propulsion Test Article
MRB	Material Review Board
MSFC	Marshall Space Flight Center
MUA	Material Usage Agreement
MWI	Marshall Work Instruction
NAC	National Agency Check
NAFCOM	NASA Air Force Cost Model
NAICS	North American Industry Classification System
NASA	National Aeronautics and Space Administration
NCAM	National Center for Advanced Manufacturing
NDE	Non-Destructive Evaluation
NDT	NASA Design Team
NEPA	National Environmental Policy Act
NESS	NF 1018 Electronic Submission System
NF	NASA Form
NFNMS	NASA Foreign National Management System
NFS	NASA FAR Supplement
NLRB	National Labor Relations Board
NMH/NTO	Monomethyl Hydrazine/Nitrogen Tetroxide
NOI	Notice of Intent
NPR	NASA Procedural Requirements
NSD	NASA Standard Detonators
NSI	NASA Standard Initiators
NTE	Not-to-Exceed
OFAC	Office of Foreign Assets Control
OFPP	Office of Federal Procurement Policy
OFT	Orbital Flight Test
OMB	Office of Management and Budget
OMI	Other Minority Institutions
OML	Outer Mold Line

OP	Operating Plan
OPI	Operational Readiness Inspections
OPSCON	Operations Concept
OSHA	Occupational Safety and Health Administration
OTB	Over Target Baseline
OTS	Over Target Schedule
P&P	Pressurization and Pneumatic
PCB BL	Program Control Board Baseline
PDR	Preliminary Design Review
PIC	Procurement Information Circular
PIV	Personal Identity Verification
PMD	Propellant Management Device
PMR	Program Management Review
POP	Program Operating Plan
PRA	Probabilistic Risk Assessment
PRB	Post Retirement Benefits
PSH&T	Packaging, Shipping, Handling, and Transportation
psig	pounds per square inch
PSM	Procurement Strategy Meeting
PTO	Power Take Off
QA	Quality Assurance
R&D	Research and Development
RBAM	Risk-Based Acquisition Management
RBD	Risk Based Design
RCS	Reaction Control System
RCS	Roll Control System
RF	Radio Frequency
RFI	Request for Information
RFP	Request for Proposal
RID	Review Item Discrepancy
RM	Risk Management
RMS	Reliability, Maintainability, and Supportability
Roscosmos	Russian Space Agency
RR	Requirements Review
RSRM	Reusable Solid Rocket Motor
S&MA	Safety & Mission Assurance
S&T	Structure and Thermal
S&T	Structures and Thermal
S/W	Software
SAE	Society of Automotive Engineers
SBO	Small Business Office
SCI	Source Controlled Items
SDB	Small Disadvantaged Business
SDR	System Design Review
SDTA	Structural Dynamic Test Article

SE&I	System Engineering and Integration
SEB	Source Evaluation Board
SEI & T	System Engineering Integration and Test
SEMO	Supply and Equipment Management Officer
SF	Standard Form
SFA	Space Flight Awareness
SHE	Safety, Health, and Environmental
SIC	Standard Industrial Classification
SIV-B	Saturn IV-B
SLOC	Source Lines of Code
SOFI	Sprayed on Foam Insulation
SOTA	State of the Art
SOW	Statement of Work
SPA	Spacecraft Payload Assembly
SPI	Schedule Performance Indicator
SRB	Solid Rocket Booster
SRR	Systems Requirement Review
SS	Subsystem
SSA	Source Selection Authority
SSC	Stennis Space Center
SSM	Subsystem Manager
STA	Structural Test Articles
STE	Special Test Equipment
SWRR	Software Requirements Review
T&V	Test and Verification
TBD	To Be Determined
TFU	Theoretical First Unit
TO	Task Order
TPM	Technical Performance Measures
TPS	Thermal Protection System
TVC	Thrust Vector Control
U.S.	United States
US	Upper Stage
USE	Upper Stage Engine
USP	Upper Stage Production
USPC	Upper Stage Production Contractor
USRCS	Upper Stage Reaction Control System
WBS	Work Breakdown Structure

[END OF ATTACHMENT]

ATTACHMENT J-19

GLOSSARY

Acceptance – The activity performed on all production articles generally consisting of inspections, measurements, and tests that demonstrate that each article was manufactured as designed and with acceptable quality and workmanship, performs in accordance with specified requirements, and is acceptable for delivery.

Acceptance Review – The Acceptance Review examines the equipment, documentation, and data that support verification. An acceptance review is accomplished to assure that equipment (at any level of assembly) is ready for transfer of ownership or custody or is ready for integration into a next-higher assembly.

Acceptance Tests – Tests performed on flight hardware and software to confirm equipment performs as qualified and is generally free of latent manufacturing, material, or “workmanship” defects for delivery of products. For hardware, acceptance testing is typically performed at operating and non-operating performance and environment limits without intruding into qualification margins. For software, acceptance testing ensures the software will load and execute on each serialized hardware platform.

Acquisition – The acquiring, by contract, of supplies or services (including construction) through purchase or lease, whether the supplies or services are already in existence or must be created, developed, demonstrated, or evaluated. Acquisition begins at the point when Agency needs are established and includes the description of requirements to satisfy Agency needs, solicitation and selection of sources, awards of contracts, contract financing, performance, administration, technical and management functions directly related to the process of fulfilling Agency needs by contract.

Advanced Development – Development efforts initiated by NASA to support the Upper Stage (US) design process, specifically in the areas of MPS, RCS, and TVC.

Analysis models – An Analysis Model is a set of one or more engineering analysis tools that operate in conjunction with one another. Analysis models may be capable of automated execution or may require user-in-the-loop/interactive operation. The models typically estimate system performance according to an engineering discipline such as aerodynamics or cost.

Anomaly – An unexpected event, hardware failure, software error, a departure from established procedures or performance, or a deviation of system,

subsystem, and/or hardware or software performance outside certified or approved design/performance specification limits.

Annual Operating Agreement – A NASA Center management plan which defines customer requirements, processes, and resources required to meet customer requirements, and the metrics defining effectiveness and efficiency of project processes.

ARM database – The risk management database tool that the Upper Stage will transition to for inputting and reporting of risks.

Bread Board Testing – Unit testing of functional system hardware at the bench test level.

Certification – A formal document signed by responsible parties (provider, integrator (if different), and the Project Office) attesting to the satisfactory completion of specified qualification activities, supported by certification records, and authorizing the use of hardware/software for recorded purposes within certified limits. Certification can be accomplished at any level of assembly from the component to the integrated system.

Certification of Flight Readiness – A commitment signed by each NASA project manager and the respective element contractor stating their readiness for launch. This document is signed during the Flight Readiness Review (FRR). Prior to FRR, each project manager is required to assess his readiness for launch by considering vehicle and facility hardware status, problems encountered during pre-launch preparation and their resolution, launch constraints, and open items.

Certificate of Qualification – Provides a uniform method for design qualification and certification of US components and subsystems.

Certification Record – A document or documents identifying the certified capability baseline, performance limits and operational constraints for a hardware/software configuration item. The certification record specifies the certified limits that govern usage during its life cycle. The certification record along with the signed certification establishes and illustrates the certified baseline.

Commercial-Off-The-Shelf – Commercially available products that can be purchased and integrated with little or no customization.

Component – An aggregate of hardware and/or software that can be characterized by one specification, is designed by a single activity to be functionally tested, and is verified as a unit.

Configuration Management – The control of changes, including the recording thereof, that are made to the hardware, software, firmware, and documentation throughout the system lifecycle. A management discipline applied over the product's life cycle to provide visibility and to control performance and functional and physical characteristics.

Control Board – The board, panel or forum chartered to have authority over a particular subject or item (ex. Flight Rules Control Board, Crew Procedures Control Board, etc.).

Cp – This is defined as the Process Capability Index which is a measure of the ability of a process to produce consistent results or the ratio between the permissible spread and the actual spread of a process. Cp measures the capability of a process to meet its specification limits, it is the ratio between the required and actual variability.

Cpk – This is defined as the Process Capability Index ('equivalent') taking account of off-centeredness. Effectively the Cpk for a centered process producing a similar level of defects or the ratio between permissible deviation, measured from the mean value to the nearest specific limit of acceptability, and the actual one-sided 3 x sigma spread of the process.

Cost Performance Report – This report consists of five formats containing data for measuring contractor's cost and schedule performance on a NASA Acquisition Contract.

Critical Design Review – The CDR discloses the complete system design in full detail, ascertains that technical problems and design anomalies have been resolved, and ensures that the design maturity justifies the decision to initiate fabrication/manufacturing, integration, and verification of mission hardware and software.

Critical Processes (Quality Assurance) - Are processes where uniform high quality cannot be ensured by inspection alone.

Critical Processes (Manufacturing Processes) – An operation, treatment, or procedure used as a step in manufacturing, testing, or inspection that, if improperly or inadequately performed, can have a significant performance, including safety, or schedule impact on new or unique processes, hardware designed for fracture control or processes identified as CIL or safety hazard control items.

Demonstration Test Articles – Test articles that are used to demonstrate a manufacturing and/or assembly process or technique.

Design – The approach that engineering disciplines use to specify how to create or do something. A successful design must satisfy a functional specification, conform to the limitations of the target medium, meets implicit or explicit requirements on performance and resource usage.

Design Certification Review – Review conducted to assure that the US as built configuration conforms to all component and system design requirements.

Design Definition Document - Provides a detailed description of the US at the end of a design analysis cycle.

Design for Manufacturability – The process of proactively designing products to (1) optimize all the manufacturing functions: fabrication, assembly, test, procurement, shipping, delivery, service, and repair, and (2) assure the best cost, quality, reliability, regulatory compliance, safety, time-to-market, and customer satisfaction.

Development Test Article – Test articles to support the design and development of the US Project element and subsystems.

Development Tests – Any test that provides data needed to reduce risk, to design hardware or software, to define manufacturing processes, to define qualification or acceptance test procedures, or to investigate anomalies discovered during test or operations.

Engineering Analysis Tool – An Engineering Analysis Tool is a single, self-contained computer program that produces a single set of outputs for a single set of inputs. An Engineering Analysis Tool makes predictions of system performance or environmental parameters, typically as they pertain to a single engineering discipline. An Engineering Analysis Tool is the smallest executable piece of an engineering computational framework.

Engineering Models – A US Engineering Model is a set of one or more engineering analysis tools that operate in conjunction with one another. US Engineering Models may be capable of automated execution or may require user-in-the-loop/interactive operation. US Engineering Models typically estimate system performance according to an engineering discipline such as aerodynamics or cost.

Equipment – A generic term used to refer to hardware at any level-of-assembly from a component up through an integrated system.

Evaluation Factors – Factors by which a contractor's proposal will be evaluated to make a contract award.

Export Control – United States export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), and the Export Administration Regulations (EAR) (see FFS 1825).

Export Licenses – Licenses or other approvals from the Department of State or the Department of Commerce related to export of hardware, technical data, or software, or provides technical assistance to a foreign destination or “foreign person” (see NFS 1852.225-70).

Facilities – Includes vehicle processing facilities, integration facilities, launch pads, mission control centers, launch control centers, control rooms, training, test, checkout, and assembly facilities with associated data processing and communication systems.

Facility Loading – The level at which a facility is used. For example, if nominal usage is defined as 40 hours of simulation support per week and 50 hours are required during key periods, facility loading would be 125%. This number is used to determine if a facility is over used and to help determine if an additional facility is needed to accommodate usage demands.

Facility Systems – Systems necessary to support the operations of the facility. Examples are facility electrical power, water, pneumatics, cranes, etc. It does not include ground support equipment.

Fit Checks – An engineering test, where hardware that is to be installed on a future mission, is brought together on the ground and structural interfaces are verified by physically mating the hardware.

Flight Article – Completely assembled Upper Stage Element including avionics and supporting hardware, Interstage, and the Upper Stage Engine.

Flight Readiness Review – The FRR examines tests, demonstrations, analyses, and audits that determine the system’s readiness for a safe and successful launch and for subsequent flight operations. It also ensures that all flight and ground hardware, software, personnel, and procedures are operationally ready.

Flight Tests – First 3 flight tests of the Ares I launch vehicle including the Orion 3 mission.

Functional Configuration Audit – Audit to verify that the hardware/software satisfies the design requirements by one or more of the following methods: test; analyses; demonstration; inspection or similarity.

Functional Tests – Operating tests that confirm that a particular hardware or software item functions in a way that will permit it to meet allocated requirements.

FTE – Full time equivalent for civil service personnel working for NASA.

Government Furnished Equipment – Equipment used during the project lifecycle that is not property of the contractor (machine tools, test equipment, furniture, vehicles, and accessory and auxiliary items).

Government Furnished Property – Property in possession of the Government and subsequently made available to the contractor (facilities, materials, special tooling and special test equipment).

Green Run Test – Initial flight acceptance test of the Upper Stage Element including the Upper Stage Engine.

Ground Planning – The preparation activities for ground processing and launch operations.

Ground Processing – The activities performed to prepare the personnel, ground systems and flight vehicles during preflight and post-flight operations.

Ground Support Equipment – Equipment that is used to support ground operations and test.

Ground System Operations – The operation of facilities, facility systems, ground support equipment, and associated software when the flight hardware is not present. These operations typically include validation of ground systems, preventative maintenance, and post-launch refurbishment operations. Also, includes the operation of training systems, whether for system maintenance and validation, or for use to certify/train Flight and Ground Operations personnel. For operations of Ground Systems when flight hardware is involved, see Ground Operations.

Ground Systems – The facilities and facilities systems, ground support equipment hardware and software which are required to support integrated test and operational flights. The ground systems include those needed for ground operations, and flight operations.

Ground Tests – Any test performed on system elements or the complete system that does not involve flight. Ground testing includes development, functional, integration, qualification, acceptance, pre-flight, and flight-worthiness tests.

Ground Vibration Test Article – Upper Stage Element test article used to determine the structural dynamic characteristics of the US Flight Vehicle and the overall CLV configuration.

Guidance Document – A document that the Contractor will use as guidance in developing a Data Requirements Document (DRD) or a subsystem.

In-flight Anomaly – Problems occurring or identified during the design element/project's mission cycle which includes post-flight data, imagery analysis, and inspections.

Initial Operational Capability – The flight that validates the human rating requirements and design, the ground operations and flight operations systems and procedures complete and verified. This is first human flight opportunity or capability or first operational flight vehicle.

Insight - Surveillance of Contractor by the monitoring of Government-identified metrics and contracted milestones. Insight involves a continuum of penetration that can range from low intensity to high intensity. Insight contrasts with Oversight which occurs in line with Contractor's processes. Insight penetration levels are defined as:

Level 0- No penetration

- Accept contractor performed tasks at face value

Level 1-Low Penetration

- Participate in reviews and Technical Interchange Meetings and assess the data presented
- Perform periodic audits on pre-defined processes
- Chair board or serve as board member or RID writer at a formal review
- Participate in resolution and closure of issues

Level 2-Intermediate Penetration

- Includes low penetration with addition of:
 - Daily or weekly involvement to identify and resolve issues

Level 3-In-depth Penetration

- Includes intermediate penetration with addition of:
 - Methodical reviews of details
 - Independent models to check and compare vendor data, as required

Level 4-Total Penetration

- Perform a complete and independent evaluation of each task

Integrated Baseline Review – Formal project-level review of the total project effort. The review is conducted jointly with personnel responsible for the efforts. Specifically an IBR verifies that the technical content of the performance measurement baseline is consistent with the contract scope, work breakdown structure and actual budget and schedule.

Integrated Collaborative Environment – The primary means of sharing, reporting, collecting, recording and accessing program information between NASA, USP Contractor, major/critical subcontractors and authorized U.S. Government personnel connected with the Constellation Program and Projects. ICE provides real-time collaborative access to a single source of management information, product information and technical data. ICE is the principal mechanism for integrating a “program” digital information management environment.

Integrated Contractor Schedule – The Contractor’s schedule for managing the US contract.

Integrated Master Schedule – The IMS is an integrated, master schedule containing the networked, detailed tasks necessary to support the events, accomplishments, and criteria of the Integrated Master Plan (IMP). The IMS shall contain all of the contract IMP events, accomplishments, and criteria from contract award to completion of the contract. The IMS shall be a logical network-based schedule that correlates to the program WBS, and is vertically and horizontally traceable to the cost/schedule reporting instrument used to address variances (such as Cost Performance Report (CPR) and 533 Cost Reporting (533M/533Q)).

Integrated Operations – The activities that involve the Orion and other flight elements (First Stage, Upper Stage Engine, Upper Stage), or the resources of multiple organizations.

Integrated Product and Process Development – A management technique that simultaneously integrates all essential product development activities through the use of multi-disciplinary teams to optimize design, manufacturing and supportability processes. It is a systematic approach to the integrated, concurrent design of products and related processes, including manufacturing and support.

Integration – A combination of activities and processes to assemble Upper Stage components, subsystems, and system elements into a desired configuration, and to verify compatibility among them.

Integration Tests – Tests conducted to verify functional performance has been achieved after hardware and/or software items are assembled and interfaces activated.

IRMA database – The risk management database tool the Upper Stage will initially use to input status and report risks.

Launch Operations – The final activities to prepare the ground systems and the integrated vehicle for launch, and the launch of the Ares launch vehicle.

Layout Review – The purpose of this review is to provide a means of communicating the design concept for the purposes of allowing buy-in of the concept by the US Project and other IPTs. The design will be evaluated for technical adequacy and ability to comply with requirements levied upon the component or system.

Life-Cycle Cost – The total of the direct, indirect, recurring, nonrecurring, and other related expenses incurred, or estimated to be incurred, in the design, development, verification, production, operation, maintenance, support, and disposal of a project.

Logistics Support – An approach that enables disciplined, unified and iterative management of support considerations into system and equipment design. Logistics support includes development of support requirements that are related to readiness objectives, to design, and to each other. Requirements in turn drive acquisition of required support; logistics support is then employed during the operational phase.

Long Lead Item- Those items which because of their complexity of design, complicated manufacturing processes, or limited production, may cause production or procurement cycles which would preclude timely or adequate delivery, if not ordered in advance of normal provisioning.

Materials and Processes Technical Information System – This data system houses historical test data on all materials used in spacecraft and launch vehicle. This database is used to certify material usage for all NASA applications.

Materials Identification and Usage List – The complete list of materials to be used in the launch vehicle or spacecraft.

Material Usage Agreement – An agreement between the contractor and the government encompassing all agreed upon materials for use in the launch vehicle or spacecraft.

Mission Specific Software – Software that is developed and built for a specific mission function. Software that is unique to a specific mission/flight; either in whole or in part.

Non-mission Specific Software – Software that possesses characteristics of being applicable to all or practically all missions/flights.

Operations – The processes, plans, system requirements, procedures, and work to be performed associated with the preparation, launch and flight execution of the US. The scope of Operations concern the activities with equipment once it has been delivered to the government and are in support of the integrated test and operational flights. This is applicable to all types of operations.

Oversight - Surveillance of Contractor that occurs in line with Contractor's processes and where the Government retains the right to nonconcur with Contractor's decisions. Oversight is a continuum that ranges from low to high with high involving Government day-to-day involvement in Contractor's decisions.

Past Performance – Factual information about the performance of a contractor against the performance requirements in past contracts.

Performance Assessment Plan – Describes the Contractor's overall approach to contract performance assessment and the implementation process for accomplishing metric evaluation and reporting.

Performance Management Review – Integrated review of cost, schedule, and technical performance on the contract.

Physical Configuration Audit - Audit to verify that the "as-built" configuration is in accordance with the "as-design". This audit in the past was known as the Configuration Inspection or First Article Configuration Inspection.

Post Flight Analysis – Analysis conducted after flight to ensure technical performance of the US element.

Preliminary Design Review – Demonstrates that the preliminary design meets all system requirements with acceptable risk. It shows that the correct design option has been selected, interfaces identified, and verifications methods have been satisfactorily described. It also establishes the basis for proceeding with detailed design.

Probabilistic Risk Assessment – A set of methodologies employed to determine quantitative probability a given end state or states (e.g., Loss of Mission, Loss of Crew) will occur. Probabilistic Risk Assessment results can be used to develop or validate Fault Trees and Failure Modes analysis. They also can be used as a tool for making design and logistics decisions.

Procedure – Set of detailed instructions used by the crew, ground operations and flight operations personnel to assess status, reconfigure, operate, troubleshoot, safe, and maintain US Systems under both nominal and off-nominal conditions. The procedures may also be executed by spacecraft executor software to fulfill specific tasks.

Producibility Analyses - Evaluation of design concepts and engineering drawings for manufacturability including methods of manufacture, processes, equipment capability, tooling requirements, ability to meet tolerances and cost effectiveness.

Producibility Engineering – Leveraging industries' manufacturing and logistics/supportability expertise during the design phase of the US development process to ensure that the US design is optimized to reduce overall life cycle cost and maximize operability.

Production Flight Unit – US Element including avionics and interstage to support the Constellation manifest.

Program Operating Plan – A document produced by a Center in response to Headquarters-directed budget guidelines, including requested budgets by program or project.

Qualification – The activity that proves design, manufacturing, and assembly have resulted in hardware/software that conforms to design and performance requirements during or after exposure to specific environmental conditions. The qualification activity consists of various tests, analyses, demonstrations, and inspections as required to verify conformance of design to specified requirements.

Qualification Tests – Formal tests conducted with defined qualification margin as part of the certification program to qualify a design, manufacturing process, and acceptance testing program to produce equipment able to accomplish the full range of performance requirements in all predicted operating and non-operating service life environments (including acceptance testing).

Real-Time Support – Level of support that has the personnel, tools, and location necessary for a timely response.

Risk – The uncertainty of attaining a performance outcome or result and is the function of the probability and the consequence of failing to attain the performance outcome or result.

Risk Management – The processes for identifying, assessing, mitigating, and tracking risks.

Safety – Freedom from those conditions that can cause death, injury, occupational illness, damage or loss of equipment or property, or damage to the environment.

Service Life – The life of an equipment item starting at the completion of fabrication and continuing through all levels of acceptance testing, handling, transportation, storage, pre-launch processing, all phases of flight (launch, on-orbit, descent, landing), rework/refurbishment, retest, and reuse as required or specified.

Software – Computer programs, procedures, rules, and associated documentation and data pertaining to the development and operation of a computer system. Software includes programs and operational data. This also includes Commercial-Off-The-Shelf, Government-Off-The-Shelf, Military-Off-The-Shelf, reuse, auto code generated, firmware, and open source software components.

Software Requirements Review – A requirements review that decomposes the subsystem requirements into lower level flight and ground software requirements, which are documented in a series of Software Requirements Specifications (SRSs).

Source Control Item – Defined as the sub-assemblies, components, and/or piece parts that are designed and / or procured by the Contractor as an end item or off-the-shelf item per a NASA provided or NASA approved specification.

Special Test Equipment - Any non-flight, non-Ground Support Equipment (GSE) or non-facility structure, hardware or equipment intended to be used for testing or simulation, or associated with the manufacturing, process development, and preparation of MSFC facilities for testing or simulation. Designs include, but are not limited to, test stands, test beds, vacuum systems, cryogenic and non-cryogenic fluid delivery systems, fire extinguishing systems, load reaction and application structures, load line components, thrust measurement systems, flight hardware mockups and simulators, hardware support stands and dollies, personnel access stands, lifting and handling hardware and tooling.

Statement of Work – A document that expresses the tasks to be performed by the contractor.

Subsystem – A system that is part of some larger system. The Upper Stage is comprised of subsystems, and finally into components.

Sustaining Engineering – Sustaining work required outside of normal production including evaluation and mitigation of in-flight anomalies (IFA), correcting deficiencies or making improvements to the certified US system design or its operation and implementing approved upgrades to the baseline hardware, non-flight software, facilities, support equipment and operations. For these improvements sustaining engineering includes engineering analysis, design, development, test, checkout, evaluation, manufacture, assembly, integration, qualification, and certification necessary to incorporate changes into production.

System – The combination of elements that function together to produce the capability required to meet a need. The elements include all hardware, software,

equipment, facilities, personnel, processes, and procedures needed for this purpose.

System Definition Review – Examines the proposed system architecture/design and the flowdown to all functional elements of the system.

System Engineering & Integration – The technical and management efforts for directing and controlling the integrated engineering effort for the System.

System Engineering, Integration & Test – The design, development, integration, and test of large and complex systems, where a system is understood to be an assembly or combination of interrelated elements or parts working together toward a common objective.

Thermal Protection System – Material such as Spray On Foam Insulation (SOFI) or ablative materials applied to the US element to maintain structural, pressurant, subsystem component temperature limits and provide insulation to the cryogenic storage tanks during ascent.

Timeline – A sequential series of events that describe the US operation. A timeline can represent the vehicles mission at different levels of detail (ex. overview, summary and detailed timelines). The timeline includes information on trajectory events and scheduled crew activities as well as associated ground activities.

Training Systems – The hardware, software, and facilities required to educate, test, certify, qualify, standboard, maintain proficiency, and otherwise prepare the crew, ground and flight operations personnel for successful execution of Exploration missions.

Transition – The handover of the US hardware and software responsibilities from the NDT to the Contractor.

Unit Testing – The testing of individual hardware components or software components to ensure that they operate correctly.

Validation – Assessment of a set of requirements demonstrating that the requirements are feasible within allowable means (cost/schedule/technical capability), are verifiable, and if fully met, will produce a product that accomplishes the intended objectives. Proof that the product accomplishes the intended purpose. May be determined by a combination of test, analysis, and demonstration.

Verification – Proof of compliance with specifications. May be determined by a combination of test, analysis, demonstration, and inspection.

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Work Breakdown Structure - A product-oriented hierarchical division of the hardware, software, services, and data required to produce the program's/projects end product, structured according to the way the work will be performed, and reflective of the way in which program/project costs, schedule, technical and risk data are to be accumulated, summarized and reported.

Work Year Equivalent – Work year equivalent for contractors performing work on NASA contracts.

[END OF ATTACHMENT]