

**AMENDMENT OF SOLICITATION/
MODIFICATION OF CONTRACT**

1. CONTRACT ID CODE

NNJ04HH99B

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1 | 1

2. AMENDMENT/MODIFICATION NO.

Modification 1

3. EFFECTIVE DATE

see block 16c

4. REQUISITION/PURCHASE REQ. NO.

N/A

5. PROJECT NO. (If applicable)

6. ISSUED BY

CODE

BH

7. ADMINISTERED BY (If other than Item 6)

CODE

NASA Projects Procurement Office
Johnson Space Center
Attn: BH/Mike Ballard
2101 NASA Parkway
Houston, TX 77058

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State, and ZIP Code)

Oceaneering Space Systems
16665 Space Center Blvd.
Houston, TX 77058

CODE

FACILITY CODE

9A. AMENDMENT OF SOLICITATION NO.

9B. DATED (SEE ITEM 11)

X

10A. MODIFICATION OF CONTRACT/ORDER NO.
NNJ04HH99B

10B. DATED (SEE ITEM 13)
12/10/04

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)
N/A

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.(x)

A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.

X

B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office,

C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:

d. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor is not, is required to sign this document and return _____ copies to the issuing office.

14. description of amendment/modification (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

The Purpose of this modification is to change the contract number from NNJ04HH99B to NNJ05HB40B.

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)

16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)

Dawn Alexander, Contracting Officer

15B. CONTRACTOR/OFFEROR

15C. DATE SIGNED

16B. UNITED STATES OF AMERICA

16C. DATE SIGNED

(Signature of person authorized to sign)

BY

Dawn Alexander
(Signature of Contracting Officer)

11/7/05

AWARD/CONTRACT

OMB Approval No. 2700-0041

2. CONTRACT NO. (Proc. Inst. Ident.) NO. NNJ04HH99B
 3. EFFECTIVE DATE
 4. REQUISITION/PURCHASE REQUEST/PROJECT NO. 4200047146
 5. ISSUED BY: CODE
 6. ADMINISTERED BY (If other than item 5): CODE

LYNDON B. JOHNSON SPACE CENTER, NASA
 PROJECTS PROCUREMENT/BH
 2101 NASA PARKWAY
 HOUSTON, TX 77058

APPROVED
Richard Johnson
 JSC PROCUREMENT OFFICER
 1/6/05
 DATE

7. NAME AND ADDRESS OF CONTRACTOR (No., street, city, county, State and ZIP code)
 Oceaneering Space Systems
 16665 Space Center Blvd.
 Houston, TX 77058

8. DELIVERY FOB ORIGIN OTHER
 9. DISCOUNT FOR PROMPT PAYMENT N/A
 10. SUBMIT INVOICES (4 copies unless other-wise specified) TO THE ADDRESS SHOWN IN:
 11. SHIP TO/MARK FOR CODE

12. PAYMENT WILL BE MADE BY: CODE
 LYNDON B. JOHNSON SPACE CENTER, NASA
 LF231/ACCOUNTS PAYABLE
 2101 NASA PARKWAY
 HOUSTON, TX 77058

13. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION
 10 U.S.C. 2304(c) 41 U.S.C. 253(c)
 14. ACCOUNTING AND APPROPRIATION DATA

15A. ITEM NO.	15B. SUPPLIES/SERVICES	15C. QTY	15D. UNIT	15E. UNIT PRICE	15F. AMOUNT
	SEE SECTION C				

15G. TOTAL AMOUNT OF CONTRACT ⇒ \$ NTE \$48M

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CONTRACTING OFFICER WILL COMPLETE ITEM 17 OR 18 AS APPLICABLE

17. CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is required to sign this document and return _____ copies to issuing office.)
 Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents (s) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)

18. AWARD (Contractor is not required to sign this document.) Your offer on Solicitation Number _____ including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your offer, and (b) this award/contract. No further contractual document is necessary.

19A. NAME AND TITLE OF SIGNER (Type or print)
 Mark M. Gittleman, P.E., Vice President and General Manager

20A. NAME OF CONTRACTING OFFICER
 Dawn Alexander

19B. NAME OF CONTRACTOR
Mark Gittleman
 (Signature of person authorized to sign)

20B. UNITED STATES OF AMERICA
 BY *Dawn Alexander*
 (Signature of Contracting Officer)

19C. DATE SIGNED
 11/8/04

20C. DATE SIGNED
 12/10/04

**PART I - THE SCHEDULE
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CONTRACT FORM**

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PART I - THE SCHEDULE

SECTION B - SUPPLIES OR SERVICES AND PRICE/COSTS

B.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: The following contract clauses pertinent to this section are hereby incorporated by reference:

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	DATE	TITLE
None included by reference		

II. NASA FAR SUPPLEMENT (48 CFR CHAPT 18)

CLAUSE NUMBER	DATE	TITLE
None included by reference		

III. FULL TEXT CLAUSES

B.2 SUPPLIES AND/OR SERVICES TO BE FURNISHED

(a) The Contractor shall provide all resources (except as may be expressly stated in this contract as furnished by the Government) necessary to support the services to be provided in accordance with the Statement of Work in Section C. This contract is for Crew, Robotics, and Vehicle Equipment (CRAVE) for NASA, using cost reimbursable Indefinite Delivery/Indefinite Quantity (IDIQ) and firm fixed price Indefinite Delivery/Indefinite Quantity (IDIQ) contracting methods. These methods provide for the acquisition of necessary labor, supplies, and other services that cannot be sufficiently identified, predetermined, or qualified in advance.

(b) The contractor is required to furnish all the services identified in the Statement of Work and as directed through the issuance of delivery orders. These services shall be ordered in accordance with Federal Acquisition Regulation (FAR) clauses entitled "Ordering," "Order Limitations," and "Indefinite Quantity" found in Section I. The Government's obligation for the indefinite quantity is limited to that specified in Clause B.3.

(End of Clause)

B.3 IDIQ GUARANTEED MINIMUM QUANTITY OF WORK

(a) The guaranteed minimum contract value of work that will be ordered under this contract, and which will be initiated through the issuance of delivery orders shall be **\$15,000**. The maximum value that can be ordered under the IDIQ provisions of this contract is **\$48,000,000**. This amount includes both cost and fee.

(b) If the Government orders supplies or services in excess of the minimum but not up to the maximum, this circumstance shall not constitute the basis for an equitable adjustment to any contract price, estimated cost or fee.

(c) The minimum amount in paragraph (a) is applicable only if the contractor submits a minimum of 5 good faith proposals on at least 5 delivery orders through out the life of the contract.

(d) If the contractor receives a Delivery Order equal to or greater than \$15,000, the Government will have satisfied its minimum requirement under this contract.

(End of Clause)

B.4 ESTIMATED COST AND FEE FOR IDIQ/CPFF DELIVERY ORDERS

(a) Estimated cost of IDIQ/CPFF Delivery Orders: **\$ TBD [Amount will be determined as the IDIQ/CPFF Delivery Orders are issued]**.

(b) Maximum fee of IDIQ/CPFF Delivery Orders: **\$ TBD [Amount will be determined as the IDIQ/CPFF Delivery Orders are issued]**.

(c) Total estimated cost and fee of IDIQ/CPFF Delivery Orders: **\$ TBD [Amount will be determined as the IDIQ/CPFF Delivery Orders are issued]**.

(End of Clause)

B.5 FIRM FIXED PRICE (NFS 1852.216-78) (DEC 1988)

Total firm fixed price of this contract is: **\$ TBD [Amount will be determined as the IDIQ/FFP Delivery Orders are issued]**

(End of Clause)

B.6 CONTRACT FUNDING

(a) For purposes of payment of cost, exclusive of fee, in accordance with the Limitation of Funds clause, the total amount allotted by the Government to this contract is:

Cost Plus Fixed Fee Delivery Orders \$1
Firm Fixed Price Delivery Orders \$1

This allotment covers the following estimated period of performance: **TBD**

(b) An additional amount of **\$TBD** is obligated under this contract for payment of fee.

(End of Clause)

B.7 IDIQ DELIVERY ORDER ESTIMATING - CPFF

These pre-established rates shall be used in establishment of the estimated cost of individual CPFF delivery orders.

A. Fully Burdened Rates without Fee

B. Travel

All travel shall be as approved by the Government prior to travel and will be allocated to the contract based on actual airfare and per diem rates per the most current official CONUS Per Diem Rates, located at www.dtic.mil/perdiem/pdrform.html. All requests for travel shall include the purpose and the rationale for the travel, such as why the purpose cannot be accomplished through a means other than travel (i.e., teleconferencing).

Costs relating to approved travel shall be allocated to individual delivery orders under this contract. Vouchers may be submitted upon completion of individual trips and shall be prepared and submitted in accordance with Clause G.4 entitled "Submission of Vouchers for Payment." The invoices shall include copies of receipts for airfare, lodging, car rental, and other expenses as required by the company policy. All costs for trips will be limited as follows:

1. Maximum allowable costs for lodging, meals and incidental expenses are limited to current Government-established per diem rates.
2. Maximum allowable cost for use of privately owned vehicles shall be restricted to the Federal Travel Regulations.
3. Allowable air travel expenses are limited to standard coach fare whenever it does not conflict with the ultimate purpose of the travel.
4. Allowable automobile rental cost is limited to compact cars.
5. Per diem paid on travel days are $\frac{3}{4}$ per diem. The time spent in travel is not considered.
6. No fee shall be applied to the costs of trips.

C. Materials and Other Non-labor Costs

As applicable, include separate cost estimates for materials, which are non-fee bearing and other miscellaneous non-labor costs that are required for performance of the delivery order. All non-labor costs that are proposed must be allowable and allocable in accordance with the FAR, NASA FAR Supplement, and any other applicable NASA procurement policy documents. The contractor shall include back-up information with their estimate that provides rationale for their proposed cost estimates for materials and other non-labor costs.

No fee shall be applied to the cost of materials.

D. Fee

The maximum Fee for delivery orders issued under this contract shall not exceed **10 percent** of the estimated cost for each delivery order, excluding travel and materials. Fee will be negotiated on a DO basis.

(End of Clause)

B.8 IDIQ DELIVERY ORDER ESTIMATING - FFP

These pre-established rates shall be used in establishment of the individual FFP delivery orders as follows. No escalation is included for non-exempt labor categories.

A. Fully Burdened Labor Rates (Plus Escalation for Exempt Labor Categories ONLY)**B. Materials, Travel and Other Non-labor Firm Fixed Prices**

As applicable, identify separately materials and other miscellaneous non-labor prices that are required for performance of the delivery order. All non-labor prices that are proposed shall include back-up information with their estimate that provides rationale for the proposed prices to allow for a Government price analysis.

(End of Clause)
[END OF SECTION]

STATEMENT OF WORK

A - Crew, Robotics, and Vehicle Equipment (CRAVE) - Unrestricted

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STATEMENT OF WORK

A - Crew, Robotics, and Vehicle Equipment (CRAVE) - Unrestricted

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STATEMENT OF WORK**A - Crew, Robotics, and Vehicle Equipment (CRAVE) - Unrestricted****1.0 INTRODUCTION**

This document describes the type of work required to perform the design, development, testing, manufacturing, and evaluation (DDTM&E) and sustaining engineering (SE) necessary to certify, deliver and maintain Extravehicular Activity (EVA) equipment, Flight Crew Equipment (FCE), Crew Health and Conditioning Systems (CHeCS), Extravehicular Robotics (EVR) equipment, Environmental Control and Life Support (ECLSS) equipment, and Active Thermal Control Systems (ATCS) equipment, including ground support equipment (GSE). These categories will subsequently be referred to as Crew, Robotics and Vehicle Equipment (CRAVE). The products and services provided in this Statement of Work (SOW) will support the Space Shuttle, the International Space Station (ISS), and advanced programs of Government-Furnished Equipment (GFE) for future human Space Flight programs. This effort includes the necessary labor, material, equipment, and facilities to accomplish the tasks required by this contract.

The contractor shall provide all necessary program, business management, engineering, technical, and administrative skills necessary to accomplish the objectives and outcomes described within this contract. The contractor shall perform the services and deliver the products described in this Statement of Work (SOW), contract terms and conditions, applicable documents, Data Requirements Descriptions (DRDs), Data Requirements List (DRL), and other plans and sections contained within this contract and as directed through authorized Delivery Orders (DOs).

2.0 SCOPE OF WORK

The scope of work to be performed under this contract includes:

- EVA tools and equipment DDTM&E and SE for the Space Shuttle and ISS Programs;
- EVR equipment DDTM&E and SE for the Space Shuttle and ISS Programs;
- ECLSS equipment DDTM&E for the Space Shuttle and ISS Programs;
- ATCS equipment DDTM&E for the Space Shuttle and ISS Programs;
- Flight Crew Equipment DDTM&E and SE for the Space Shuttle and ISS Programs;
- Crew Health and Conditioning Systems DDTM&E and SE for the Space Shuttle and ISS Programs;
- Design, fabrication and test support for advanced development programs for categories of products listed above;
- Hardware/Software upgrades, modifications, and build-to-print provisioning for categories of equipment listed above.

GFE consists of both mechanical and electrical/electronic hardware and software elements. The tasks to be performed under this contract include DDTM&E and SE of the following:

- EVA tools and equipment including, but not limited to: EVA hooks, safety tethers, foot restraints, workstations, lights, ratchets, sockets, power tools, torque multipliers and

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other crew aids and tools. Advanced development EVA tasks expected to be part of this contract include the design and fabrication necessary to support the pressurized garment assembly and the portable life support system in the Advanced Spacesuit Program.

- EVR equipment, including, but not limited to: dexterous hands, arms, manipulators, and end effectors, robotic workstations, including telepresence equipment, robotic mobile platforms, automated free-flying camera or instrument platforms, robotic handling interfaces, tools and targets, crew safety devices such as the Simplified Aid for EVA Rescue (SAFER) and robotic ground simulation systems.
- ECLSS equipment, including, but not limited to: Water Transfer Hardware such as connectors, hoses, and liquid containers; Detection equipment for hazardous chemicals such as hydrazine; Emergency breathing equipment including masks, hoses, and tanks; water recovery systems; air revitalizations systems; galley food processing equipment; and water metering equipment.
- ATCS equipment including, but not limited to: active thermal control and payload cold storage hardware such as: payload interface coolant subsystems, actively powered freezer and transport systems, un-powered (Passive) freezers and transport systems, hardware associated with stowing science samples, and ATCS associated crew aids and personal protection equipment (PPE). The tasks will include design, fabrication and/or testing of coolant interface subsystems, coolers and related systems, cold boxes, heat exchangers, phase change and desiccant materials and packaging, sample containers, related soft goods and supporting hardware.
- Flight Crew Equipment including, but not limited to: Housekeeping equipment, softgoods, and consumables to support routine cleaning and trash collection; Restraints and Mobility Aids for IVA such as handrails, stowage equipment, and foot restraints; Crew Provisioning items to support nominal work and personal activities such as: clothing; hygiene; crew requests; personal items; and entertainment. Tools and Diagnostics equipment such as: maintenance work area; intravehicular activity (IVA) tools and test equipment used to support routine maintenance and identification of failed systems, the isolation of failures, and the replacement of defective devices.
- CHeCS product types are flight packaging for COTS Medical Equipment; design, test, analysis, and as-built documentation, for new or modified COTS Physical Conditioning equipment; design, test, analysis, as-built documentation for modified Commercial Off The Shelf (COTS) medical equipment, flight qualified and certified Medical equipment, flight qualified and certified physical conditional equipment; design, test, analysis, and as-built documentation, for new or modified COTS environmental monitoring equipment necessary to assure crew health; and flight qualified and certified environmental monitoring products.

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- Other GFE items that are not specifically identified above but are in the general category of the GFE groupings. These items and the documentation required will be identified in the request for work.

Additional tasks expected to be part of this contract include the manufacturing, delivery, and maintenance of existing designs for each of the categories of equipment listed,, which the Government has manufacturing rights.

2.1 GENERAL OVERVIEW

Work will be authorized for this contract through the issuance of Delivery Orders (DOs). The DOs will define the detailed requirements specific to a particular task. The work processes and procedures that have been used to satisfactorily complete GFE and Flight Products are documented and located on the Engineering, Safety & Mission Assurance (S&MA), ISS program and SSP program servers. The contractor can offer changes to the general requirements following the Engineering Change Control process defined in EA-WI-027, "Configuration Management Requirements." The contractor shall furnish the personnel, equipment, materials, resources, and facilities necessary to perform any, or all of the following activities: design, development, test, evaluation, manufacturing, delivery, maintenance, storage, repair and the sustaining engineering of the GFE.

2.1.1 The contractor shall, provide support of Government-managed design, development, test, manufacture, evaluation, delivery, maintenance, repair and sustaining engineering activities for the hardware/system.

2.1.2 The contractor shall seek and use, when found, innovations that promote improvements in the overall efficiency and economy in all areas of responsibility defined in this SOW.

2.1.3 The contractor shall utilize commercial off-the-shelf (COTS) hardware/software in the design of the CRAVE hardware/system whenever the COTS hardware meets design requirements.

2.1.4 The contractor shall perform all tasks in accordance with the JSC Engineering Directorate work instruction EA-WI-023, Project Management of GFE Flight Projects, unless otherwise directed by a DO.

2.1.5 When electrical/electronic packages and subsystems require the design/development of software or firmware, these tasks shall be performed in accordance with EA-WI-025, GFE Flight Project Software and Firmware Development, unless otherwise directed by a DO.

2.1.6 Configuration management of these tasks shall be performed in accordance with EA-WI-027, unless otherwise directed by a DO.

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2.1.7 Any contractor desired exceptions to EA-WI-023, EA-WI-025 or EA-WI-027 shall be submitted for review and approved by NASA.

2.1.8 All handling, processing, or testing of Class I or II hardware at the contractor's facility, prior to acceptance by the Government, shall be documented using a work authorization document.

2.2 DESIGN AND ANALYSIS REQUIREMENTS OVERVIEW

The contractor shall perform design and analysis tasks for mechanical and electrical/electronics hardware and related software as directed by a DO. EVA tasks shall follow the requirements that are specified in JSC 26626, Extravehicular Activity (EVA) Hardware Generic Design Requirements Document. All designs produced under this contract shall comply with the requirements of JPG 8080.5, JSC Design and Procedural Manual. These tasks include, but are not limited to, the following:

- 2.2.1 Develop hardware and software project requirements.
- 2.2.2 Develop conceptual layouts and perform engineering and feasibility studies.
- 2.2.3 Perform preliminary design and analysis of mechanical and electrical/electronics components and subsystems.
- 2.2.4 Complete detail design and analysis of mechanical and electrical/electronics components and subsystems.
- 2.2.5 Complete detailed design and analysis of software in support of electrical/electronics packages and subsystems.
- 2.2.6 Complete hazard analysis.
- 2.2.7 Perform failure analysis.

2.3 FABRICATION AND ASSEMBLY REQUIREMENTS OVERVIEW

The contractor shall perform the following fabrication and assembly tasks as directed by a DO:

- 2.3.1 Fabricate and assemble mechanical and electrical/electronics components and subsystems.
- 2.3.2 Fabricate and assemble Space Flight hardware.
- 2.3.3 Write and deliver software programs in support of electrical/electronics packages and subsystems.

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2.3.4 Maintain and repair Space Flight mechanical and electrical/electronics equipment.

2.4 TESTING REQUIREMENTS OVERVIEW

The contractor shall be required to perform testing as directed by DO. The testing shall be performed at contractor, subcontractor, or Government facilities. The contractor shall test mechanical and electrical/electronics components, subsystems and integrated assemblies.

2.5 APPLICABLE DOCUMENTS

Applicable documents are listed in Attachment J-12. All listed documents are applicable to the extent specified. When there are conflicts between the listed documents and the requirements of this SOW, the SOW shall prevail. The contractor shall utilize the latest revision of the documents at the time a DO is issued.

3.0 FUNCTIONAL REQUIREMENTS

The scope of work for each end product will be identified in a DO. The effort required to complete a DO will require all or some subset of the tasks described below. Alternate forms or additional documentation may be required and will be identified in a DO.

3.1 Design and Analysis

3.1.1 Hardware/Software Project Requirements Definition

The contractor shall develop hardware/software project requirements necessary to complete the conceptual and preliminary designs. These requirements are derived from the mission goals and objectives and from top-level performance requirements. Mission goals and objectives and top-level performance requirements will be provided in a DO or in the "Project Technical Requirements Specification (PTRS)." In some cases, if directed by a DO, the contractor shall develop the PTRS from the top-level requirements provided in a DO.

The hardware/software project requirements shall include, but not be limited to, those associated with function, performance, testing, operations, interfaces, facilities, environment, assembly and installation, hardware and software integration, materials and processes, S&MA, structural integrity, logistics and reporting. For hardware and software that will be used Intravehicular (IVA) and has been determined to be non-critical GFE, the contractor shall provide the documentation of project requirements in accordance with the Data Requirements Document (DRD) titled, "Flight Hardware Project Requirements and Verification Document (PRVD)."

A SRR data package shall be submitted and conform to the guidelines in DRD titled, "GFE Systems Requirements Review Data Package," unless otherwise directed by a DO. If directed by a DO, the contractor shall be required to present the requirements at a Systems Requirements Review (SRR) as defined in WI-EA-023. The SRR will occur either at Johnson Space Center (JSC), the contractor's facility or another location.

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The following documents are required to be available at the SRR:

Products	Version	SRR Data Pkg.	RIDable (Y/N)
PTRS or PRVD	Final* (see Section 7.1.3.2 of WI-EA-023) *For PRVD, requirements portion only	Yes	Yes
Interface Control Documents (ICDs)	Final for Functional Characteristics content	Yes	Yes
Configuration Management Plan	Final	Yes	No
Software Development Plan	Final	Yes	No

3.1.2 Conceptual Design and Analysis

The contractor shall develop hardware/software design concepts and approaches and shall perform preliminary analyses. The conceptual design end-products may consist of functional requirements for mechanical and electrical/electronic elements; preliminary drawings, sketches, layouts, diagrams, and conceptual mockups; supporting analyses, trade studies, and feasibility assessments; and cost and schedule estimates for hardware/software design, fabrication and installation. The contractor shall also show the feasibility of designing and fabricating the proposed hardware and software along with the most probable design and fabrication approach. The contractor shall be required to present the conceptual design and analysis results to NASA, unless otherwise directed by a DO.

3.1.3 Preliminary Design

The contractor shall develop the preliminary designs as directed by a DO. The preliminary design process may consist of the following, as appropriate: engineering layouts, and analyses; hardware/software designs; fabrication and installation approaches; detailed equipment requirements; any special test or handling requirements; and cost schedule or estimates for manufacturing test, etc. The fabrication of breadboard, brassboard, or engineering units of the proposed design may be required as part of the preliminary design process.

Preliminary designs shall comply with the detailed equipment requirements and describe the main components, configurations, limitations, characteristics and modes of operation. A Preliminary Design Review (PDR) package shall be submitted and conform to the guidelines in DRD titled, Preliminary Design Review Data Package, unless otherwise directed by a DO. The contractor shall be required to present the design at PDR. The PDR will occur either at JSC, the contractor's facility or another location.

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The PDR data package shall include detailed equipment requirements in the form of a preliminary End Item Specification (EIS) and/or preliminary Software Design Document (SDD), unless otherwise directed by a DO. For EVA projects, the detailed equipment requirements shall be provided in the form of a preliminary Certification and Acceptance Document (CARD).

A partial listing of the documentation products that are to be provided in the PDR data package are identified in the table below (a full listing of the documentation is identified in DRD titled, Preliminary Design Review Data Package. Additional documentation products will be added through DO direction.

Products	Version	PDR Data Pkg.	RIDable (Y/N)
EIS	Preliminary	Yes	Yes
CARD (for EVA Projects only)	Preliminary	Yes	No
Software Requirement Specification	Final	Yes	Yes
Engineering Drawings	Preliminary	Yes	Yes
SDD	Preliminary	Yes	Yes
V&VD Or PRVD	Preliminary for verification plan content	Yes	Yes
ICDs	Preliminary for Detailed Specification content	Yes	Yes
Safety Data Package	Phase I	Yes	Yes
EEE Parts Analysis	Preliminary	Yes	Yes
Design Analyses Reports	Preliminary	Yes	Yes

3.1.4 Detailed Design

The contractor shall provide detailed designs as at the Critical Design Review (CDR) that may consist of the following, as appropriate: detailed fabrication and assembly drawings; detailed engineering analyses; hardware and software specifications and other documents as required; certification requirements, computer files generated from Computer Aided Design (CAD), Finite Element Analysis (FEA), and Contractor written source codes and executable programs. The CDR data package shall be submitted by the contractor and shall conform to the guidelines in the DRD entitled, "Critical Design Review," unless otherwise directed by a DO. The contractor may be required, if directed by a DO, to present the detailed design at the CDR. The CDR will occur either at JSC, the contractor's facility or another location.

The contractor shall provide, as part of the CDR Data package, final, detailed drawings, including assembly drawings suitable for fabrication and assembly of hardware and a drawing tree that shows the relationship of the GFE end item to the assembly, sub-assembly and the piece parts. All drawings shall be in the Pro-E format suitable for inclusion into the JSC Drawing Database. Electrical and electronic schematics shall be provided in the ORCAD format. The contractor shall also provide fully parameterized solid models, including assembly drawings, in a

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Pro-E readable format. Drawing formats, practices, naming conventions for solid models and drawings, and configuration management shall be performed in accordance with JPG 8500.4, Engineering Drawing System Manual. Drawings shall be formatted in accordance with DRD titled, Engineering Drawings. All final drawings and subsequent drawing revisions will be approved by the Government before hardware fabrication begins.

The contractor shall either: (1) release drawings through the JSC Engineering Drawing Control Center (EDCC) or (2) deliver drawings and associated files released through the contractor's system that are JPG 8500.4 complaint to the JSC Engineering Drawing Control Center (EDCC) upon delivery of the first piece of hardware. If the contractor is delivering to the EDCC, the contractor shall have a system in place similar to the JSC system for configuration management prior to delivery that has been approved by NASA. The Government will approve all top assembly drawings. If an in-place drawing system is used, the contractor, upon completion of a DO, shall deliver to the EDCC all original drawings; native engineering files (e.g. CAD models, drawing files, etc.) created or revised by the contractor or sub-contractor, and serialization/lot number records for all hardware built to those drawings.

The CDR data package shall include detailed equipment specifications in the form of an End Item Specification (EIS) and/or SDD. The detailed equipment specifications and test requirements for EVA projects shall be provided in the form of a CARD. In addition, the contractor shall prepare a plan for the sustaining of the GFE hardware/system based on the information shown in paragraph 3.4 of this SOW

A partial listing of the documentation products that are to be provided in the CDR data package are identified in the table below (a full listing is identified in the DRD titled, Critical Design Review Data Package). The final versions of the preliminary documents presented at PDR are to be available. Additional documentation products will be added through issuance of delivery orders.

Products	Version	CDR Data Pkg.	RIDable (Y/N)
Engineering Drawings	Final	Yes	Yes
CARD (for EVA Projects only)	Final	Yes	Yes
ICDs	Final for Detailed Specification content	Yes	Yes
Safety Data Package	Phase II	Yes	Yes
Engineering Analyses Reports	Final	Yes	Yes
V&VD Or PRVD	Final for verification plan content	Yes	Yes
SDD	Final	Yes	Yes
Software Code	Preliminary	No	No
EIS	Final	Yes	Yes
Sustaining Engineering Plan	Preliminary	No	No
EEE Parts Analysis	Final	Yes	Yes

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Upon completion of the CDR, the design of the hardware/software shall be controlled and any changes to the requirements or design that deviate from the material submitted during CDR shall be submitted to the Technical Manager's Representative (TMR) for approval. The contractor shall document the changes in an Engineering Design Change Proposal (DRD titled, Engineering Drawing Change Proposal). The contractor shall be required to present the change to the appropriate JSC Configuration Control Board.

3.1.5 Hazard Analysis

The contractor shall provide analysis verifying that the detailed hardware and software design is safe for personnel and facilities. The contractor shall meet all applicable safety and reliability design requirements as defined JSC 17481 "Safety Requirements Document for JSC Shuttle Space Flight Equipment" for the Space Shuttle program and SSP 50021, Space Station Safety Requirements, for the Space Station Program.

The contractor shall be required to present the results or relevant calculations of the analysis at the CDR or at other forums as directed by NASA. All calculations and results shall be in the contractor's report format and be available to the Government upon request.

3.2 FABRICATION

The contractor shall provide all material, equipment, facilities, transportation, resources, and personnel to perform the fabrication, assembly, maintenance and repair of the hardware as described in a DO.

Workmanship standards shall be employed throughout all phases of hardware manufacture to control the quality of the operations.

3.2.1 Mechanical Work Disciplines

Mechanical work disciplines shall include equipment and expertise in, but not limited to, the following: conventional and specialized machining; metalsmith fabrication; riveting, soldering, brazing, and welding; conventional and specialized woodworking; lay-up, bonding, processing, and machining of composite materials; hand fairing and finishing of sculptured surfaces and contours; electrical discharge machining (wire or die sink); tubing and instrumentation installation and softgoods fabrication. Specialized services shall include heat treating, plating, rapid prototype and painting, anodizing, alodining, composite lay-up, vacuum bagging and wire wrapping. Fabrication may also include special processes identified in paragraph 3.2.3 of this SOW.

Fabrication of Space Flight hardware will require workmanship standards as specified in paragraph 2.1.3.2 of JPG 8500.4 and SKZ36103755, JSC Fabrication Tolerances and Practices, or best commercial practice. If best commercial practice is used, the contractor's standards shall be submitted per DRD titled, Flight GFE Workmanship Specification List, for review and approval.

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Consideration for tight dimensional tolerances and allowances for tolerance build-up may also be required when fabricating and assembling Space Flight hardware.

3.2.2 Electrical/Electronics

The contractor shall provide Electrical/Electronic work disciplines and equipment with expertise in, but not limited to the following: fabrication and assembly of printed circuit boards with surface mount technology and through hole assembly; electrical/electronic hardware components and subsystems; and general electronics fabrication and assembly of miscellaneous hardware such as: cables, harnesses, and any associated special tooling or fixtures. Integration of electrical/electronic hardware into final assemblies shall use installation and operation specifications, and shall provide mounting, power, wiring and circuit protection.

Fabrication of all electronic equipment shall include the installation of all software codes, if applicable, in support of electrical/electronics packages and subsystems. Workmanship standards shall be employed throughout all phases of hardware manufacture to control the quality of the operations. These standards shall comply with the NASA-STD-8739 series. The contractor's standards shall be submitted per DRD titled Flight GFE Workmanship Specification List for review and approval.

3.2.3 Special Processes

The contractor shall provide specialized processes, which include but are not limited to, as follows: splicing, gear cutting, gear grinding, centerless and blanchard grinding, vacuum and conventional heat treating, stress relieving, plating, metalizing, plasma spraying, sand blasting, anodizing, laser engraving, painting, graphics artwork layout, silk screening and decaling of instrumentation (panels, chassis, cabinets, and printed circuit boards), and any other types of surface treatments.

3.2.4 Materials

Materials expected to be utilized in this contract include, but are not limited to, the following: ferrous metals, non ferrous metals (including super and high temperature alloys), ceramics, composites, plastics, wood, Teflon, foam, honeycomb, Nomex and Beta cloth fabrics, coolant fluids, etc.

3.2.5 Material Process Control

The contractor shall perform hardware development, modifications, and upgrades discussed in this SOW utilizing adequate materials and process control per SE-R-0006, General Specification, Space Shuttle Systems Requirements for Materials and Process, for the Space Shuttle Program and SSP 30233, Space Station Requirements for Materials and Processes, and JSC 27301, Materials Control Plan for JSC Flight Hardware, for the Space Station Program.

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The contractor shall be required to submit sample materials for NASA to perform materials testing per NASA-STD-6001, Flammability, Odor, and Off-Gassing Requirements and Test Procedures for Materials in Environments that Support Combustion. The contractor shall control stress, corrosion, cracking, and material fracture by designing to MSFC-STD-3029, Design Guidelines for Controlling Stress Corrosion Cracking, and JSC 25863, Fracture Control Plan for JSC Flight Hardware, for the Space Shuttle Program and SSP 30558, Fracture Control Requirements for Space Station, for the Space Station Program. The contractor shall comply with the JSC Fastener Integrity Program that is identified in JSC 23642. All materials shall be reviewed and approved as part of the Preliminary Design Review, Critical Design Review, and Engineering Design Change Proposal processes. Materials and process controls for the fabrication of advanced development hardware will be specified in a DO.

3.3 TESTING

The contractor shall be required to perform development, acceptance, and qualification testing of hardware/systems as directed by a DO or identified in the CARD, V&VD or PRVD. The contractor shall test mechanical and electrical/electronics packages, components, subsystems and integrated assemblies.

3.3.1 Laboratory Use

The testing shall be performed at Contractor or Government-Furnished Facilities. The contractor shall be responsible for the efficient, well planned use of Government laboratories that may be used in support of this contract. The contractor shall identify cost effective alternative plans and approaches available for those times when Government services and facilities are not available for contractor use. The Government may direct the use of a particular test facility. Unique testing, such as human thermal vacuum testing, will be performed at Government-Furnished Facilities. Any testing that is performed at Government-Furnished facilities shall follow the appropriate work instructions for that facility.

3.3.2 Test Documentation

The contractor shall be responsible for the preparation of the test requirements, test plans and procedures, work authorization documents, discrepancy reporting and tracking, post test reports, and all documentation associated with testing of hardware/systems. All test documentation will require the approval by the Government. Unless otherwise directed by a DO, the test documentation shall include but not be limited to:

3.3.2.1 Certification Plans

Certification plans shall be provided in the form of a Verification and Validation Document (reference DRD titled, Flight GFE Verification and Validation Plan), and for EVA hardware and software, the certification plan is identified in Table 4, Verification Matrix of the DRD titled, Certification and Acceptance Requirements Document (CARD). The certification plan shall

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define the specific methods to be used to verify that the hardware and software meets the technical design requirements.

3.3.2.2 Certification Verification

The contractor shall provide a certification report,, which contains the formal certification data that are required to allow the hardware and software to be certified. Certification verification shall be prepared in accordance with DRD titled, Government Certification and Approval Request (GCAR).

3.3.2.3 Test Plans

The contractor shall provide development, certification, and acceptance test plans. The certification test plan shall be in accordance with DRD titled, Certification Plan. For EVA hardware and software, this plan is included in the Verification Matrix of the CARD. For development and acceptance test plans, the format shall be in the contractor's format.

3.3.2.4 Test Procedures

The contractor shall prepare development, certification, and acceptance test procedures. Development test procedures shall be submitted to the Technical Manager's Representative in the contractor's own test procedure format for review two weeks prior to the start of testing. If no comments are received within that time period, testing can proceed. Certification test procedures shall be prepared in accordance with DRD titled, GFE Qualification Test Procedure, and acceptance test procedures shall be submitted in accordance with DRL titled, GFE Acceptance Test Procedure.

3.3.2.5 Test Reports

The contractor shall prepare certification reports in accordance with DRD titled, "Certification Report." Post development and acceptance test reports shall be in the contractor's report format.

3.3.2.6 Test Fixture and Test Configuration Drawings

The contractor shall provide drawings and solid models in accordance with DRD titled, "Engineering Drawings," for any special test fixtures and test configurations that are used in acceptance and certification tests as specified in a DO. These drawings shall be released into the JSC drawing system.

3.3.3 Test Capability

The contractor shall perform development, qualification and acceptance testing of CRAVE hardware/system. Testing shall be performed in accordance with the requirements that have been identified in the CARD, V&VD or PRVD. Testing shall include, but not be limited to, the following:

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The contractor shall perform development/evaluation testing of hardware/systems in an appropriate laboratory setting to verify the design approach.

3.3.3.2 Thermal Testing

The contractor shall perform thermal testing of mechanical and electrical/electronic hardware to insure proper function at thermal environment limits.

3.3.3.3 Vacuum and Thermal Vacuum Testing

The contractor shall perform vacuum and thermal vacuum testing of mechanical and electrical/electronic hardware to insure proper function at vacuum or thermal vacuum environment limits.

3.3.3.4 Vibration Testing

The contractor shall perform hardware workmanship acceptance testing as well as vibration environmental testing for certification of mechanical and electrical/electronic hardware.

3.3.3.5 Oxygen Acceptance Testing

The contractor shall perform Oxygen acceptance testing on all oxygen systems components to ensure proper oxygen system workmanship. Testing shall be performed per SSP 41172, Qualification and Acceptance Environmental Test Requirements. The contractor shall provide testing, processing, and handling facilities and capabilities compatible with 100% high and low pressure oxygen systems and components. Facilities and capabilities shall include, but are not limited to, clean rooms, laminar flow benches, and precision cleaning facilities.

All new and existing GFE, pertaining to 100% oxygen systems and components, shall be evaluated for oxygen systems hazards by White Sands Test Facility (WSTF), Oxygen Systems personnel. In addition, all Oxygen systems and components shall be subjected to WSTF oxygen compatibility and acceptance testing per JSC 27301.

3.3.3.6 Electromagnetic Interference/Electromagnetic Compatibility (EMI/EMC) Testing

The contractor shall perform EMI/EMC tests to insure an electromechanical or electronic component or assembly will not adversely affect or be affected by spacecraft systems. Testing shall be in accordance with JSC 27743, EMC Test Methods for Shuttle Orbiter Equipment/Experiments, for the Space Shuttle Program and SSP 30238, Space Station Electromagnetic Techniques, for the Space Station Program.

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The contractor shall perform Ionizing Radiation Testing in accordance with NSTS 07700 Volume X Book 1 and 2 for the Space Shuttle Program and in accordance with SSP 30512, Space Station Ionizing Radiation Design Environment, for the Space Station Program.

3.3.3.8 Vacuum Ultraviolet Testing

The contractor shall perform Vacuum UltraViolet (VUV) radiation testing in accordance with SSP 30425, "Space Station Program Natural Environment Definition for Design.

3.3.3.9 Atomic Oxygen Testing

The contractor shall perform Atomic Oxygen (AO) testing in an atomic oxygen Plasma Asher or equivalent facility and shall follow procedures determined appropriate by the JSC Structural Engineering Division/Materials and Process Branch, and as directed by DOs.

3.3.3.10 Contrast Ratio, Bi-directional Reflectance Distribution Function (BRDF) Testing

When Contrast Ratio and BRDF testing are required for hardware/systems, a "2 X 2" checkerboard coupon conforming to requirements specified in a DO or appropriate specifications shall be made using the same materials and processes as the flight hardware (or qualification units).

3.3.3.11 Static/Dynamic Loads Testing

The contractor shall perform static loads testing when the hardware design cannot be adequately analyzed to insure a positive margin of safety. The contractor shall perform dynamic testing such as random vibration, acoustic, modal, sine sweep, or smart hammer to complete acceptance testing requirements.

3.3.3.12 Functional Performance Testing

The contractor shall perform functional performance testing in an appropriate laboratory setting to ensure the hardware and software meets all functional performance requirements.

3.3.3.13 Software Verification and Validation Testing

The contractor shall perform software Verification and Validation (V&V) testing on software code, which supports electrical/electronic packages and subsystems.

3.3.4 System Acceptance

The contractor shall provide a Certification Data Package (CDP) for the hardware/system that has been identified in a DO as flight hardware and software required in support of the SSP or ISS

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programs. As part of the CDP, the contractor shall complete the V&V matrix (DRD titled, Flight GFE Projects Requirements and Verification Document) and assemble the documentation that is identified in the Flight GFE Verification and Validation Report (DRD titled, Flight GFE Verification and Validation Report). The contractor shall be required to present the data at a System Acceptance Review (SAR) that will occur either at JSC, the contractor's facility or another location.

The contractor shall provide to NASA, upon request, any special test fixtures and test configurations, instrumentation, spare components (engineering or flight) including non-compliant components, and any unused materials purchased under a DO.

The documentation products that are to be available at the SAR are shown in the table below:

Products	Version	SAR Data Pkg.	RIDable (Y/N)
Version Description Document (software and/or firmware)	Final	Yes	N/A
V&VD or PRVD	Final for verification results content	Yes	N/A
CARD (for EVA projects only)	Final with verification matrix completed	Yes	N/A
Engineering Drawings (including CAD models)	Final	Yes	N/A
Ground Safety Analysis Report (as required by KSC) (see EA-WI-023 for details)	Final	Yes	N/A
Certification Data Package (see EA-WI-023 for details)	N/A	Yes	N/A
ADP or JSC Project Parts Tag- JF 911, (see EA-WI-023 for applicability)	N/A	Yes	N/A
Safety Data Package	Phase III	Yes	N/A
ISS Functional Configuration Audit/Physical Configuration Audit (FCA/PCA) (See Section 7.5.2.7 of EA-WI-023)	N/A	Yes	N/A
User's Guide (as described below)	Final	Yes	N/A
Sustaining Engineering Plan	Final	Yes	N/A
Qualification & Acceptance Procedures	Final	Yes	N/A

The contractor shall develop a Flight Products User's Guide (reference DRD titled, Flight Product User Guide) to provide a descriptive explanation of the GFE for the intended end use. The guide shall indicate how to use the GFE to accomplish the operational requirements and stay within any operational constraints to maintain the safety and functionality of the GFE.

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Sustaining a GFE item consists of many activities that interact with each other. Under nominal conditions, (e.g., no changes, no problems, no off-nominal scenario discussions, etc.), the activities can be separated into mission-specific activities and non-mission-specific activities. Any of these activities can result in the need to perform an off-nominal activity, such as closure of a discrepancy report or modification to the design, the procedures, or the certification.

Sustaining activities are grouped into the following list of nominal and off-nominal activities. The list below is a high level depiction of the activities involved in sustaining GFE. Additional activities, as applicable, may be added to DOs.

Nominal Sustaining Activities:

- Project Management Activity
- Engineering Activity
- Contracting Activity
- Configuration Control Activity
- ALERTS/Advisories (A/As) Activity
- Program Change Evaluation Activity
- Flight Readiness Activity
- Processing Activity
- Pre-flight and Post-flight Operations Activity
- In-flight Operations Activity
- Inventory Activity
- Maintenance Activity
- Limited Life/Cycle Activity
- Unique GSE, STE, and Facility Activity
- Retire GFE Activity

Off-nominal Sustaining Activities:

- Discrepancy Reporting (DR) Activity
- Problem Reporting and Corrective Action (PRACA)
- Repair Activity
- Delta DDTM&E Activity
- Delta Certification Activity
- Alternate Production Certification Activity

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The contractor shall provide sustaining engineering support following delivery of hardware and software for a period of time specified in a DO. Sustaining engineering activities shall include drawing revisions, document revisions, equipment modifications, acceptance test support, procedure review, mission support, failure investigation, and presentations to NASA review boards and management. The contractor may also be tasked by DO to provide sustaining engineering services for hardware/systems that were delivered under previous contracts.

3.5 QUALITY ASSURANCE**3.5.1 Quality System**

The contractor shall have a quality program that complies with International Organization for Standardization document SAE-AS9100, Model for Quality Assurance in Design/Development, Production, Installation, and Servicing. Third party certification/registration is required within nine (9) months of contract date. The contractor's quality plan, as developed per SAE-AS9100 requirements, shall be submitted in accordance with DRD titled, Quality Plan.

The contractor's quality plan shall make provisions for the following supplements to the SAE-AS9100 elements:

3.5.1.1 Customer Verification of Subcontracted Products

The contractor shall submit the appropriate subcontract documentation to the designated NASA quality representative for determination of the need for Government Source Inspection (GSI) prior to release of the procurement.

When the NASA quality representative elects to require GSI for a subcontract, the following statement shall be included in the direction:

"All work on this order is subject to inspection and test by the Government at any time and place. The Government quality representative who has been delegated quality assurance functions on this procurement shall be notified immediately upon receipt of this order. The Government representative shall be also notified 48 hours in advance of the time articles or materials are ready for inspection or test."

For procurements that do not require GSI, the following statement shall be included in the direction:

"The Government has the right to inspect any or all of the work included in this order at the contractor's plant."

3.5.1.2 Review and Disposition of Nonconforming Product

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The cognizant Government quality representative shall approve all dispositions of nonconforming products other than those being reworked to meet specified requirements or scrap.

Nonconformance reporting shall commence with the manufacturing of the certification or production hardware and continue through all phases of the project. The reporting shall include all problems associated with the GSE for the hardware. Nonconformance reporting for materials to be used in Class I or II hardware, shall commence with the receipt of the material. All nonconformances shall be reported in accordance with DRD titled, Nonconformance Record.

Nonconformances may be repaired by Standard Repair Procedures, as determined by the Material Review Board. Before use, Standard Repair Procedures shall be submitted for NASA approval.

3.5.2 Waivers/Deviation Request

A waiver/deviation request shall be submitted in accordance with EA-WI-027 for all hardware or software not meeting defined specifications. For proposed waivers and deviations, the contractor shall establish a means to analyze the safety impact.

3.5.3 Workmanship Specifications

The following standards shall be used in the design and manufacture of Electrical/electronic equipment for high-reliability (flight hardware, critical ground support equipment, etc.) applications:

- a) Soldering, Through-Hole Technology – NASA-STD-8739.3, Soldered Electrical Connections,
- b) Soldering, Surface Mount Technology – NASA-STD-8739.2, Workmanship Standard for Surface Mount Technology,
- c) Crimping, Cable and Harness – NASA-STD-8739.4, Crimping, Interconnecting Cables, Harnesses and Wiring,
- d) Conformal Coating and Staking – NASA-STD-8739.1, Workmanship Standard for Staking and Conformal Coating of Printed Wiring Boards and Electronic Assemblies,
- e) Fiber Optics – NASA-STD-8739.5, Fiber Optic Terminations, Cable Assemblies and Installation,
- f) Electrostatic Discharge Control (ESD) – ANSI/ESD S20.20-1999, Development of an Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrical Initiated Explosive Devices,

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- g) Rigid Printed Wiring Board (PWB) Design – IPC-2221, Generic Standard on Printed Board Design, and IPC-2222, Sectional Design Standard for Rigid Organic Printed Boards, and
- h) Rigid Printed Wiring Board (PWB) – IPC-6011, Generic Performance Specification for Printed Boards, and IPC-6012, Qualification and Performance Specification for Printed Boards.”
- i) NASA Technical Standards for flight hardware workmanship are available electronically at:

<http://standards.nasa.gov>

- j) IPC standards required shall be supplemented with NASA Goddard Space Flight Center (GSFC), S-312-P-003B, Procurement Specification for Rigid Printed Boards for Space Applications and other High Reliability Uses. (Note: all specification references to “GSFC” shall be substituted with “JSC” for this procurement.) If the contractor chooses to use other standards, the contractor shall submit those standards for NASA approval per DRD titled, Flight GFE Workmanship Specification List.

3.5.4 Traceability

A system shall be in place to ensure identification of all materials/products, whether separately produced discrete items, or material produced in batches, to ensure traceability to the original source/manufacturer and to determine verification status. This system shall be maintained throughout the life of this contract, including material/product receipt; all stages of production; delivery; installation, etc.

3.5.5 Changes

The contractor shall notify the Government of any proposed changes (including from proprietary sources), including, but not limited to the following: fabrication, materials, methods, product operating characteristics, or processes previously approved. The contractor shall obtain written approval from the Government before making any change.

3.5.6 Test Results

Records of test results shall be maintained and must be traceable to the procured articles. Purchased raw materials shall be accompanied with chemical and physical test results from the manufacture or obtained from a NASA approved testing facility.

3.5.7 Software Quality Assurance

Software Quality Assurance requirements are applicable to the following categories of software and firmware: flight software and firmware; critical ground support software and firmware, i.e., software and firmware that are an integral part of the operational mission (i.e., support of flight program); and software support tools used in (1) the development of flight and critical ground support software and firmware; (2) manufacturing processes of mission critical hardware; and

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(3) test and integration of mission critical hardware, software, and firmware.

The contractor shall prepare a Software Quality Assurance (SQA) Plan in accordance with DRD titled, Software Quality Assurance Plan Report. The contractor shall implement the SQA requirements in accordance with the approved SQA plan.

3.5.8 Audits

The contractor shall conduct internal audits to ensure compliance with contract requirements. Additionally, the JSC Contracting Officer may request (JSC and contractor) audits of specific processes to identify potential systemic problem areas for improvement

3.5.9 Problem Reporting and Corrective Action

The contractor shall implement and participate in the process for reporting problems and the establishments of corrective action in accordance with JSC-28035, Program Problem Reporting and Corrective Action (PRACA) System for JSC Government Furnished Equipment. Refer to DRD titled, Problem Reporting and Corrective Action. The contractor shall participate in the PRACA system unless otherwise directed by a DO.

The contractor shall perform a failure analysis of defective hardware and software returned to the contractor unless deemed unnecessary by the Technical Manager's Representative. The failure analysis shall be performed in a systematic method such that the true cause of the failure can be identified. The contractor shall recommend corrective action required to prevent the recurrence of a failure. The results of the failure analysis and corrective action shall be submitted in a written report to the Technical Manager's Representative in accordance with DRD titled, Flight GFE Failure Analysis Report. The contractor may be required to present the results of the failure investigation and closure ration to the appropriate JSC personnel per JSC 28035, Program Problem Reporting and Corrective Action for JSC Government Furnished Equipment.

When applicable, the contractor shall be responsible for ensuring all PRACA requirements are met. The contractor shall maintain a status on all open problems, which do not have NASA approval for closure.

3.5.10 Calibration System

The contractor shall have a documented calibration system that meets the requirements of ISO 10012:2003, Quality assurance requirements for measuring equipment, or the American National Standard Institute (ANSI)/National Conference of Standards Laboratories (CSL) ANSI/CSL Z540-1, General Requirements for Calibration Laboratories and Measuring and Test Equipment.

3.5.11 Acceptance Data Package

When required by a DO, an acceptance data package (ADP) for each deliverable item in a DO shall be prepared in accordance with DRD titled, Acceptance Data Package. The ADP shall

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provide NASA with the documentation necessary to determine the acceptability of the delivered item. The ADP shall accompany the item at delivery and will be retained by NASA. The contractor shall also provide final engineering drawings and CAD models at delivery. These shall be formatted in accordance with DRD titled, Engineering Drawings..

3.6 SAFETY, RELIABILITY, AND MISSION ASSURANCE (SR&MA)**3.6.1 Reliability Requirements**

The contractor shall maintain a reliability program, which is planned and developed in conjunction with other contractor activities. Reliability and maintainability functions shall include the evaluation of the hardware and software reliability through analysis, review, and assessments. Reliability and maintainability shall be considered in the design process. The contractor is responsible for planning, management, and effective execution of the reliability effort.

3.6.1.1 Reliability Plan

The contractor shall provide a reliability plan in accordance with the Reliability and Maintainability Plan, DRD titled, Reliability and Maintainability Plan, to ensure compliance with specified reliability requirements. The Plan shall serve as the master planning and control document for reliability.

3.6.1.2 Failure Modes and Effects Analysis

The contractor shall provide a failure modes and effect analysis (FMEA) in accordance with the GFE FMEA and Critical Items List (CIL) and DRD titled, Space Shuttle GFE Failure Modes and Effects Analysis and Critical Items List, for the Space Shuttle Program, and DRD titled, Space Station GFE Failure Modes and Effects Analysis and Critical Items List, for the Space Station Program.

The contractor shall update and maintain the failure modes and effects analysis to support:

- Additional design actions
- Safety Analysis
- Hardware/Software Interface analysis
- Test planning
- Mission planning
- Preparation of mandatory inspection points
- Fault detection and isolation
- Maintainability and analysis planning
- Maintainability planning
- Logistics planning

STATEMENT OF WORK**A - Crew, Robotics, and Vehicle Equipment (CRAVE) - Unrestricted****3.6.1.3 Critical Items List**

The contractor shall provide a critical items list in accordance with the GFE FMEA and CIL, DRD titled, Space Shuttle GFE Failure Modes and Effects Analysis and Critical Items List, for the Space Shuttle Program, and DRD titled, Space Station GFE Failure Modes and Effects Analysis and Critical Items List, the the Space Station Program. The contractor shall update and maintain the critical items list, which requires special risk assessment to support the following:

- Waivers to program requirements
- Additional design action
- Safety analysis
- Test planning
- Mission planning
- Preparation of mandatory inspection points
- Fault detection and isolation
- Maintainability analysis and planning
- Maintenance planning
- Logistics planning

3.6.1.4 Limited Life Items and Status Report

The contractor shall identify limited life items in accordance with DRD titled, Limited Life Systems List,. The contractor shall provide a report, which estimates wearout life for Orbit maintainable items to support maintenance time predictions and preventative maintenance analysis. Limited Life items include limited shelf life, limited operating life, and time-action control sensitive items, or a combination of these.

3.6.1.5 Electronic, Electrical, and Electromechanical (EEE)/Mechanical Parts Control Plan

The contractor shall prepare a Parts Control Plan in accordance with DRD Electrical, Electronic, and Electromechanical (EEE) Parts Control Plan. The contractor plan shall describe the process of how the contractor will interface with NASA management, EEE and Mechanical Parts personnel, and design engineers to assure the system, board level designs, and selected parts meet performance parameters, ensure long-term reliability, and minimize program life cycle cost. All EEE parts used for Class I or Class II hardware shall be reviewed and approved by the JSC Engineering Directorate Certified Parts Approval Program (EDCPAP), JSC 61360.

3.6.1.6 Submittal of Electronic and Mechanical Parts Data

The contractor shall submit electronic and mechanical parts data in accordance with their Parts Control Plan (Reference DRD titled, Electrical, Electronic, and Electromechanical (EEE) Parts Control Plan.) and submit a EEE Parts list and Analysis Report (Reference DRD titled, EEE Parts Lists and Analysis Report) to ensure that the system, board level design, and selected parts:

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meet the specification performance parameters, ensure long-term reliability, are suitable for the application, and minimize the cost of ownership over the life of the application program.

3.6.1.7 Acute Launch Emergency Reliability Tip (ALERT) System

The contractor shall provide a documented response to each requested ALERT investigation and resolution to NASA JSC in accordance with DRD titled, Government Industry Data Exchange Program and NASA Advisory Problem Data. Program/Project initiated ALERTs are disseminated by the NASA JSC contractors, NASA centers, and the Government-Industry Data Exchange Program (GIDEP).

3.6.1.8 Failure Detection, Isolation and Recovery Assessment

The contractor shall develop a Failure Detection, Isolation and Recovery (FDIR) analysis process to ensure that each end item design meets the FDIR requirements in SSP 41000, System Specification for the International Space Station (ISS). The contractor shall document this analysis in a Space Station Reliability and Maintainability Predictions Report in accordance with DRD titled, Reliability and Maintainability Plan.

3.6.2 Safety Requirements

The contractor shall maintain a safety program, which is planned and developed in conjunction with other contractor activities and includes the plans and reports discussed below. Safety functions shall include the evaluation of hardware and software safety through analysis, review, and assessment, as well as evaluation of waivers, attendance at status reviews, evaluation of testing, and evaluation of flight item failures. The contractor shall be responsible for planning, management, and effective execution of the safety effort.

3.6.2.1 For Space Shuttle: The contractor shall perform and update safety analyses in accordance with the Space Shuttle GFE Safety Analysis Report (SAR) and Hazard Report (HR) (DRD titled, Space Shuttle GFE Safety and Analysis Report and Hazard Report).

3.6.2.2 For Space Station: The contractor shall perform and update safety analyses in accordance with the Space Station Hazard Report (HR)/System Description (DRD titled, ISS Hazard Report).

3.6.2.3 For Payloads: The contractor shall Perform and update payload safety analysis in accordance with the Payload Safety Data Package (DRD titled, Shuttle/Station Payload Safety Data Package).

3.6.3 System Safety Program Plan

The contractor shall provide a safety plan in accordance with DRD titled, System Program Safety Plan, and the requirements stated in Chapter 2 of NSTS 5300.4 (1D-2) for Space Shuttle

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and SSP 50021 Safety Requirements Document, for Space Station. The contractor shall describe the methods used and assure identification, elimination, and/or control of potential hazards, which may lead to injury, loss of personnel, and/or damage or loss of flight/training hardware and software, or mission-related ground support equipment/software throughout the complete cycle of the program.

3.6.4 S&MA Certification

The contractor shall document certification and acceptance requirements for hardware and software using the V&V (DRD titled, Flight GFE Verification and Validation Plan, or the PRVR (DRD titled, Flight GFE Projects Requirements and Verification Document). For EVA projects. The contractor shall document certification and acceptance requirements for hardware and software using the CARD. The contractor shall document the results of the hardware and software certification using the Certification Data Package.

3.6.5 Risk Assessment Summary Report

The contractor shall provide a Risk Assessment Executive Summary Report (RAESR) to document safety critical aspects of flight hardware and software. The RAESR shall be prepared in accordance with DRD titled, Risk Assessment Executive Summary Report.

3.6.6 Safety Review and Reporting

The contractor shall provide reports and presentation material for the S&MA Review Team (SMART) and System Safety Review Panel (SSRP) safety reviews. Contractor technical expertise and a presenter knowledgeable in the design and safety aspects in the project are required to attend. NASA Project Managers and S&MA representatives will review these reports and presentations for submittal to the panel. The contractor shall allow two weeks prior to the panel submittal date for the NASA project managers and S&MA representatives to review the reports and presentation.

3.6.7 Safety and Health

3.6.7.1 Mishap Notification and Investigation. When a mishap, which results in injury, illness, property damage or loss, or environmental release or damage occurs in the performance of contract work, you are required to notify the Government as described in JPG 1700.1, JSC Safety and Health Handbook, section 2, chapter 2.7, Mishap and Incident Investigation. You are also required to perform an investigation, and report the results, along with corrective actions, to the Government. The cited chapter describes specific requirements and schedules for notification, investigation, and reporting. In addition to any additional reporting requirements imposed by OSHA or this contract, the contractor must send notifications and reports, in accordance with the specified schedule to Mishaps@ems.jsc.nasa.gov

3.6.7.2 The following mishaps will be reported: Any mishap, which causes death or disability, or hospitalization of 3 or more workers, irrespective of employer; or results in injury or illness to

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a Government employee or damage to Government property. When the following OSHA recordable injuries and illnesses are experienced by only contractor workers, they are exempt from these reporting requirements: lost days away from work, restricted duty, and medical treatment. First aid cases are also exempt.

4.0 MANAGEMENT

4.1 PROJECT MANAGEMENT

The contractor shall be responsible for the effective and efficient management of all tasks, products, activities and resources required to perform this SOW. The contractor shall establish, document, and maintain the processes and controls necessary to accomplish this purpose including general/project management, resource, business and schedule management, data management, and contract and subcontract management. The monthly summary report of associated activities shall be reported in accordance with DRD titled, Delivery Order Regular Status Report/Summary Review.

4.2 CONFIGURATION MANAGEMENT

All customer controlled requirement changes or configuration baseline changes shall be proposed through the Engineering Design Change Proposal (EDCP) process and implemented after the approval by NASA, unless otherwise directed by a DO. Changes shall be processed through the responsible NASA Configuration Change Board and shall be documented through DRD titled, Engineering Drawing Change Proposal.

The contractor shall prepare specifications as required for subcontractor effort, if any. Such specifications shall be compatible with applicable requirements of this contract and any applicable DOs.

The contractor shall prepare material and process specifications to define the processing and fabrication techniques. Such specifications shall be compatible with applicable requirements of this contract and any applicable DOs.

4.3 PROGRAM DIRECTION AND MEETINGS

The JSC Contracting Officer (CO) shall be the sole source for all contractual direction, and technical direction shall come from the Contracting Officer Technical Representative (COTR), or Alternate COTR. During the performance of the contract, the Technical Manager's Representative (TMR) will conduct monthly reviews of the contractor design, analysis, fabrication, and testing status and data. These reviews will consist of contractor programmatic progress presentations, technical consultations, design requirement interpretations, Government visits to contractor facilities, and assistance in evaluating test data. Government personnel will also participate in all program reviews.

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All contractual direction and formal data transmittals shall be coordinated between the JSC Contracting Officer and a designated contractor counterpart to the JSC Contracting Officer.

4.4 PROGRAM SCHEDULE

The contractor shall meet the milestones identified or directed through each DO. The contractor shall provide schedules in accordance with DRD titled, Project Schedule.

4.5 FINANCIAL MANAGEMENT

The contractor shall maintain a Financial Management System (FMS) for the accumulation, documentation, analysis, and reporting of project cost and staffing data. The FMS shall be the basis for financial communication with NASA through the reporting requirements of DRD titled, NASA Contractor Financial Management Reporting and through DRD titled, Delivery Order Status Report/Summary Review, The FMS shall be capable of accounting for forecast and accrued expenditures of both labor hours and costs, commitments, and termination/liability forecasting of cost and manpower requirements by month, by quarter, and by Government Fiscal Year (GFY) and by DO. The NASA Contractor Financial Management Reporting DRD data is to be provided in a flat file format suitable for SAP. Variance Analysis and corrective action reporting shall also be included in accordance with the DRD.

4.5.1 Work Breakdown Structure

The Work Breakdown Structure shall be in accordance with Table 1 below. NASA shall expand the sub-elements of this minimal WBS as needed to meet the status reporting requirements of the Shuttle, International Space Station or Advanced Program Offices. Each DO will be assigned a WBS sub-element number to the WBS below. Cost reporting at the DO level by WBS shall be done in accordance with DRD titled, Delivery Order Status Report/Summary Review.

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Table 1 – Work breakdown Structure	
1.0	EVA Projects
1.1	Shuttle EVA Projects
1.2	ISS EVA Projects
1.3	Advanced Programs EVA Projects
2.0	Flight Crew Equipment Projects
2.1	Shuttle FCE Projects
2.2	ISS FCE Projects
2.3	Advanced Programs FCE Projects
3.0	EVR Projects
3.1	Shuttle EVR Projects
3.2	ISS EVR Projects
3.3	Advanced Programs EVR Projects
4.0	ECLSS Projects
4.1	Shuttle ECLSS Projects
4.2	ISS ECLSS Projects
4.3	Advanced Programs ECLSS Projects
5.0	ATCS Projects
5.1	Shuttle ATCS Projects
5.2	ISS ATCS Projects
5.3	Advanced Programs ATCS Projects
6.0	CHeCS Projects
6.1	Shuttle CHeCS Projects
6.1.1	<i>Flight Medical Projects</i>
6.1.2	<i>Crew Conditioning Projects</i>
6.1.3	<i>Environmental Monitoring Projects</i>
6.2	ISS CHeCS Projects
6.2.1	<i>Flight Medical Projects</i>
6.2.2	<i>Crew Conditioning Projects</i>
6.2.3	<i>Environmental Monitoring Projects</i>
6.3	Advanced Programs CHeCS Projects
6.3.1	Flight Medical Projects
6.3.2	Crew Conditioning Projects
6.3.3	Environmental Monitoring Projects

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The contractor shall provide documentation and reports in accordance with this contract and any applicable Dos and DRDs. The contractor shall develop, manage, and maintain an information and data management system for the preparation, publication, configuration control, and dissemination of data essential to this contract and the programs supported by the contractor through this contract. All the data requirements shall be delivered in the format as depicted in each DRD and compatible with JSC software loads. All documentation shall be maintained within the Engineering Directorate's Design Data Management System (DDMS).

5.1 DATA REQUIREMENTS

Each DO will identify the required documentation and applicable data requirements.

5.1.1 Data Requirements Innovation

When feasible and cost effective, the contractor shall identify alternative documentation requirements for NASA approval. The contractor shall consider factors such as cost, schedule, availability of personnel and equipment, task complexity, and other factors that are applicable for recommending alternative methods to meet project or end item requirements.

SECTION D PACKAGING AND MARKING

D.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: The following contract clauses pertinent to this section are hereby incorporated by reference:

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	DATE	TITLE
None included by reference		

II. NASA FAR SUPPLEMENT (48 CFR CHAPT 18)

CLAUSE NUMBER	DATE	TITLE
None included by reference		

III. FULL TEXT CLAUSES

D.2 PACKAGING, HANDLING, AND TRANSPORTATION (NFS 1852.211-70) (JUN 2000)

- (a) The contractor shall comply with NPG 6000.1E, "Requirements for Packaging, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components", dated April 26, 1999, as may be supplemented by the statement of work or specifications of this contract, for all items designated Class I, II, or III.
- (b) The contractor's packaging, handling, and transportation may be used, in whole or in part, subject to the written approval of the Contracting Officer, provided (1) the Contractor's procedures are not in conflict with any requirements of this contract, and (2) the requirements of this contract shall take precedence in the event of any conflict with the contractor's procedures.
- (c) The contractor must place the requirements of this clause in all subcontracts for items that will become components of deliverable class I, II, or III items.

**(End of Clause)
[END OF SECTION]**

SECTION E – INSPECTION AND ACCEPTANCE

E.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: The following contract clauses pertinent to this section are hereby incorporated by reference:

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	DATE	TITLE
52.246-2	AUG 1996	INSPECTION OF SUPPLIES – FIXED PRICE
52.246-3	MAY 2001	INSPECTION OF SUPPLIES-COST REIMBURSEMENT
52.246-4	AUG 1996	INSPECTION OF SERVICES – FIXED PRICE
52.246-5	APR 1984	INSPECTION OF SERVICES-COST REIMBURSEMENT
52.246-9	APR 1984	INSPECTION OF RESEARCH AND DEVELOPMENT (SHORT FORM)
52.246-16	APR 1984	RESPONSIBILITY FOR SUPPLIES

II. NASA FAR SUPPLEMENT (48 CFR CHAPT 18)

CLAUSE NUMBER	DATE	TITLE
None included by reference		

III. FULL TEXT CLAUSES

E.2 HIGHER-LEVEL CONTRACT QUALITY REQUIREMENT (FAR 52.246-11) (FEB 1999)

The contractor shall comply with the higher-level quality standard selected below:

<u>Quality Standard</u>	<u>Description of Quality Standard</u>
SAE AS9100	Quality Systems-Aerospace-model for Quality Assurance in Design, Development, Production, Installation and Servicing

(End of Clause)

**E.3 MATERIAL INSPECTION AND RECEIVING REPORT
(NFS 1852.246-72) (AUG 2003)**

(a) At the time of each delivery to the Government under this contract, the contractor shall furnish a Material Inspection and Receiving Report (DD Form 250 series) prepared in 3 copies, an original and 2 copies.

(b) The contractor shall prepare the DD Form 250 in accordance with NASA FAR Supplement 1846.672-1. The contractor shall enclose the copies of the DD Form 250 in the package or seal them in a waterproof envelope, which shall be securely attached to the exterior of the package in the most protected location.

(c) When more than one package is involved in a shipment, the contractor shall list on the DD Form 250, as additional information, the quantity of packages and the package numbers. The contractor shall forward the DD Form 250 with the lowest numbered package of the shipment and print the words "CONTAINS DD FORM 250" on the package.

(End of Clause)

E.4 HUMAN SPACE FLIGHT ITEM (NFS 1852.246-73)(MAR 1997)

The Contractor shall include the following statement in all subcontracts and purchase orders placed by it in support of this contract, without exception as to amount or subcontract level:

"FOR USE IN HUMAN SPACE FLIGHT; MATERIALS, MANUFACTURING, AND WORKMANSHIP OF HIGHEST QUALITY STANDARDS ARE ESSENTIAL TO ASTRONAUT SAFETY.

IF YOU ARE ABLE TO SUPPLY THE DESIRED ITEM WITH A HIGHER QUALITY THAN THAT OF THE ITEMS SPECIFIED OR PROPOSED, YOU ARE REQUESTED TO BRING THIS FACT TO THE IMMEDIATE ATTENTION OF THE PURCHASER."

(End of clause)

E.5 INSPECTION AND ACCEPTANCE (JSC 52.246-91) (JUN 1991)

Preliminary inspection for compliance with the contract specifications and requirements may be performed at origin by an authorized representative of the Government, and final inspection and acceptance will be performed at NASA Lyndon B. Johnson Space Center by the contracting officer or his/her authorized representative.

(End of Clause)

E.6 QUALITY ASSURANCE SURVEILLANCE PLAN (JSC 52.246-93) (JULY 1996)

A Quality Assurance Surveillance Plan will be developed and implemented by the Contracting Officer's Technical Representative as a part of the contract administration and monitoring activities conducted to assure that the Government receives products and services that conform to contract requirements. The nature and extent of quality assurance surveillance contemplated in this plan will be based, in part, on the specific content of the contractor's Quality Plan as required in DRD titled, "Quality Plan."

(End of Clause)
[END OF SECTION]

SECTION F – DELIVERIES OR PERFORMANCE

F.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: The following contract clauses pertinent to this section are hereby incorporated by reference:

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	DATE	TITLE
		CLAUSES APPLICABLE TO IDIQ/CPFF:
52.242-15	AUG 1989	STOP-WORK ORDER (ALTERNATE I) (APR 1984)
		CLAUSES APPLICABLE TO IDIQ/FFP:
52.242-15	AUG 1989	STOP-WORK ORDER
52.242-17	APR 1984	GOVERNMENT DELAY OF WORK
		CLAUSES APPLICABLE TO IDIQ/CPFF and FFP:
52.247-34	NOV 1991	F.O.B. DESTINATION

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18)

CLAUSE NUMBER	DATE	TITLE
None included by reference		

III. FULL TEXT CLAUSES

F.2 COMPLETION OF WORK (JSC 52.211-95) (OCT 2001)

All work required under this contract, including submission of all reports, shall be completed on or before 5 years after contract start or as specified on the delivery order.

(End of Clause)

F.3 PLACE OF PERFORMANCE

The effort required under this contract shall be performed at the contractor’s facilities, at or near the Lyndon B. Johnson Space Center (JSC) and at other locations as covered by the Statement of Work or delivery orders.

(End of Clause)

F.4 METHOD OF PLACING DELIVERY ORDERS (JSC 52.216-95) (SEP 1998)

Delivery Orders may be placed only by the contracting officer. Delivery Orders will be in writing on JSC Form 1429 or orally, followed by written confirmation. Delivery Orders will be numbered "1," second will be Number "2", and each succeeding Delivery Order will be numbered consecutively.

Each Delivery Order placed against this contract shall consist of the following information:

- (A) delivery order number and contract number;
- (B) place of delivery or performance (including consignee);
- (C) item/items ordered, including quantity, unit price, and amount of each;
- (D) date of order, and required delivery date;
- (E) name of person placing order;
- (F) funding and appropriation data;
- (G) Procurement placement code;
- (H) total amount; and
- (I) signature of the Contracting Officer.

Amendments to orders may be issued in the same manner as original orders. Each order or amended order shall contain a citation of funds from which payment for the supplies or services ordered shall be made.

(End of Clause)

F.5 ORDERING PROCEDURES

The following contracts have been awarded to perform requirements in support of CRAVE.

- TBD #, A-CRAVE Companies
- TBD #, B-CRAVE Companies

Companies awarded contracts under the A-CRAVE solicitation will compete with any contractors awarded contracts under the B-CRAVE solicitation for Delivery Order awards.

(a) Only the Contracting Officer may issue delivery orders and amendments to delivery orders to the contractor, providing specific authorization or direction to perform work within the scope of the contract and as specified in the schedule. The contractor may incur costs under this contract in performance of delivery orders and amendments to delivery orders issued in accordance with this clause and within the dollar amounts specified in B.6 Contract Funding. No other costs are authorized unless otherwise specified in the contract or expressly authorized by the Contracting Officer.

(b) Prior to issuing a delivery order, the Contracting Officer (or his/her designated representative) shall provide the contractors listed above with the following data:

(1) A functional description of the work identifying the objectives or results desired from the contemplated order, as applicable.

(2) Where applicable, proposed quality assurance and performance standards to be used as criteria for determining whether the delivery order requirements have been met (i.e., acceptance criteria, terms of quality, timeliness, quantity, etc.)

(3) A request for a task plan/proposal, broken out by task, from the contractor to include the Basis of Estimate (BOE), including technical approach, period of performance (including milestones and schedules), deliverables, appropriate cost information, and any other information required to determine the reasonableness of the contractor's proposal.

(4) List of any Government-Furnished items, services, facilities, etc., required to perform the delivery order.

(c) Within 14 calendar days after receipt of the Contracting Officer's (or his/her designated representative's) request, contractors shall submit a delivery order proposal conforming to the request. In special circumstances, the Contracting Officer may allow more than 14 calendar days, if deemed appropriate.

(d) After review of each contractor's proposal, and any necessary discussions, the Contracting Officer may issue a delivery order to the contractor considered to be the best value pursuant to the stated selection criteria for the Delivery Order. Past performance on previous CRAVE delivery orders will be taken into consideration during delivery order competitions

(e) In the event of a conflict between the requirements of the delivery order and the contractor's approved task plan, the delivery order shall prevail.

(f) All delivery orders are subject to the terms and conditions of this contract. In the event of conflict between a delivery order and this contract, the contract shall control.

(End of Clause)

(2) At least 15 days before shipment, the Contractor shall request in writing GBLs from: Transportation Management, Attn: Mail Code JB9, 2101 NASA Parkway, Houston, TX 77058. If time is limited, requests may be by telephone: 281-483-3208. Requests for GBLs shall include the

- (i) Item identification/ description.
- (ii) Origin and destination.
- (iii) Individual and total weights.
- (iv) Dimensional Weight.
- (v) Dimensions and total cubic footage.
- (vi) Total number of pieces.
- (vii) Total dollar value.
- (viii) Other pertinent data.

(End of Clause)

F.8 FLIGHT ITEM (JSC 52.247-95) (SEP 1989)

For delivery orders requiring the shipment of flight items -

Block 16 of each Department of Defense Form 250 prepared for hardware or equipment to be shipped under this contract must be annotated as follows in 1/4-inch letters or larger by hand printing or rubber stamp:

'THIS IS A FLIGHT ITEM: OR "THIS IS MISSION ESSENTIAL GROUND SUPPORT EQUIPMENT," as applicable.

**(End of Clause)
[END OF SECTION]**

SECTION G – CONTRACT ADMINISTRATION DATA

G.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: The following contract clauses pertinent to this section are hereby incorporated by reference:

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	DATE	TITLE
None included by reference		

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES

CLAUSE NUMBER	DATE	TITLE
1852.216-75	DEC 1988	APPLICABLE TO IDIQ/CPFF PAYMENT OF FIXED FEE
1852.223-71	DEC 1988	FREQUENCY AUTHORIZATION
1852.227-70	MAY 2002	NEW TECHNOLOGY
1852.227-86	DEC 1987	COMMERCIAL COMPUTER SOFTWARE LICENSING
1852.242-73	JULY 2000	APPLICABLE TO IDIQ/CPFF: NASA CONTRACTOR FINANCIAL MANAGEMENT REPORTING
1852.245-70	JUL 1997	CONTRACTOR REQUEST FOR GOVERNMENT-OWNED EQUIPMENT
1852.245-72	MAR 1989	LIABILITY FOR GOVERNMENT PROPERTY FURNISHED FOR REPAIR OR OTHER SERVICES

III. FULL TEXT CLAUSES**G.2 SECURITY/BADGING REQUIREMENTS FOR FOREIGN NATIONAL VISITORS AND EMPLOYEES/REPRESENTATIVES OF FOREIGN CONTRACTORS (JSC 52.204-91) (MAR 2002)**

(a) An employee of a domestic Johnson Space Center (JSC) contractor or its subcontractor who is not a U.S. citizen (foreign national) may not be admitted to the JSC site for purposes of performing work without special arrangements. In addition, all employees or representatives of a foreign JSC contractor/subcontractor may not be admitted to the JSC site without special arrangements. For employees as described above, advance notice must be given to the Security Office of the host installation [JSC or White Sands Test Facility (WSTF)] at least 3 weeks prior to the scheduled need for access to the site so that instructions on obtaining access may be provided.

(b) All visit/badge requests for persons described in (a) above must be entered in the NASA Request for Request (RFR) and Foreign National Management System (NFMNS) for acceptance, review, concurrence and approval purposes. When an authorized company official requests a JSC or WSTF badge for site access, he/she is certifying that steps have been taken to ensure that its contractor or subcontractor employees, visitors, or representatives will not be given access to export-controlled or classified information for which they are not authorized. These individuals shall serve as the contractor's representative(s) in certifying that all visit/badge request forms are processed in accordance with JSC and WSTF security and export control procedures. No foreign national, representative, or resident alien contractor/subcontractor employee shall be granted access into JSC or WSTF until a completed RFR has been approved and processed through the NFMNS. Unescorted access will not be granted unless a favorable National Agency Check (NAC) has been completed by the JSC Security Office.

(c) The contractor agrees that it will not employ for the performance of work onsite at the JSC or WSTF any individuals who are not legally authorized to work in the United States. If the JSC or WSTF Industrial Security Specialist or the Contracting Officer has reason to believe that any employee of the contractor may not be legally authorized to work in the United States and/or on the contract, the contractor may be required to furnish copies of Form I-9 (Employment Eligibility Verification), U.S. Department of Labor Application for Alien Employment Certification, and any other type of employment authorization document.

(d) The contractor agrees to provide the information requested by the JSC or WSTF Security Office in order to comply with NASA policy directives and guidelines related to foreign visits to NASA facilities so that (1) the visitor/employee/ representative may be allowed access to JSC or other NASA Centers for performance of this contract, (2) required investigations can be conducted, and (3) required annual or revalidation reports can be submitted to NASA Headquarters. All requested information must be submitted in a timely manner in accordance with instructions provided by JSC or any other Center to be visited.

(End of Clause)

G.3 USE OF JSC CALIBRATION LABORATORY (JSC 52.204-92) (OCT 1997)

The contractor shall utilize the services of the JSC Calibration Laboratory to the maximum extent practicable for calibration of all instruments (Government property or contractor property) utilized under this contract, the total cost for maintenance of which would otherwise be a direct charge to the Government. The procedures for obtaining calibration of instruments are described in JSC Procedures and Guidelines 5151.2 – "JSC Support Contractor Procedures and Guidelines."

(End of Clause)

G.4 SUBMISSION OF VOUCHERS FOR PAYMENT (NFS 1852.216-87) (MAR 1998)

(a) The designated billing office for cost vouchers for purposes of the Prompt Payment clause of this contract is indicated below. Public vouchers for payment of costs shall include a reference to the number of this contract.

(b) (1) If the contractor is authorized to submit interim cost vouchers directly to the NASA paying office, the original voucher should be submitted to:

NASA Shared Services Center (NSSC)
Financial Management Division (FMD)-Accounts Payable
Bldg 1111, C. Road
Stennis Space Center, MS 39529
Ph: 1-877-677-2123
Fax: 1-866-209-5415
Email: NSSC-AccountsPayable@nasa.gov

(2) For any period that the Defense Contract Audit Agency has authorized the Contractor to submit interim cost vouchers directly to the Government paying office, interim vouchers are not required to be sent to the Auditor, and are considered to be provisionally approved for payment, subject to final audit.

(3) Copies of vouchers should be submitted as directed by the Contracting Officer.

(c) If the contractor is not authorized to submit interim cost vouchers directly to the paying office as described in paragraph (b), the contractor shall prepare and submit vouchers as follows:

(1) One original Standard Form (SF) 1034, SF 1035, or equivalent Contractor's attachment to:

DCAA
Houston Branch Office
Attn: Mark Kramer
8876 Gulf Freeway, Suite 500
Houston, Texas 77017

(2) Five copies of SF 1034, SF 1035A, or equivalent Contractor's attachment to the following offices by insertion in the memorandum block of their names and addresses:

- (i) Copy 1 NASA Contracting Officer
- (ii) Copy 2 Auditor
- (iii) Copy 3 Contractor
- (iv) Copy 4 Contract administration office; and
- (v) Copy 5 Project management office.

(3) The Contracting Officer may designate other recipients as required.

(d) Public vouchers for payment of fee shall be prepared similarly to the procedures in paragraphs (b) or (c) of this clause, whichever is applicable, and be forwarded to:

NASA Lyndon B. Johnson Space Center
2101 NASA Parkway
Attn: BH2/Michael D. Ballard
Houston, TX 77058

This is the designated billing office for fee vouchers for purposes of the Prompt Payment clause of this contract.

(e) In the event that amounts are withheld from payment in accordance with provisions of this contract, a separate voucher for the amount withheld will be required before payment for that amount may be made.

(End of Clause)

G.5 JSC HAZARDOUS MATERIALS USE (JSC 52.223-92) (DEC 1999)

(a) This clause is JSC-unique, and the requirements are in addition to any U.S. Environmental Protection Agency, U.S. Occupational Safety and Health Administration, or other state or Federal regulation or statute. Therefore, the following requirements do NOT supercede any statutory or regulatory requirements for any entity subject to this clause.

(b) "Hazardous materials," for the purposes of this clause, consist of the following:

(1) Those materials defined as "highly hazardous chemicals" in Occupational Safety and Health Administration Process Safety Management Regulation, 29 Code of Federal Regulation 1010.119, without regard for quantity.

(2) Those "extremely hazardous substances" subject to the emergency planning requirements in the Environmental Protection Agency Emergency Planning and Community Right-to-Know Regulation, 40 Code of Federal Regulation 355, Part 355, without regard for quantity.

(3) Those "hazardous substances" subject to the release notification requirements under Environmental Protection Agency's Emergency Planning and Community Right-to-Know Regulation, 40 Code of Federal Regulation 302.4, without regard for quantity.

(4) Any radioisotope material or device that produces ionizing radiation.

(5) Any Class II, III, or IV laser as defined by the American National Standards Institute No. Z136.1(1986).

- (6) Any explosive or any pyrotechnics.
- (7) Any pesticide.
- (c) The contractor shall develop and maintain an inventory listing the identity and quantity of hazardous materials stored or used onsite at JSC for the performance of the contract.
- (d) The contractor shall ensure that the proper training of its employees in the use and inherent hazards of these materials is accomplished prior to use.
- (e) The contractor shall notify the JSC Occupational Health and Test Support Office (SD13) prior to any initial use or different application of these materials.
- (f) The contractor shall use all hazardous materials properly and take all necessary precautions to ensure no harm is done to humans or the environment.
- (g) The contractor shall insert the substance of this clause, including this Paragraph F with appropriate changes of designations of the parties, in subcontracts under which hazardous materials will be utilized, or may reasonably be expected to be utilized, onsite at JSC.
- (h) In the event the contractor fails or refuses to comply with any aspect of this clause, such failure or refusal may be considered a material breach of this contract.

(End of Clause)

G.6 DESIGNATION OF NEW TECHNOLOGY REPRESENTATIVE AND PATENT REPRESENTATIVE (NFS 1852.227-72) (JUL 1997)

(a) For purposes of administration of the clause of this contract entitled "New Technology" or "Patent Rights--Retention by the Contractor (Short Form)," whichever is included, the following named representatives are hereby designated by the Contracting Officer to administer such clause:

Office Title	Code	Address
New Technology Representative	HA	NASA, Lyndon B. Johnson Space Center Technology Utilization Officer Houston, TX 77058
Patent Representative	HA	NASA, Lyndon B. Johnson Space Center Patent Counsel Houston, TX 77058

(b) Reports of reportable items, and disclosure of subject inventions, interim reports, final reports, utilization reports, and other reports required by the clause, as well as any correspondence with respect to such matters, should be directed to the New Technology Representative unless transmitted in response to correspondence or request from the Patent Representative. Inquires or requests regarding disposition of rights, election of rights, or related matters should be directed to the Patent Representative. This clause shall be included in any subcontract hereunder requiring a "New Technology" clause or "Patent Rights--Retention by the Contractor (Short Form)" clause, unless otherwise authorized or directed by the Contracting Officer. The respective responsibilities and authorities of the above-named representatives are set forth in 1827.305-370 of the NASA FAR Supplement.

(End of Clause)

G.7 SUBMISSION OF INVOICES (JSC 52.232-90) (OCT 1993)

For fixed price type delivery orders, invoices shall be prepared and submitted in quadruplicate unless otherwise specified. Invoices shall contain the following information as applicable: contract and order number, item numbers, description of supplies or services, sizes, quantities, unit prices, and extended totals. Invoices shall be submitted to:

NASA Johnson Space Center
Attn: BH2/Michael D. Ballard
2101 NASA Parkway
Houston, TX 77058-3696

In the event that amounts are withheld from payment in accordance with the New Technology Clause or other provisions of this contract, a separate invoice for the amount withheld will be required before payment for that amount may be made.

(End of Clause)

G.8 ADDITIONAL REQUIREMENTS FOR SUBMISSION OF INVOICES

In addition to clause G.7, invoices for FFP IDIQ Delivery Orders will be submitted upon completion/acceptance of the FFP IDIQ Delivery Order or milestones as specified in the order.

(End of Clause)

G.9 TECHNICAL DIRECTION (NFS 1852.242-70) (SEP 1993) (APPLICABLE TO CPFF ONLY)

(a) Performance of the work under this contract is subject to the written technical direction of the Contracting Officer's Technical Representative (COTR), who shall be specifically appointed by the Contracting Officer in writing in accordance with NASA FAR Supplement 1842.270. "Technical direction" means a directive to the contractor that approves approaches, solutions, designs, or refinements; fills in details or otherwise completes the general description of work or documentation items; shifts emphasis among work areas or tasks; or furnishes similar instruction to the contractor. Technical direction includes requiring studies and pursuit of certain lines of inquiry regarding matters within the general tasks and requirements in Section C of this contract.

(b) The COTR does not have the authority to, and shall not, issue any instruction purporting to be technical direction that--

- (1) Constitutes an assignment of additional work outside the statement of work;
- (2) Constitutes a change as defined in the changes clause;
- (3) Constitutes a basis for any increase or decrease in the total estimated contract cost, the fixed fee (if any), or the time required for contract performance;

- (4) Changes any of the expressed terms, conditions, or specifications of the contract; or
- (5) Interferes with the contractor's rights to perform the terms and conditions of the contract.
- (c) All technical direction shall be issued in writing by the COTR.
- (d) The contractor shall proceed promptly with the performance of the technical direction duly issued by the COTR in the manner prescribed by this clause and within the COTR's authority. If, in the contractor's opinion, any instruction or direction by the COTR falls within any of the categories defined in paragraph (b) above, the contractor shall not proceed but shall notify the Contracting Officer in writing within 5 days after receiving it and shall request the Contracting Officer to either issue an appropriate contract modification within a reasonable time or advise the contractor in writing within 30 days that the instruction or direction is--
- (1) Rescinded in its entirety; or
- (2) Within the requirements of the contract and does not constitute a change under the Changes clause of the contract, and that the contractor should proceed promptly with its performance.
- (e) A failure of the contractor and Contracting Officer to agree that the instruction or direction is both within the requirements of the contract and does not constitute a change under the Changes clause, or a failure to agree upon the contract action to be taken with respect to the instruction or direction, shall be subject to the Disputes clause of this contract.
- (f) Any action(s) taken by the contractor in response to any direction given by any person other than the Contracting Officer or the COTR shall be at the contractor's risk.

(End of Clause)

G.10 IDENTIFICATION OF EMPLOYEES (JSC 52.242-92) (MAR 2002)

At all times while on Government property, the contractor, subcontractors, their employees, and agents shall wear badges which will be issued by the NASA Badging & Visitor Control Office, located in Building 110 at the Johnson Space Center (JSC), or at the Main Gate at the White Sands Test Facility (WSTF). JSC employee badges will be issued only between the hours of 7:30 a.m. to 4 p.m., Monday through Thursday, and 7:30 am to 12:00 pm on Friday. JSC visitor badges will be issued between the hours of 6 a.m. to 10 p.m., 7 days a week. WSTF employee badges will be issued only between the hours of 8 a.m. to 2 p.m., Monday through Friday. WSTF visitor badges will be issued on a 7-day-a-week, 24-hour-a-day basis. Resident aliens and foreign nationals/representatives shall be issued green foreign national badges.

Each individual who wears a badge shall be required to declare citizenship and personally sign for the badge. The contractor shall be held accountable for issued badges and all other related items and must assure that they are returned to the NASA Badging & Visitor Control Offices

upon completion of work under the contract in accordance with Security Management Directive (SMD) 500-15, "Security Termination Procedures." Failure to comply with the NASA contractor termination procedures upon completion of the work (e.g., return of badges, decals, keys, CAA cards, clearance terminations, JSC Public Key Infrastructure (PKI)/special program deletions, etc.) may result in final payment being delayed.

(End of Clause)

**G.11 INSTALLATION-ACCOUNTABLE GOVERNMENT PROPERTY
(NFS 1852.245-71) (JUNE 1998) AND ALTERNATE I (MAR 1989)
AS MODIFIED BY JSC VERSION (APR 2003)**

(a) The Government property described in the clause at G.12 (1852.245-77-List of Installation Accountable Property and Services) shall be made available to the contractor on a no-charge basis for use in performance of this contract. This property shall be utilized only within the physical confines of the NASA installation that provided the property. Under this clause, the Government retains accountability for, and title to, the property, and the contractor assumes the following user responsibilities:

The responsibilities of the contractor as contemplated by this clause are defined in the following property management directives and installation supplements to these directives.

- | |
|---|
| <ul style="list-style-type: none"> a. NPG 4200.1, NASA Equipment Management Manual b. NPG 4200.2, NASA Equipment Management Procedures and Guidelines for Property Custodians c. NPG 4300.1, NASA Personal Property Disposal Procedures and Guidelines d. NPG 4100.1, NASA Materials Inventory Management Manual. JSC will provide the contractor with all applicable regulations, handbooks, and other materials that may be required. |
|---|

(b) The Government property described in the clause at 1852.245-77, List of Installation-Accountable Property and Services, shall be made available to the Contractor on a no-charge basis for use in performance of this contract. This property shall be utilized only within the physical confines of the NASA installation that provided the property. Under this clause, the Government retains accountability for, and title to, the property, and the Contractor assumes the following user responsibilities:

User Responsibilities: Reference Document (NPG 4200.2) - Chapter 2:

2.7. Responsibility of the Individual. The contractor shall ensure that each of its employees are responsible for Government property as follows: An employee has a duty to protect and conserve Government property and shall not use such property, or allow its use, for other than authorized purposes. Additional responsibilities include the following:

2.7.1. Reporting any missing or un-tagged (meeting the criteria for control) equipment, transfer, location change, or user change of equipment to the property custodian immediately.

- 2.7.2. Notifying the property custodian, supervisor, and the Center security officer immediately if theft of Government property is suspected.
- 2.7.3. Ensuring that equipment is used only in pursuit of approved NASA programs and projects.
- 2.7.4. Notifying the property custodian of equipment not actively being used for determination of proper disposition.
- 2.7.5. Ensuring that equipment is returned through the property custodian when no longer needed. Under no circumstances will an employee throw away Government equipment.
- 2.7.6. Assigned users retain all responsibilities including notifying property custodians of all activity associated with the user's assigned equipment.
- 2.8. The contractor must ensure that all on-site contractor employees notify the contracting officer, property custodian, and SEMO upon termination of employment.

Chapter 4:

- 4.2.11. The user will assist the custodian in completing NF 1618 and sign in the designated block.

The contractor shall establish and adhere to a system of written procedures for compliance with these user responsibilities.

(c)(1) The official accountable record keeping, physical inventory, financial control, and reporting of the property subject to this clause shall be retained by the Government and accomplished by the installation Supply and Equipment Management Officer (SEMO) and Financial Management Officer. If this contract provides for the contractor to acquire property, title to which will vest in the Government, the following additional procedures apply:

- (i) The contractor's purchase order shall require the vendor to deliver the property to the installation central receiving area;
- (ii) The contractor shall furnish a copy of each purchase order, prior to delivery by the vendor, to the installation central receiving area;
- (iii) The contractor shall establish a record of the property as required by FAR 45.5 and 1845.5 and furnish to the Industrial Property Officer a DD Form 1149 Requisition and Invoice/Shipping Document (or installation equivalent) to transfer accountability to the Government within 5 working days after receipt of the property by the contractor. The contractor is accountable for all contractor-acquired property until the property is transferred to the Government's accountability.
- (iv) Contractor use of Government property at an off-site location and off-site subcontractor use require advance approval of the contracting officer and notification of the SEMO. The contractor shall assume accountability and financial reporting responsibility for such property. The contractor shall establish records and property control procedures and maintain the property in accordance with the requirements of FAR Part 45.5 until its return to the installation.

(2) After transfer of accountability to the Government, the contractor shall continue to maintain such internal records as are necessary to execute the user responsibilities identified in paragraph (a) and document the acquisition, billing, and disposition of the property. These

records and supporting documentation shall be made available, upon request, to the SEMO and any other authorized representatives of the contracting officer.

(3) The contractor shall not utilize the installation's central receiving facility for receipt of contractor-acquired property. However, the contractor shall provide listings suitable for establishing accountable records of all such property received, on a quarterly basis, to the Contracting Officer and Supply and Equipment Management Officer.

(End of Clause)

**G.12 LIST OF INSTALLATION-ACCOUNTABLE PROPERTY AND SERVICES
(NFS 1852.245-77) (JULY 1997) AS MODIFIED BY JSC VERSION (APR 2003)**

In accordance with the clause 1852.245-71, Installation - Accountable Government Property the Contractor is authorized use of the types of property and services listed below, to the extent they are available, in the performance of this contract within the physical borders of the installation which may include buildings and space owned or directly leased by NASA in close proximity to the installation, if so designated by the Contracting Officer.

(a) Office space, work area space, and utilities. Government telephones are available for official purposes only; pay telephones are available for contractor employees for unofficial calls.

(b) General - and special-purpose equipment, including office furniture.

(1) Equipment to be made available is listed in Attachment J-6 Table 1 List of Installation Accountable Property and Services. The Government retains accountability for this property under the clause at 1852.245-71, Installation-Accountable Government Property, regardless of its authorized location.

(2) If the contractor acquires property, title to which vests in the Government pursuant to other provisions of this contract, this property also shall become accountable to the Government upon its entry into Government records as required by the clause at 1852.245-71, Installation-Accountable Government Property.

(3) The Contractor shall not bring to the installation for use under this contract any property owned or leased by the Contractor, or other property that the Contractor is accountable for under any other Government contract, without the Contracting Officer's prior written approval.

(c) Publications and blank forms stocked by the installation.

(d) Safety and fire protection for Contractor personnel and facilities.

(e) Installation service facilities:

1. Audiovisual: Presentation services, sound services, Release Print Film Library, Film Repository, and loan of audiovisual equipment.

2. Automatic Data Processing (ADP) Services (onsite only): Generally, this includes access to large general-purpose computer systems, workstations, and the accessing media; i.e., terminals, printers, data communications, and consultation and training in the use of said systems. Unless otherwise specified in the contract, this does not include providing computer systems or ADP services for the Contractor business management, accounting, and administrative functions.

3. Transportation: Shuttle bus service for Contractor employees within the parameters provided for Government employees.

4. Disposal Services: Disposal services for excess onsite and offsite Contractor-held/Government-owned property.

5. Fabrication Services: Fabrication services such as machining, sheet metal and welding, electronics, metal finishing, model and plastics, and precision cleaning.

6. Photography, Processing, and Closed-Circuit Television: For technical and scientific photography, photographic processing, photographic sciences, and closed-circuit television.

7. Pickup and Delivery of Official Mail: Within the Center and to and from the Albert Thomas Post Office, provided the mail is properly sealed and stamped. Such mail will be picked up or dropped from only one point as designated by JSC or, if preferred, JSC will provide a box in the central mailroom for the Contractor to pick up and deposit its mail.

(f) Medical treatment of a first-aid nature for Contractor personnel injuries or illnesses sustained during on-site duty.

(g) Cafeteria privileges for Contractor employees during normal operating hours.

(h) Building maintenance for facilities occupied by Contractor personnel.

(i) Moving and hauling for office moves, movement of large equipment, and delivery of supplies. Moving services shall be provided on-site, as approved by the Contracting Officer.

(j) The user responsibilities of the Contractor are defined in paragraph (a) of the clause at 1852.245-71, Installation-Accountable Government Property.

(End of Clause)

G.13 FINANCIAL REPORTING OF NASA PROPERTY IN THE CUSTODY OF CONTRACTORS (NFS 1852.245-73) (OCT 2003)

(a) The Contractor shall submit annually a NASA Form (NF) 1018, NASA Property in the Custody of Contractors, in accordance with the provisions of 1845.505-14, the instructions on

the form, subpart 1845.71, and any supplemental instructions for the current reporting period issued by NASA.

(b) (1) Subcontractor use of NF 1018 is not required by this clause; however, the Contractor shall include data on property in the possession of subcontractors in the annual NF 1018.

(2) The Contractor shall mail the original signed NF 1018 directly to the cognizant NASA Center Deputy Chief Financial Officer, Finance, unless the Contractor uses the NF 1018 Electronic Submission System (NESS) for report preparation and submission.

(3) One copy shall be submitted (through the Department of Defense (DOD) Property Administrator if contract administration has been delegated to DOD) to the following address: LF631/Property Accounting and JB3/Property Administrator 2101 NASA Parkway Houston TX 77058, unless the Contractor uses the NF 1018 Electronic Submission System (NESS) for report preparation and submission.

(c) (1) The annual reporting period shall be from October 1 of each year through September 30 of the following year. The report shall be submitted in time to be received by October 15. The information contained in these reports is entered into the NASA accounting system to reflect current asset values for agency financial statement purposes. Therefore, it is essential that required reports be received no later than October 15. Some activity may be estimated for the month of September, if necessary, to ensure the NF 1018 is received when due. However, contractor procedures must document the process for developing these estimates based on planned activity such as planned purchases or NASA Form 533 (NF 533 Contractor Financial Management Report) cost estimates. It should be supported and documented by historical experience or other corroborating evidence, and be retained in accordance with FAR Subpart 4.7, Contractor Records Retention. Contractors shall validate the reasonableness of the estimates and associated methodology by comparing them to the actual activity once that data is available, and adjust them accordingly. In addition, differences between the estimated cost and actual cost must be adjusted during the next reporting period. Contractors shall have formal policies and procedures, which address the validation of NF 1018 data, including data from subcontractors, and the identification and timely reporting of errors. The objective of this validation is to ensure that information reported is accurate and in compliance with the NASA FAR Supplement. If errors are discovered on NF 1018 after submission, the contractor shall contact the cognizant NASA Center Industrial Property Officer (IPO) within 30 days after discovery of the error to discuss corrective action.

(2) The Contracting Officer may, in NASA's interest, withhold payment until a reserve not exceeding \$25,000 or 5 percent of the amount of the contract, whichever is less, has been set aside, if the Contractor fails to submit annual NF 1018 reports in accordance with 1845.505-14 and any supplemental instructions for the current reporting period issued by NASA. Such reserve shall be withheld until the Contracting Officer has determined that NASA has received the required reports. The withholding of any amount or the subsequent payment thereof shall not be construed as a waiver of any Government right.

(d) A final report shall be submitted within 30 days after disposition of all property subject to reporting when the contract performance period is complete in accordance with (b)(1) through (3) of this clause.

(End of Clause)

**G.14 LIST OF GOVERNMENT FURNISHED PROPERTY (NFS 1852.245-76)
(OCT 1988)**

For performance of work under this contract, the Government will make available Government property identified below or in Attachment J-6 Table 2 List of Government Furnished Property and Services. The Contractor shall use this property in the performance of this contract at: (to be included in Delivery Orders, if applicable). Under the FAR 52.245 Government property clause of this contract, the Contractor is accountable for the identified property included in List A, List of Property the Contractor Shall Replace and List B, List of Property the Government Will Replace, of Attachment J-6 Table 2 List of Government Furnished Property and Services.

(End of clause)

G.15 REPAIR OF GOVERNMENT PROPERTY (JSC 52.245-91) (JUNE 1986)

When removal of Government-owned property from its place of use for repair is necessary, the contractor must prepare a JSC Form 1318 prior to removing the equipment. The form and instructions regarding its use are available from the Property and Equipment Branch, Building 419, Room 162, phone number 281-483-6524. The repaired Government property is to be returned to the location from which it was removed unless otherwise directed by the Government.

(End of Clause)
[END OF SECTION]

SECTION H – SPECIAL CONTRACT REQUIREMENTS

H.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: The following contract clauses pertinent to this section are hereby incorporated by reference:

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	DATE	TITLE
None included by reference		

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES

CLAUSE NUMBER	DATE	TITLE
1852.208-81	OCT 2001	RESTRICTIONS ON PRINTING AND DUPLICATING
1852.223-72	APR 2002	SAFETY AND HEALTH (SHORT FORM)
1852.223-75	FEB 2002	MAJOR BREACH OF SAFETY OR SECURITY ALTERNATE I (MAY 2002)
1852.225-70	FEB 2000	EXPORT LICENSES AND ALTERNATE 1 (FEB 2000) AND PARA (B) [INSERT: "JOHNSON SPACE CENTER"]
1852.228-72	SEP 1993	CROSS-WAIVER OF LIABILITY FOR SPACE SHUTTLE ACTIVITIES
1852.228-76	DEC 1994	CROSS-WAIVER OF LIABILITY FOR SPACE STATION ACTIVITIES
1852.228-78	SEP 1993	CROSS WAIVER OF LIABILITY FOR NASA EXPENDABLE LAUNCH VEHICLE (EVL) LAUNCHES
1852.235-73	FEB 2003	FINAL SCIENTIFIC AND TECHNICAL REPORTS AND ALTERNATES 1 AND 2
1852.244-70	APR 1985	GEOGRAPHIC PARTICIPATION IN THE AEROSPACE PROGRAM
1852.246-70	MAR 1997	MISSION CRITICAL SPACE SYSTEMS PERSONNEL RELIABILITY PROGRAM

III. FULL TEXT CLAUSES

H.2 REPRESENTATIONS, CERTIFICATIONS, AND OTHER STATEMENTS OF OFFERORS (JSC 52.209-90) (SEP 1988)

This contract incorporates Section K, Representations, Certifications, and Other Statements of Offerors, as set forth in the contractor's proposal 2004-002 dated 7/15/2004 by reference, with the same force and effect as if it were given in full text.

(End of Clause)

**H.3 SMALL BUSINESS SUBCONTRACTING GOALS (JSC 52.219-90) (JAN 2003)
[NOT APPLICABLE TO SMALL BUSINESSES]**

For purposes of this clause, the terms, "HUB Zone Small Business Concern," "Small Disadvantaged Business Concern," "Service-Disabled, Veteran-Owned Small Business Concern," "Veteran-Owned Small Business Concern," "Women-Owned Small Business Concern," and "Historically Black College or University (HBCU)" are defined in paragraph 2.101 of the Federal Acquisition Regulation.

The total small business goal, expressed as a percent of total contract value, is TBD percent, including options. The small business percentage goal of **25%** includes the following goals expressed as a percent of total contract value:

Small Disadvantaged Business Concerns	13%
Woman-Owned Small Business Concerns	5%
HUB Zone Small Business Concerns	3%
Veteran-Owned Small Business Concern	3%
Service-Disabled, Veteran-Owned Small Business Concern	3%
HBCU's (includes other minority institutions)	1%

(End of Clause)

H.4 ADDITIONAL EXPORT CONTROL REQUIREMENTS

In addition to the requirements set forth in NFS 1852.225-70 Export Licenses, the Contractor shall perform the following tasks.

The following requirements shall be met by the Contractor and its Subcontractors, respectively, to use Department of Commerce or Department of State export licenses obtained by NASA and to use any NASA export license exceptions or exemptions as they apply to the Programs and Projects of NASA.

For exports (hardware, software, technical data) originating from Houston, Huntsville, AL or Cape Canaveral, FL, submit the equivalent information described below to the Center Export Administrator (CEA) at the geographically closest NASA Space Flight Center (Johnson Space

Center (JSC), Marshall Space Flight Center (MSFC) or Kennedy Space Center (KSC)) according to the policies and procedures of that center. A courtesy copy of equivalent information submitted to MSFC or KSC shall be provided to the JSC CEA's office. The contractor shall review documents for Export Control requirements and label with the definitive classification for the document. Provide copies of shipping documents for shipments made under a NASA Export License, exemption or exception to the appropriate CEA within two weeks after the shipment.

(a) A minimum of 15 working days prior to export, the Contractor or its subcontractors who are exporting on behalf of NASA must obtain approval from the Center Export Administrator's (CEA) office by following an Advance Notification of Shipment (ANS) process.

(b) Before effecting an export on behalf of NASA, the Contractor or its subcontractors shall determine the classification recommendation of the item(s) or document(s) and whether it needs a license. If required, the contractor or its subcontractors shall provide a more technical rationale supporting the classification, if requested by NASA

(c) Formal letter, fax or email is sufficient, addressed to the CEA's office, and must include the details listed below.

- NASA license number (include date of expiration) or license exception/exception.
- Quantity and description as it appears on the applicable license.
- Date of planned shipment (and expected date of return if not a permanent export).
- Origin of shipment (Company and city).
- Destination of shipment (Country, city and company).
- Point of contact (for technical questions – must be a representative of the originating shipper).
- Export Classification Control Number (ECCN) or category under Export Administration Regulations or United States Munitions List regulations.
- Rationale for classification.
- Requirement to export (i.e., MOU, contract number, meeting minutes). You may be asked to provide copy of the requirement.
- Additional information as necessary to clarify the export.

(d) A copy of the completed Pro Forma Invoice (JSC Form 1735) attached to an email is sufficient to meet this requirement as long as all required information above is also included.

(e) After all the information is submitted, the CEA's office will respond to Contractor or its subcontractor within ten working days. Once approved, NASA will provide the destination control statement to use on all export documentation.

Included in the applicable export exceptions, the Contractor or its subcontractors are authorized to export hardware, software or data to ISS International Partner (IP) governmental offices that meet the conditions of license exception GOV (15 CFR 740.11(b)(2)(iii)(A)).

For Verification of End Use, Contractor or its subcontractors shipping on behalf of NASA using a license or license exception or exemption, shall provide a copy of all shipping documentation within two business weeks of the shipment date to the CEA's office.

For temporary exports, Contractor or its subcontractors shipping on behalf of NASA, shall notify the CEA in writing within five business days of the date that the item was actually returned.

The Contractor or its subcontractors shall keep those records required by Department of Commerce and Department of State regulations for all exports and make them available upon request to NASA and its representatives.

These requirements, do not apply to Contractor or subcontractor commercial contract related exports or exports pursuant to Technical Assistance Agreements or other license authorizations received by the Contractor or its subcontractors and for which the Contractor or its subcontractors will be the exporter of record.

The Contractor and its subcontractors shall perform annual self-audits of their export control processes and provide written audit results to the CEA in accordance with the Data Requirements Description (DRD) titled, "Export Control Audit Results" included in this contract.

The Contractor and its subcontractors shall report to the NASA JSC EST, in writing, any potential export issues (including those related to support of sustaining engineering and operations of ISS, Space Shuttle, or other NASA Programs and Projects) that cannot be resolved by the Contractor or its subcontractors, respectively. Such reports and/or notifications of issues and technical tasks should be reported to the NASA JSC EST at least three months in advance of requested action.

Upon discovery of unforeseen adverse export issues, the Contractor shall immediately notify NASA JSC EST by telephone or email of said issue and shall report to the NASA JSC EST, in writing, as the facts become known.

When directed in writing by the Contracting Officer or designated representative, the Contractor, shall export on behalf of NASA, NASA specifically identified technical data, computer software, hardware, or defense services to a named foreign entity or person, in the manner and under the conditions provided for in the direction.

(End of Clause)

H.5 (LIMITED) RELEASE OF CONTRACTOR CONFIDENTIAL BUSINESS INFORMATION (CBI) (JSC 52.227-91) (MAY 2002)

(a) NASA may find it necessary to release information submitted by the Contractor pursuant to the provisions of this contract, to individuals not employed by NASA. Business information that would ordinarily be entitled to confidential treatment may be included in the information released to these individuals. Accordingly, by signature on this contract, the Contractor hereby consents to a limited release of its confidential business information (CBI).

(b) Possible circumstances where the Agency may release the Contractor's CBI include the following:

(1) To other Agency contractors and subcontractors, and their employees tasked with assisting the Agency in handling and processing information and documents in the administration of Agency contracts, such as providing post award audit support and specialized technical support to NASA;

(2) To NASA contractors and subcontractors, and their employees engaged in information systems analysis, development, operation, and maintenance, including performing data processing and management functions for the Agency.

(c) NASA recognizes its obligation to protect the contractor from competitive harm that could result from the release of such information to a competitor. Except where otherwise provided by law, NASA will permit the limited release of CBI under subparagraphs (1) or (2) only pursuant to non-disclosure agreements signed by the assisting contractor or subcontractor, and their individual employees who may require access to the CBI to perform the assisting contract.

(d) NASA's responsibilities under the Freedom of Information Act are not affected by this clause.

(e) The Contractor agrees to include this clause, including this paragraph (e), in all subcontracts at all levels awarded pursuant to this contract that require the furnishing of confidential business information by the subcontractor.

(End of Clause)

H.6 KEY PERSONNEL AND FACILITIES (NASA 1852.235-71) (MARCH 1989)

(a) The personnel and/or facilities listed below (or specified in the contract Schedule) are considered essential to the work being performed under this contract. Before removing, replacing, or diverting any of the listed or specified personnel or facilities, the contractor shall:

(1) notify the Contracting Officer reasonably in advance, and

(2) submit justification (including proposed substitutions) in sufficient detail to permit evaluation of the impact on this contract.

(b) The contractor shall make no diversion without the Contracting Officer's written consent; provided that the Contracting Officer may ratify in writing the proposed change, and that ratification shall constitute the Contracting Officer's consent required by this clause.

(c) The list of personnel and/or facilities (shown below or as specified in the contract Schedule) may, with the consent of the contracting parties, be amended from time to time during the course of the contract to add or delete personnel and/or facilities.

List here the personnel and/or facilities considered essential:

(End of Clause)

H.7 PROVIDING FACILITY ITEMS (JSC 52.245-97) (FEB 2003)

Include in a contract under which existing facilities will be provided to a contractor. The contracting officer must first document the file with a detailed explanation of the circumstances which make furnishing of facilities in the best interest of the Government (See: NASA Federal Acquisition Regulation (FAR) Supplement 1845.302-1.)

The purpose of this clause is to set forth the parties' intent regarding their respective responsibilities for providing facility items under this contract. The parties accordingly agree as follows:

- (a) "Provide," as used in this clause, has the same meaning as set forth in NASA FAR Supplement 1845.301. "Facilities," as used in this clause, has the same meaning as set forth in FAR 45.301.
- (b) The Government shall provide to the contractor the facilities identified in Attachment J-6, List A, List of Property the Contractor Shall Replace, for use in performance of this contract, only if in the best interest of the Government and if identified on the Delivery Order.
- (c) The contractor shall replace any of the existing facilities identified in (b) above that reach the end of their useful life during the contract period or which are beyond economical maintenance or repair, if the facilities are still needed for contract performance. Such replacements shall be made with contractor-owned facilities and shall not be a direct charge to the contract.

(d) The contractor shall not acquire facility items for the Government, unless specifically authorized by the contract or consent has been obtained in writing from the contracting officer pursuant to FAR 45.302-1(a). The contractor agrees to provide all facilities necessary for performance of this contract except as provided in (b) above.

(End of Clause)

H.8 SUBCONTRACTING WITH RUSSIAN ENTITIES FOR GOODS OR SERVICES

- (a) The Contractor shall not subcontract with
- (1) the Russian Aviation and Space Agency (Rosaviakosmos),
 - (2) any organization or entity under the jurisdiction or control of Rosaviakosmos, or
 - (3) any other organization, entity, or element of the Government of the Russian Federation.
- (b) "Organization or entity under the jurisdiction or control of Rosaviakosmos" means an organization or entity that
- (1) was made part of the Russian Space Agency upon its establishment on February 25, 1992;
 - (2) was transferred to the Russian Space Agency by decree of the Russian Government on July 25, 1994, or May 12, 1998;
 - (3) was or is transferred to the Russian Aviation and Space Agency or Russian Space Agency by decree of the Russian Government at any other time before, on, or after March 14, 2000; or
 - (4) is a joint stock company in which the Russian Aviation and Space Agency or Russian Space Agency has at any time held controlling interest.
- (c) The Contractor shall obtain the contracting officer's permission to subcontract with any Russian entity or with any other entity performing any part of the contract in the Russian Federation. The Contractor shall support such a request with facts (and, if requested, supporting documentation) sufficient to establish to the contracting officer's satisfaction that the entity with which the Contractor seeks permission to subcontract is not an entity described in paragraphs (a) and (b).
- (d) The contracting officer may direct the Contractor to provide the information required under paragraph (c) for any other prospective or existing subcontract at any tier. The contracting officer may direct the Contractor to terminate for the convenience of the government any subcontract at any tier with an entity described in paragraphs (a) and (b), subject to an equitable adjustment.
- (e) The Contractor shall include the substance of this clause in all its subcontracts, and shall require such inclusion in all other subcontracts of any tier.

(End of Clause)
[END OF SECTION]

PART II - CONTRACT CLAUSES

SECTION I - CONTRACT CLAUSES

I.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: The following contract clauses pertinent to this section are hereby incorporated by reference:

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	DATE	TITLE
52.202-1	JUL 2004	DEFINITIONS (ALTERNATE D) (MAY 2001)
52.203-3	APR 1984	GRATUITIES
52.203-5	APR 1984	COVENANT AGAINST CONTINGENT FEES
52.203-6	JUL 1995	RESTRICTIONS ON SUB-CONTRACTOR SALES TO THE GOVERNMENT
52.203-7	JUL 1995	ANTI-KICKBACK PROCEDURES
52.203-8	JAN 1997	CANCELLATION, RECISSION, AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY
52.203-10	JAN 1997	PRICE OF FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY
52.203-12	JUN 2003	LIMITATION OF PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS
52.204-2	AUG 1996	SECURITY REQUIREMENTS
52.204-4	AUG 2000	PRINTED OR COPIED DOUBLE-SIDED ON RECYCLED PAPER
52.204-7	OCT 2003	CENTRAL CONTRACTOR REGISTRATION
52.209-6	JUL 1995	PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT
52.211-5	AUG 2000	MATERIAL REQUIREMENTS
52.211-15	SEP 1990	DEFENSE PRIORITY AND ALLOCATION REQUIREMENTS

CLAUSE NUMBER	DATE	TITLE
52.215-2	JUN 1999	AUDIT AND RECORDS – NEGOTIATION
52.215-8	OCT 1997	ORDER OF PRECEDENCE – UNIFORM CONTRACT FORMAT
52.215-10	OCT 1997	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA
52.215-12	OCT 1997	SUBCONTRACTOR COST OR PRICING DATA
52.215-14	OCT 1997	INTEGRITY OF UNIT PRICES
52.215-15	DEC 1998	PENSION ADJUSTMENTS AND ASSET REVERSIONS
52.215-18	OCT 1997	REVERSION OF ADJUSTMENT OF PLANS FOR POSTRETIREMENT BENEFITS OTHER THAN PENSIONS
52.215-19	OCT 1997	NOTIFICATION OF OWNERSHIP CHANGES
52.215-21	OCT 1997	REQUIREMENTS FOR COST OR PRICING DATA OR INFORMATION OTHER THAN COST OR PRICING DATA
		APPLICABLE TO ONLY IDIQ/CPFF:
52.216-7	DEC 2002	ALLOWABLE COST AND PAYMENT
52.216-8	MAR 1997	FIXED FEE
52.216-18	OCT 1995	ORDERING
52.216-19	OCT 1995	ORDER LIMITATIONS [INSERT: “\$15,000; \$10,000,000; \$10,000,000; 30; AND 5”]
52.219-8	MAY 2004	UTILIZATION OF SMALL BUSINESS CONCERNS
52.219-9	JAN 2002	SMALL BUSINESS SUBCONTRACTING PLAN (ALTERNATE II) (OCT 2001) { NOT APPLICABLE TO SMALL BUSINESS }
52.219-16	JAN 1999	LIQUIDATED DAMAGES SUBCONTRACTING PLAN
52.219-23	JUN 2003	NOTICE OF PRICE EVALUATION ADJUSTMENT FOR SMALL DISADVANTAGED BUSINESS CONCERNS
52.219-25	OCT 1999	SMALL DISADVANTAGED BUSINESS PARTICIPATION PROGRAM DISADVANTAGED STATUS REPORTING
52.222-1	FEB 1997	NOTICE TO THE GOVERNMENT OF LABOR DISPUTES
52.222-2	JUL 1990	PAYMENT FOR OVERTIME PREMIUMS [PARAGRAPH A: INSERT: \$0]
52.222-3	JUN 2003	CONVICT LABOR
52.222-4	SEP 2000	CONTRACT WORK HOURS AND SAFETY STANDARDS ACT OVERTIME COMPENSATION

CLAUSE NUMBER	DATE	TITLE
52.222-19	JUN 2004	CHILD LABOR-COOPERATION WITH AUTHORITIES AND REMEDIES
52.222-20	DEC 1996	WALSH-HEALEY PUBLIC CONTRACTS ACT
52.222-21	FEB 1999	PROHIBITION OF SEGREGATED FACILITIES
52.222-26	FEB 2002	EQUAL OPPORTUNITY (ALTERNATE 1) (FEB 1999)
52.222-29	JUN 2003	NOTIFICATION OF VISA DENIAL
52.222-35	DEC 2001	EQUAL OPPORTUNITY FOR SPECIAL DISABLED VETERANS, VETERANS OF THE VIETNAM ERA, AND OTHER ELIGIBLE VETERANS
52.222-36	JUN 1998	AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES
52.222-37	DEC 2001	EMPLOYMENT REPORTS ON SPECIAL DISABLED VETERANS, VETERANS OF THE VIETNAM ERA, AND OTHER ELIGIBLE VETERANS
52.222-41	MAY 1989	SERVICE CONTRACT ACT OF 1965, AS AMENDED
52.223-5	AUG 2003	POLLUTION PREVENTION AND RIGHT TO KNOW
52.223-6	MAY 2001	DRUG FREE WORKPLACE
52.223-10	AUG 2002	WASTE REDUCTION PROGRAM
52.223-14	AUG 2003	TOXIC CHEMICAL RELEASE REPORTING
52.225-5	JUN 2004	TRADE AGREEMENTS
52.225-8	FEB 2000	DUTY FREE ENTRY
52.225-13	JUN 2003	RESTRICTIONS ON CERTAIN FOREIGN PURCHASES
52.227-1	JUL 1995	AUTHORIZATION AND CONSENT (ALTERNATE I)(APR 1984)
52.227-2	AUG 1996	NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT
52.227-11	JUN 1997	PATENT RIGHTS – RETENTION BY THE CONTRACTOR (SHORT FORM) AS MODIFIED BY NFS 1852.227-11{APPLICABLE TO SMALL BUSINESS ONLY}
52.227-14	JUN 1987	RIGHTS IN DATA-GENERAL AS MODIFIED BY NFS 1852.227-14 ALTERNATES II AND III (JUN 1987)
52.227-16	JUN 1987	ADDITIONAL DATA REQUIREMENTS
52.228-5	JAN 1997	INSURANCE – WORK ON A GOVERNMENT INSTALLATION
52.228-7	OCT 1988	INSURANCE – LIABILITY TO THIRD PERSONS
52.229-3	APR 2003	FEDERAL, STATE, AND LOCAL TAXES

CLAUSE NUMBER	DATE	TITLE
52.230-2	APR 1998	COST ACCOUNTING STANDARDS { NOT APPLICABLE TO SMALL BUSINESS }
52.230-6	NOV 1999	ADMINISTRATION OF COST ACCOUNTING STANDARDS
52.232-2	APR 1984	PAYMENTS UNDER FIXED-PRICE RESEARCH AND DEVELOPMENT CONTRACTS APPLICABLE TO ONLY IDIQ/FFP:
52.232-8	FEB 2002	DISCOUNTS FOR PROMPT PAYMENT
52.232-9	APR 1984	LIMITATION ON WITHHOLDING OF PAYMENTS APPLICABLE TO ONLY IDIQ/FFP:
52.232-11	APR 1984	EXTRAS
52.232-17	JUN 1996	INTEREST
52.232-18	APR 1984	AVAILABILITY OF FUNDS APPLICABLE TO ONLY IDIQ/CPFF:
52.232-22	APR 1984	LIMITATION OF FUNDS
52.232-23	JAN 1986	ASSIGNMENT OF CLAIMS
52.232-25	OCT 2003	PROMPT PAYMENT (ALTERNATE 1) (FEB 2002)
52.232-34	MAY 1999	PAYMENT BY ELECTRONIC FUNDS TRANSFER – OTHER THAN CENTRAL CONTRACTOR REGISTRATION
52.233-1	JUL 2002	DISPUTES (ALTERNATE I) (DEC 1991)
52.233-3	AUG 1996	PROTEST AFTER AWARD (ALTERNATE I) (JUN 1985)
52.237-2	APR 1984	PROTECTION OF GOVERNMENT BUILDINGS, EQUIPMENT AND VEGETATION
52.237-3	JAN 1991	CONTINUITY OF SERVICES [90 DAYS]
52.239-1	AUG 1996	PRIVACY OR SECURITY SAFEGUARDS APPLICABLE TO ONLY IDIQ/CPFF:
52.242-1	APR 1984	NOTICE OF INTENT TO DISALLOW COSTS
52.242-2	APR 1991	PRODUCTION PROGRESS REPORTS APPLICABLE TO ONLY IDIQ/CPFF:
52.242-3	MAY 2001	PENALTIES FOR UNALLOWABLE COSTS APPLICABLE TO ONLY IDIQ/CPFF:
52.242-4	JAN 1997	CERTIFICATION OF FINAL INDIRECT COSTS
52.242-13	JUL 1995	BANKRUPTCY
52.243-1	AUG 1987	CHANGES-FIXED-PRICE (ALTERNATE V) (APR 1984)

CLAUSE NUMBER	DATE	TITLE
52.243-2	AUG 1987	CHANGES – COST – REIMBURSEMENT (ALTERNATES II AND V) (APR 1984)
52.244-2	AUG 1998	SUBCONTRACTS (ALTERNATE I) (AUG 1998)
52.244-5	DEC 1996	COMPETITION IN SUBCONTRACTING
52.244-6	MAY 2004	SUBCONTRACTS FOR COMMERCIAL ITEMS
52.245-2	MAY 2004	GOVERNMENT PROPERTY (FIXED PRICE CONTRACTS) (ALTERNATE II) (APR 1984)
52.245-5	MAY 2004	GOVERNMENT PROPERTY (COST REIMBURSEMENT, TIME AND TIME AND MATERIAL OR LABOR HOUR CONTRACTS) (DEVIATION - AS MODIFIED BY NASA PIC 99-15)
52.245-17	MAY 2004	SPECIAL TOOLING { APPLICABLE ONLY TO FIXED PRICED DELIVERY ORDERS }
52.245-18	FEB 1993	REQUEST FOR SPECIAL TEST EQUIPMENT
52.246-24	FEB 1997	LIMITATION OF LIABILITY – HIGH VALUE ITEMS
52.246-25	FEB 1997	LIMITATION OF LIABILITY – SERVICES
52.247-1	APR 1984	COMMERCIAL BILL OF LADING NOTATIONS
52.247-63	JUN 2003	PREFERENCE FOR U.S. FLAG AIR CARRIER
52.247-64	APR 2003	PREFERENCE FOR PRIVATELY OWNED U.S. FLAG COMMERCIAL VESSELS
52.247-67	JUN 1997	SUBMISSION OF COMMERCIAL TRANSPORTATION BILL TO THE GENERAL SERVICES ADMINISTRATION FOR AUDITS
52.248-1	FEB 2000	VALUE ENGINEERING APPLICABLE TO ONLY IDIQ FFP:
52.249-2	MAY 2004	TERMINATION FOR THE CONVENIENCE OF THE GOVERNMENT (FIXED-PRICE
52.249-6	MAY 2004	TERMINATION (COST REIMBURSEMENT) APPLICABLE TO ONLY IDIQ FFP:
52.249-8	APR 1984	DEFAULT (FIXED PRICE SUPPLY AND SERVICE) APPLICABLE TO ONLY IDIQ/CPFF:
52.249-14	APR 1984	EXCUSABLE DELAYS
52.251-1	APR 1984	GOVERNMENT SUPPLY SOURCES
52.253-1	JAN 1991	COMPUTER GENERATED FORMS

A - Crew, Robotics, and Vehicle Equipment (CRAVE) - Unrestricted

I.4 AUTHORIZED DEVIATIONS IN CLAUSES (FAR 52.252-6) (APR 1984)

The use in this solicitation or contract of any Federal Acquisition Regulation (48 CFR Chapter 1) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the clause.

The use in this solicitation or contract of any NASA FAR Supplement Regulation (48 CFR 18) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

(End of Clause)

I.5 SECURITY CLASSIFICATION REQUIREMENTS (NFS 1852.204-75) (SEP 1989)

Performance under this contract will involve access to and/or generation of classified information, work in a security area, or both, up to the level of confidential. See Federal Acquisition Regulation clause 52.204-2 in this contract and DD Form 254, Contract Security Classification Specification.

(End of Clause)

1.6 SECURITY REQUIREMENTS FOR UNCLASSIFIED INFORMATION TECHNOLOGY RESOURCES (NFS 1852.204-76) (MAY 2007)

(a) The Contractor shall be responsible for information and information technology (IT) security when –

(1) The Contractor or its subcontractors must obtain physical or electronic (i.e., authentication level 2 and above as defined in National Institute of Standards and Technology (NIST) Special Publication (SP) 800-63, Electronic Authentication Guideline) access to NASA's computer systems, networks, or IT infrastructure; or

(2) Information categorized as low, moderate, or high by the Federal Information Processing Standards (FIPS) 199, Standards for Security Categorization of Federal Information and Information Systems is stored, generated, processed, or exchanged by NASA or on behalf of NASA by a contractor or subcontractor, regardless of whether the information resides on a NASA or a contractor/subcontractor's information system.

(b) IT Security Requirements.

(1) Within 30 days after contract award, a Contractor shall submit to the Contracting Officer for NASA approval an IT Security Plan, Risk Assessment, and FIPS 199, Standards for Security Categorization of Federal Information and Information Systems, Assessment. These plans and assessments, including annual updates shall be incorporated into the contract as compliance documents.

(i) The IT system security plan shall be prepared consistent, in form and content, with NIST SP 800-18, Guide for Developing Security Plans for Federal Information Systems, and any additions/augmentations described in NASA Procedural Requirements (NPR) 2810, Security of Information Technology. The security plan shall identify and document appropriate IT security

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controls consistent with the sensitivity of the information and the requirements of Federal Information Processing Standards (FIPS) 200, Recommended Security Controls for Federal Information Systems. The plan shall be reviewed and updated in accordance with NIST SP 800-26, Security Self-Assessment Guide for Information Technology Systems, and FIPS 200, on a yearly basis

(ii) The risk assessment shall be prepared consistent, in form and content, with NIST SP 800-30, Risk Management Guide for Information Technology Systems, and any additions/augmentations described in NPR 2810. The risk assessment shall be updated on a yearly basis.

(iii) The FIPS 199 assessment shall identify all information types as well as the "high water mark," as defined in FIPS 199, of the processed, stored, or transmitted information necessary to fulfill the contractual requirements.

(2) The Contractor shall produce contingency plans consistent, in form and content, with NIST SP 800-34, Contingency Planning Guide for Information Technology Systems, and any additions/augmentations described in NPR 2810. The Contractor shall perform yearly "Classroom Exercises." "Functional Exercises," shall be coordinated with the Center CIOs and be conducted once every three years, with the first conducted within the first two years of contract award. These exercises are defined and described in NIST SP 800-34.

(3) The Contractor shall ensure coordination of its incident response team with the NASA Incident Response Center (NASIRC) and the NASA Security Operations Center, ensuring that incidents are reported consistent with NIST SP 800-61, Computer Security Incident Reporting Guide, and the United States Computer Emergency Readiness Team's (US-CERT) Concept of Operations for reporting security incidents. Specifically, any confirmed incident of a system containing NASA data or controlling NASA assets shall be reported to NASIRC within one hour that results in unauthorized access, loss or modification of NASA data, or denial of service affecting the availability of NASA data.

(4) The Contractor shall ensure that its employees, in performance of the contract, receive annual IT security training in NASA IT Security policies, procedures, computer ethics, and best practices in accordance with NPR 2810 requirements. The Contractor may use web-based training available from NASA to meet this requirement.

(5) The Contractor shall provide NASA, including the NASA Office of Inspector General, access to the Contractor's and subcontractors' facilities, installations, operations, documentation, databases, and personnel used in performance of the contract. Access shall be provided to the extent required to carry out IT security inspection, investigation, and/or audits to safeguard against threats and hazards to the integrity, availability, and confidentiality of NASA information or to the function of computer systems operated on behalf of NASA, and to preserve evidence of computer crime. To facilitate mandatory reviews, the Contractor shall ensure appropriate compartmentalization of NASA information, stored and/or processed, either by information systems in direct support of the contract or that are incidental to the contract.

(6) The Contractor shall ensure that system administrators who perform tasks that have a material impact on IT security and operations demonstrate knowledge appropriate to those tasks. Knowledge is demonstrated through the NASA System Administrator Security Certification Program. A system administrator is one who provides IT services (including network services,

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file storage, and/or web services) to someone other than themselves and takes or assumes the responsibility for the security and administrative controls of that service. Within 30 days after contract award, the Contractor shall provide to the Contracting Officer a list of all system administrator positions and personnel filling those positions, along with a schedule that ensures certification of all personnel within 90 days after contract award. Additionally, the Contractor should report all personnel changes which impact system administrator positions within 5 days of the personnel change and ensure these individuals obtain System Administrator certification within 90 days after the change.

(7) The Contractor shall ensure that NASA's Sensitive But Unclassified (SBU) information as defined in NPR 1600.1, NASA Security Program Procedural Requirements, which includes privacy information, is encrypted in storage and transmission.

(8) When the Contractor is located at a NASA Center or installation or is using NASA IP address space, the Contractor shall --

(i) Submit requests for non-NASA provided external Internet connections to the Contracting Officer for approval by the Network Security Configuration Control Board (NSCCB);

(ii) Comply with the NASA CIO metrics including patch management, operating systems and application configuration guidelines, vulnerability scanning, incident reporting, system administrator certification, and security training; and

(iii) Utilize the NASA Public Key Infrastructure (PKI) for all encrypted communication or non-repudiation requirements within NASA when secure email capability is required.

(c) Physical and Logical Access Requirements.

(1) Contractor personnel requiring access to IT systems operated by the Contractor for NASA or interconnected to a NASA network shall be screened at an appropriate level in accordance with NPR 2810 and Chapter 4, NPR 1600.1, NASA Security Program Procedural Requirements. NASA shall provide screening, appropriate to the highest risk level, of the IT systems and information accessed, using, as a minimum, National Agency Check with Inquiries (NACI). The Contractor shall submit the required forms to the NASA Center Chief of Security (CCS) within fourteen (14) days after contract award or assignment of an individual to a position requiring screening. The forms may be obtained from the CCS. At the option of NASA, interim access may be granted pending completion of the required investigation and final access determination. For Contractors who will reside on a NASA Center or installation, the security screening required for all required access (e.g., installation, facility, IT, information, etc.) is consolidated to ensure only one investigation is conducted based on the highest risk level. Contractors not residing on a NASA installation will be screened based on their IT access risk level determination only. See NPR 1600.1, Chapter 4.

(2) Guidance for selecting the appropriate level of screening is based on the risk of adverse impact to NASA missions. NASA defines three levels of risk for which screening is required (IT-1 has the highest level of risk).

(i) IT-1 -- Individuals having privileged access or limited privileged access to systems whose misuse can cause very serious adverse impact to NASA missions. These systems include, for example, those that can transmit commands directly modifying the behavior of spacecraft, satellites or aircraft.

A - Crew, Robotics, and Vehicle Equipment (CRAVE) - Unrestricted

(ii) IT-2 -- Individuals having privileged access or limited privileged access to systems whose misuse can cause serious adverse impact to NASA missions. These systems include, for example, those that can transmit commands directly modifying the behavior of payloads on spacecraft, satellites or aircraft; and those that contain the primary copy of "level 1" information whose cost to replace exceeds one million dollars.

(iii) IT-3 -- Individuals having privileged access or limited privileged access to systems whose misuse can cause significant adverse impact to NASA missions. These systems include, for example, those that interconnect with a NASA network in a way that exceeds access by the general public, such as bypassing firewalls; and systems operated by the Contractor for NASA whose function or information has substantial cost to replace, even if these systems are not interconnected with a NASA network.

(3) Screening for individuals shall employ forms appropriate for the level of risk as established in Chapter 4, NPR 1600.1.

(4) The Contractor may conduct its own screening of individuals requiring privileged access or limited privileged access provided the Contractor can demonstrate to the Contracting Officer that the procedures used by the Contractor are equivalent to NASA's personnel screening procedures for the risk level assigned for the IT position.

(5) Subject to approval of the Contracting Officer, the Contractor may forgo screening of Contractor personnel for those individuals who have proof of a --

(i) Current or recent national security clearances (within last three years);

(ii) Screening conducted by NASA within the last three years that meets or exceeds the screening requirements of the IT position; or

(iii) Screening conducted by the Contractor, within the last three years, that is equivalent to the NASA personnel screening procedures as approved by the Contracting Officer and concurred on by the CCS.

(d) The Contracting Officer may waive the requirements of paragraphs (b) and (c)(1) through (c)(3) upon request of the Contractor. The Contractor shall provide all relevant information requested by the Contracting Officer to support the waiver request.

(e) The Contractor shall contact the Contracting Officer for any documents, information, or forms necessary to comply with the requirements of this clause.

(f) At the completion of the contract, the contractor shall return all NASA information and IT resources provided to the contractor during the performance of the contract and certify that all NASA information has been purged from contractor-owned systems used in the performance of the contract.

(g) The Contractor shall insert this clause, including this paragraph (g), in all subcontracts

(1) Have physical or electronic access to NASA's computer systems, networks, or IT infrastructure; or

(2) Use information systems to generate, store, process, or exchange data with NASA or on behalf of NASA, regardless of whether the data resides on a NASA or a contractor's information system.

(End of Clause)

**I.7 STATEMENT OF EQUIVALENT RATES FOR FEDERAL HIRES
(FAR 52.222-42) (MAY 1989)**

In compliance with the Service Contract Act of 1965, as amended, and the regulations of the Secretary of Labor (29 CFR part 4), this clause identifies the classes of service employees expected to be employed under the contract and states the wages and fringe benefits payable to each if they were employed by the contracting agency subject to the provisions of 5 U.S.C. 5341 or 5332. This Statement is for Information Only. It is not a Wage Determination.

STANDARD FORM 98a February 1973 U.S. DEPARTMENT OF LABOR Employment Standards Administration	NOTICE OF INTENTION TO MAKE A SERVICE CONTRACT AND RESPONSE TO NOTICE (Attachment A)	11. Notice No. NASA 15026 MOU
12. CLASSES OF SERVICE EMPLOYEES TO BE EMPLOYED ON CONTRACT	13. NUMBER OF EMPLOYEES IN EACH CLASS	14. HOURLY WAGE RATE THAT WOULD BE PAID IF FEDERALLY EMPLOYED
Drafter, I	1	GS-3 \$11.31
Drafter, II	1	GS-4 \$12.70
Drafter, III	1	GS-5 \$14.21
Drafter, IV	1	GS-7 \$17.60
Machine-Tool Operator	1	WG-9 \$20.18
Engineering Technician, I	1	GS-3 \$11.31
Engineering Technician, II	1	GS-4 \$12.70
Engineering Technician, III	1	GS-5 \$14.21
Engineering Technician, IV	1	GS-7 \$17.60
Engineering Technician, V	1	GS-9 \$21.52
Engineering Technician, VI	1	GS-11 \$26.04
Tool and Die Maker	1	WG-13 \$24.02
Sewing Machine Operator	1	WG-6 \$16.40
Fabric Worker	1	WG-7 \$17.74
Welder	1	WG-10 \$21.21
Sheet-Metal Worker	1	WG-10 \$21.21
General Clerk, I	1	GS-1 \$9.22
General Clerk, II	1	GS-2 \$10.37
General Clerk, III	1	GS-3 \$11.31
General Clerk, IV	1	GS-4 \$12.70

(End of Clause)

I.8 OMBUDSMAN (NFS 1852.215-84) AND (ALTERNATE I) (JUN 2000)

(a) An ombudsman has been appointed to hear and facilitate the resolution of concerns from offerors, potential offerors, and contractors during the preaward and postaward phases of this acquisition. When requested, the ombudsman will maintain strict confidentiality as to the source of the concern. The existence of the ombudsman is not to diminish the authority of the contracting officer, the Source Evaluation Board, or the selection official. Further, the ombudsman does not participate in the evaluation of proposals, the source selection process, or the adjudication of formal contract disputes. Therefore, before consulting with an ombudsman, interested parties must first address their concerns, issues, disagreements, and/or recommendations to the Contracting Officer for resolution.

(b) If resolution cannot be made by the Contracting Officer, interested parties may contact the installation ombudsman,

Randy K. Gish
2101 NASA Parkway
Houston, TX 77058
Phone: 281-483-0490
FAX: 281-483-2200
randy.k.gish@nasa.gov

Concerns, issues, disagreements, and recommendations, which cannot be resolved at the installation may be referred to the NASA ombudsman, James A. Balinkas, the Director of the Contract Management Division, at 202-385-0445, facsimile 202-358-3083, e-mail james.a.balinkas@nasa.gov. Please do not contact the ombudsman to request copies of the solicitation, verify offer due date, or clarify technical requirements. Such inquiries shall be directed to the Contracting Officer or as specified elsewhere in this document.

(c) If this is a task or delivery order contract, the ombudsman shall review complaints from contractors and ensure they are afforded a fair opportunity to be considered, consistent with the procedures of the contract.

(End of Clause)

I.9 INFORMATION INCIDENTAL TO CONTRACT ADMINISTRATION

(a) With the exception of financial information, the Government shall have unlimited rights to use and distribute to third parties any administrative or management information developed by the contractor or a subcontractor at any tier in whole or in part for the performance of the contract or first produced in the performance of the contract, whether or not said information is specified as a contract deliverable, if created in whole or in part at Government expense. The Contracting Officer may, at any time during the contract performance or within a period 3 years after acceptance of all items to be delivered under this contract, order any administrative or management information developed by the contractor

or a subcontractor at any tier in whole or in part for the performance of the contract or first produced in the performance of the contract.

(b) The Contracting Officer may release the contractor from the requirements of this clause for specifically identified information at any time during the 3-year period set forth in paragraph A of this clause.

(End of Clause)

I.10 TECHNICAL INFORMATION RELEASES AND PUBLICATIONS

As authorized by paragraph (d)(1) of the Rights in Data-General Clause (FAR 52.227-14) of this contract, the following exception shall apply:

During the performance of this contract, if data relating to this contract is planned for use in oral or written presentations, professional meetings, seminars, or in articles to be published in professional, scientific, and technical journals and similar media, the contractor shall assure that an advance information copy of the presentation or article is sent to the COTR to have the benefit of advance information concerning accomplishments of interest to provide an opportunity to make suggestions to the contractor concerning revisions, if it is considered that such comments might be useful to the contractor to help assure the technical accuracy of the information to be presented or published. The information copy will be forwarded to the COTR of the contract at least four weeks in advance of the date the author intends to give the presentation or submit the article for publication.

The advance information copy may be submitted in the format or medium, which will be utilized in its ultimate release.

(End of Clause)

I.11 DATA RIGHTS NOTICE

(a) Any proposal submitted during the course of contract performance must expressly identify any computer software or technical data that is to be provided with less than unlimited data rights. The contractor shall notify the Contracting Officer in writing prior to incorporating any item, component, subcomponent, process, or software, wherein the related technical data or computer software qualifies as limited rights data or restricted computer software in accordance with Alternate II and III of FAR 52.227-14 and NFS 1852.227-86. This notification does not apply to commercial off-the-shelf (shrink-wrapped) computer software, and corresponding documentation, that has a standard commercial license unless the software is to be incorporated as a subcomponent in a developmental effort.

(b) Technical data and computer software delivered shall not be marked with restrictive legends unless the Contracting Officer has given prior written consent.

(c) All license agreements shall be compliant with Federal laws, regulations and the terms and conditions of this contract and shall be transferable to the government upon completion of the contract without additional cost to the Government. One copy of the final negotiated license agreement shall be forwarded to the Contracting Officer within 30 days of agreement to ensure compliance.

(End of Clause)

I.12 SPECIAL PROVISION FOR CONTINGENT REPROCUREMENT RIGHTS

(a) Because of the long life of the Space Shuttle and Space Station Programs, and in order to preclude problems in the event the contractor at some point becomes no longer able or willing to supply the hardware required to be delivered under this contract, the contractor shall deliver to the Government a complete data package sufficient in technical detail to enable a responsible third party to manufacture the hardware. This data shall be delivered as part of the Critical Design Review Package, as specified in DRD titled, "Critical Design Review Data Package."

(b) To the extent that any such data qualifying as proprietary (limited rights data and/or restricted computer software), and contingent upon 1) the Government's exercise of one, or both, hardware production options, and 2) the contractor's inability or unwillingness to supply the Government's additional requirements for the hardware at any time in the future, the Government shall then have the additional right to use such data for purposes of manufacture (or rehabilitation, repair, etc.) and to release it to a third party for such purposes.

(c) Until such time as the events described in paragraph (b) occur, any data which should be included in the CDR package but which is proprietary, shall be included in a supplemental package to be retained by the contractor's facility in order for the Government to review the data and ensure that it is complete and sufficient in technical detail. In addition, periodic reviews may be requested by the Government at the contractor's facility. The contractor will automatically notify the Government when any changes are made to procedures, processes, materials, etc., which affect the proprietary data contained in the supplemental package in order that any necessary reviews may be conducted. The Government shall not have the right to remove or obtain such copies in the course of conducting such reviews. Only Government personnel will be permitted to review the supplemental package.

(d) If the events in paragraph (b) occur, in accordance with paragraph (g)(2) (vi) of the clause at 52.227-14, Rights in Data—General (JUN 1987) and its Alternates and as modified by 18-52.227-14 NASA FAR Supplement, the Government will notify the contractor in writing of its intent to exercise its contingent reprocurement rights, if the Government reasonably determines that the Contractor is no longer capable of supplying, or no longer willing to supply the Government's additional requirements for hardware, parts, maintenance, rehabilitation, or the like.

(e) The Contractor shall incorporate, and require its subcontractors at all tiers to incorporate, this clause in all subcontracts. It is the contractor's responsibility to ensure that this clause is enforceable at all subcontract levels.

(End of Clause)

I.13 LIMITED RIGHTS DATA NOTICE

(a) Notwithstanding any other terms and conditions of this contract, the Government shall have the right to disclose technical data marked as limited rights data outside of the Government, without obtaining permission from the contractor, under the following circumstances:

(1) Use (except for manufacture) by support service contractors.

(2) Evaluation by non-government evaluators.

(3) Use (except for manufacture) by other contractors participating in the Government's program of which the specific contract is a part, for information and use in connection with the work performed under each contract.

(4) Emergency repair or overhaul work.

(5) Release to a foreign government, or instrumentality thereof, as the interests of the United States Government may require, for information or evaluation, or emergency repair or overhaul work by such government.

(b) Prior to disclosure, except in emergency circumstances as identified in paragraphs 4 and 5 above, the Government shall require the recipient to sign an agreement, provided by and acceptable to the contractor, to protect the data from unauthorized use and disclosure. The contractor shall provide a copy of the acceptable nondisclosure agreement to the Contracting Officer no later than 30 days after contract award.

(End of Clause)

I.14 INDEFINITE QUANTITY (52.216-22) (OCT 1995)

(a) This is an indefinite-quantity contract for the supplies and services specified, and effective for the period stated in the contract. The quantities of supplies and services specified in the contract are estimates only and are not purchased by this contract.

(b) Delivery or performance shall be made only as authorized by orders issued in accordance with the Ordering clause. The Contractor shall furnish to the Government, when and if ordered, the supplies or services specified in the contract up to and including the maximum designated in the contract.

(c) Except for any limitations on quantities in the Order of Limitation clause, there is no limit on the number of orders requiring delivery to multiple destinations or performance at multiple locations.

(d) An order issued during the effective period of this contract and not completed within that period shall be completed by the Contractor within the time specified in the order. The contract

shall govern the Contractor's and Government's rights and obligations with respect to that order to the same extent as if the order were completed during the Contract's effective period; provided, that the Contractor shall not be required to make any deliveries under this contract after 12 months from the completion date of the contract.

(End of Clause)

I.15 SUBCONTRACTS FOR COMMERCIAL ITEMS (52.244-6) (APR 2003)

(a) *Definitions.* As used in this clause-

"Commercial item" has the meaning contained in the clause at 52.202-1, Definitions.

"Subcontract" includes a transfer of commercial items between divisions, subsidiaries, or affiliates of the Contractor or subcontractor at any tier.

(b) To the maximum extent practicable, the Contractor shall incorporate, and require its subcontractors at all tiers to incorporate, commercial items or nondevelopmental items as components of items to be supplied under this contract.

(c)(1) The Contractor shall insert the following clauses in subcontracts for commercial items:

(i) 52.219-8, Utilization of Small Business Concerns (Oct 2000) (15 U.S.C. 637(d)(2) and (3)), in all subcontracts that offer further subcontracting opportunities. If the subcontract (except subcontracts to small business concerns) exceeds \$500,000 (\$1,000,000 for construction of any public facility), the subcontractor must include 52.219-8 in lower tier subcontracts that offer subcontracting opportunities.

(ii) 52.222-26, Equal Opportunity (Apr 2002) (E.O. 11246).

(iii) 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (Dec 2001) (38 U.S.C. 4212(a));

(iv) 52.222-36, Affirmative Action for Workers with Disabilities (June 1998) (29 U.S.C. 793).

(v) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (Apr 2003) (46 U.S.C. Appx 1241 and 10 U.S.C. 2631) (flow down required in accordance with paragraph (d) of FAR clause 52.247-64).

(2) While not required, the Contractor may flow down to subcontracts for commercial items a minimal number of additional clauses necessary to satisfy its contractual obligations.

(d) The Contractor shall include the terms of this clause, including this paragraph (d), in subcontracts awarded under this contract.

(End of Clause)

[END OF SECTION]

SECTION J – LIST OF ATTACHMENTS

- J-1 Data Requirements List & Data Requirement Descriptions**
- J-2 Acronym List**
- J-3 DOL Wage Determination**
- J-4 IT Security Plan (after issuance of first DO)**
- J-5 Small Business Plan**
- J-6 Table 1 - List of Installation-Accountable Property and Services**
Table 2 – Government Furnished Property/Facilities
- J-7 Government Property Plan**
- J-8 Flight GFE Configuration Management Plan**
- J-9 Reliability and Maintainability Plan**
- J-10 System Safety Plan**
- J-11 Quality Plan**
- J-12 Applicable Documents**
- J-13 Total Compensation Plan**

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

Attachment J-1

**Data Requirements List
&
Data Requirements Descriptions**

DATA REQUIREMENTS LIST (DRL) AND DATA REQUIREMENTS DESCRIPTIONS

The following pages set out the documentation requirements of this contract, starting with a DRL, which is an index to the DRDs. Each DRD prescribes the required data product content, schedule, type, and other particulars for specific data submission requirements.

Subject to the Clause 52.227-14, Rights in Data - General, this document sets forth the data requirements in each Data Requirements Description (DRD) and shall govern that data required for this contract. The contractor shall furnish data defined by the DRD's listed on the Data Requirements List (DRL) by category of data. Such data shall be prepared, maintained, and delivered to NASA in accordance with the requirements set forth within this document. In cases where data requirements are covered by a Federal Acquisition Regulation (FAR) or NASA FAR Supplement (NFS) regulation or clause, the regulation will take precedence over this document, per FAR 52.215.33. NASA-Owned/Contractor-Held records shall be managed by the Contractor in accordance with Title 36 of the code of Federal Regulations, Chapter XII B, Records Management, and NMI 1440.6, NASA Records Management Program. The records shall be organized in accordance with the instructions in NHB 1442.1, NASA Uniform Files index, as applicable. The contractor shall disposition records and non-records in accordance with NHB 1441.1, NASA Retention Schedules, which has been approved by NASA and the National Archives and Records Administration (NARA). All questions on records management issues shall be directed through the Contracting Officer to the JSC Records Management Officer.

Documents included as applicable documents in the data requirements form a part of this document to the extent specified herein. References to documents other than applicable documents in the data requirements of this document may sometimes be utilized. These do not constitute a contractual obligation on the contractor. They are to be used only as a possible example or to provide related information to assist the contractor in developing a response to that particular data requirement.

DESCRIPTION

This document identifies and defines the requirements and data types for information and data required under this contract.

The Data Requirement Descriptions (DRD)s, along with the Data Requirements List (DRL), define, by an individual Data Requirement, the information and data required for each deliverable document.

The data types are used to identify the approval and control required for each DRD. The Data Requirements List (DRL) is an index of all the DRDs by category and includes additional requirements for each DRD and the data types, as described below.

Documentation submitted pursuant to this clause may incorporate references to other current approved documentation, provided the references are adequate and include such identification elements as title, document number, and approval date (where applicable). However, if the pertinent information is of relatively minor size, the contractor shall incorporate the information itself, in lieu of using a reference. The contractor shall assure that any referenced information is readily available to appropriate users of the submitted document.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

DATA TYPES

For the purpose of this clause, the following information/documentation types are applicable:

Type 1 (written approval)- That information and documentation which requires NASA approval prior to release. Approved type 1 information and documentation shall be controlled, and deviations from or changes to the concepts, techniques, and/or requirements stated therein shall require NASA approval prior to implementation. All work under this contract covered by approved type 1 documents shall be performed in accordance with those approved documents. The Contracting Officers Technical Representative will have approval authority and will sign the data prior to its release. Contractually binding documents will not be implemented nor revised without contractual authorization.

Type 2 (mandatory submittal)- That information and documentation for which NASA reserves a time-limited right to disapprove, in whole or in part. Type 2 data shall be submitted to JSC for review not less than 30 calendar days prior to its release for use or implementation. The contractor shall clearly identify the release target date in the "submitted for review" transmittal. If the contractor has not received any comment prior to the released target date, the document may be released for appropriate use. Any NASA comment received shall be appropriately dispositioned before the document is to be used. Type 2 data may be approved by NASA prior to its submittal.

Type 3 (submittal upon request)- That information and documentation which is provided to NASA for surveillance, information, review, and/or management control. This information does not require formal NASA review and approval. Information in this category would include design solutions, status, and cost/schedule reporting; analyses and test results, handbooks; and other designated lists, reports, etc.

Type 1 submissions shall be marked "TYPE 1 PRELIMINARY pending NASA approval or Type I APPROVED BY NASA, as appropriate." Additional special designations and deviations may be required on specific submissions in accordance with configuration management requirements.

Type 2 submissions shall be marked "TYPE 2 PRELIMINARY --RELEASE TARGET DATE, xx/xx/xx" or "TYPE 2 FINAL - NASA COMMENTS INCLUDED" or "TYPE 2 FINAL DOCUMENT," where NASA comments were not received.

NOTE: Documents submitted under this clause, even though directly (Type 1) or implicitly (Type 2) approved by NASA, shall not take precedence over the specifications as set out in Section C, Statement of Work.

The contractor shall normally deliver a complete revised Type 1 or Type 2 data requirement with NASA comments incorporated within 45 days of receipt of comments.

Type 3 submissions shall be marked "TYPE 3 DOCUMENT - FOR INFORMATION, SURVEILLANCE, REVIEW OR MANAGEMENT CONTROL".

NUMBER OF COPIES AND DISTRIBUTION REQUIREMENTS

The contractor shall provide one copy of each DRD to the standard distribution list shown in Block 8 of the DRLs. Additional distribution shall be made as directed, in writing, by the Contracting Officer. The number of copies required will not exceed the limits set forth in Clause 1852.208-81, Restrictions on Printing and Duplicating, without prior Contracting Officer approval. Data Transmittal Forms will be used to confirm delivery of electronically resident DR deliverables.

ELECTRONIC FORMAT

All the data requirements shall be delivered in the format as depicted in each DRD and compatible with JSC software loads. All documentation shall be maintained within the Engineering Directorate's Design Data Management System (DDMS).

DRDs shall be maintained electronically.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

FURTHER EXPLANATION OF DRL

Block 3 – Frequency of submittal:

<u>Code Description</u>	<u>Code Description</u>	<u>Code Description</u>
AD As Directed	DA Daily	RD As Released
AN Annually	DD Deferred Delivery	RT One Time Revisions
AR As Required	MO Monthly	SA Semi Annually
BE Biannually	OT One Time	TY Three Per Year
BM Bimonthly	PV Per Vehicle	UR Upon Request
BW Biweekly	QU Quarterly	WK Weekly

Block 4 – As of Date- If reports are of a recurring nature an as of date will be included in this block.

Block 6 – Copies –

<u>Code Description</u>
E Electronic
CD Compact Disk
HC Hard Copy

Special note regarding document titles:

Any reference to “NPG” is synonymous with “NPR”.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

a. Title of Contract, Project, SOW, etc.				b. Contract/RFP No.		c. DRL Date/Mod Date	
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE)				NNJ04HH99B			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
1	Flight GFE Configuration Management Plan	OT		See 9		CD	3
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager NT3/Government Furnished Equipment Branch Contracting Officer's Technical Representative		1 electronic copy on CD 1 electronic copy on CD 1 electronic copy on CD		Block 5: To be delivered with the proposal Block 6: 3 electronic copies stored on CD are permanent record			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
2	Delivery Order Status Report/Summary Review	MO		1 st period after start		E	3
7. Data Type: <input type="checkbox"/> (1) Written approval <input checked="" type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative NT3 Government Furnished Equipment Branch COTR Contracting Officer		1 electronic copy by e-mail 1 electronic copy by e-mail 1 electronic copy by e-mail 1 hard copy and 1 electronic copy by e-mail 1 hard copy and 1 electronic copy by e-mail					
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
3	Project Technical Requirements Specification	RT		See 9		E/CD	2/2
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative NT3/ Government Furnished Equip. Branch		1 electronic copy by e-mail 1 electronic copy on CD and 1 web based compatible electronic CD 1 electronic copy by e-mail		Block 5: As included in the DO scope, consistent with EA-WI-023 processes Block 6: Permanent electronic copy stored on CD is formal record			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
4	GFE Systems Requirements Data Package	RT		See 9		CD	3
7. Data Type: <input type="checkbox"/> (1) Written approval <input checked="" type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative Flight Hardware QE		1 electronic copy on CD 1 web based compatible electronic CD 1 electronic copy on CD		Block 5: As included in the DO scope, consistent with EA-WI-023 processes			

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

a. Title of Contract, Project, SOW, etc.				b. Contract/RFP No.		c. DRL Date/Mod Date	
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE)				NNJ04HH99B			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
5	Flight GFE Projects Requirements & Verification Document	RT		See 9		CD	4
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution <i>(Continue on a blank sheet if needed)</i>			9. Remarks				
Delivery Order Manager 1 electronic copy on CD Technical Manager's Representative 1 electronic copy on CD and 1 web based compatible electronic CD NT3/Gov't Furnished Equip. Branch 1 electronic copy on CD			Block 5: As included in the DO scope, consistent with EA-WI-023 processes				
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
6	Preliminary Design Review Data Package	RT		See 9		CD	4
7. Data Type: <input type="checkbox"/> (1) Written approval <input checked="" type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution <i>(Continue on a blank sheet if needed)</i>			9. Remarks				
Delivery Order Manager 1 electronic copy on CD Technical Manager's Representative 1 electronic copy by on CD and 1 web based compatible electronic CD NT3 Gov't Furnished Equipment Branch 1 electronic copy on CD			Block 5: As included in the DO scope, consistent with EA-WI-023 processes				
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
7	Flight GFE Workmanship Specifications List	RT		See 9		E	4
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution <i>(Continue on a blank sheet if needed)</i>			9. Remarks				
Delivery Order Manager 1 electronic copy by e-mail Technical Manager's Representative 1 electronic copy by e-mail NT3/ Government Furnished Equip. Branch 1 electronic copy by e-mail NX/Advanced programs and Analysis Division 1 electronic copy by e-mail			Block 5: As included in the DO scope, consistent with EA-WI-023 processes				
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
8	Project Schedule	RT		See 9		E/CD	2/1
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution <i>(Continue on a blank sheet if needed)</i>			9. Remarks				
Delivery Order Manager 1 electronic copy by e-mail Technical Manager's Representative 1 electronic copy on CD NT3/Gov't Furnished Equip. Branch 1 electronic copy by e-mail			Block 3: After initial schedule established, request for revisions to the schedule are submitted to the Technical Manager's Representative. Block 5: With DO proposal, updated and more details provided as DO progresses.				

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

a. Title of Contract, Project, SOW, etc.				b. Contract/RFP No.		c. DRL Date/Mod Date	
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE)				NNJ04HH99B			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
9	Flight GFE Interface Control Document	RT		See 9		CD	3
7. Data Type:		<input checked="" type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Technical Manager's Representative NT3/Gov't Furnished Equip. Branch		1 electronic copy on CD and 1 web based compatible electronic CD 1 electronic copy on CD		Block 3: Frequent revisions are required between PDR and Flight readiness. Block 5: As included in the DO scope, consistent with EA-WI-023 processes			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
10	GFE End Item Specification	RT		See 9		CD	4
7. Data Type:		<input checked="" type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative NT3/Gov't Furnished Equip. Branch		1 electronic on electronic CD 1 electronic on CD and 1 web based compatible electronic CD 1 electronic copy on CD		Block 3: Frequent revisions are required between PDR and flight readiness Block 5: As included in the DO scope, consistent with EA-WI-023 processes			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
11	Flight GFE Failure Analysis Report	AR		See 9		E	3
7. Data Type:		<input type="checkbox"/> (1) Written approval	<input checked="" type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative NT3/ Government Furnished Equip. Branch		1 electronic copy by e-mail 1 electronic copy by e-mail 1 electronic copy by e-mail		Block 5: Submit by mutual agreement with Technical Manager's Representative and contractor report submitted in support of DRD no. 40			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
12	Flight GFE Verification and Validation Plan	RT		See 9		CD/E	3/1
7. Data Type:		<input checked="" type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative NT3/Gov't Furnished Equip. Branch		1 electronic copy by e-mail 1 electronic copy on CD and 1 Web based compatible electronic CD 1 electronic copy on CD		Block 3: Submitted consistent with EA-WI-023 and scope of the DO. Frequent revisions are made between PDR and CDR. Block 5: As included in the DO scope, consistent with EA-WI-023 processes			

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

a. Title of Contract, Project, SOW, etc.				b. Contract/RFP No.		c. DRL Date/Mod Date	
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE)				NNJ04HH99B			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
13	GFE Software Requirements Specification	RT		See 9		CD/E	2/2
7. Data Type:		<input checked="" type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
	8. Distribution (Continue on a blank sheet if needed) Delivery Order Manager Technical Manager's Representative NT3/Gov't Furnished Equip. Branch	1 electronic copy by e-mail 1 electronic copy on CD and 1 web based compatible electronic CD 1 electronic copy by e-mail	9. Remarks Block 3: Frequent modifications are made between PDR and CDR. Block 5: As included in the DO scope, consistent with EA-WI-023 processes				
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
14	GFE Software Development Plan	RT		See 9		E	3
7. Data Type:		<input checked="" type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
	8. Distribution (Continue on a blank sheet if needed) Delivery Order Manager Technical Manager's Representative NT3 Government Furnished Equipment Branch	1 electronic copy by e-mail 1 electronic copy by e-mail 1 electronic copy by e-mail	9. Remarks Block 5: As included in the DO scope, consistent with EA-WI-023 processes				
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
15	GFE Software Design Document	AR		See 9		CD/E	3/1
7. Data Type:		<input checked="" type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
	8. Distribution (Continue on a blank sheet if needed) Delivery Order Manager Technical Manager's Representative NT3/ Government Furnished Equip. Branch	1 electronic copy by e-mail 1 electronic copy on CD and 1 web based compatible electronic CD 1 electronic copy on CD	9. Remarks Block 5: As included in the DO scope, consistent with EA-WI-023 processes				
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
16	Engineering Drawings	RT		PDR		E /HC	4/4
7. Data Type:		<input checked="" type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
	8. Distribution (Continue on a blank sheet if needed) Delivery Order Manager Technical Manager's Representative NT3/Gov't Furnished Equip. Branch Engineering Drawing Control Center	1 electronic by e-mail 3 HC at design reviews, 1 E by e-mail 1 HC at design reviews, 1 E by e-mail 1 electronic transfer via network	9. Remarks Block 3: First submittal into the EDCC and revision on the EDCC thereafter. Block 5: As included in the DO scope, consistent with EA-WI-023 processes				

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

a. Title of Contract, Project, SOW, etc.				b. Contract/RFP No.		c. DRL Date/Mod Date	
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE)				NNJ04HH99B			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
17	EEE Parts Lists and Analysis Report	AR		See 9		CD/E	3/1
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager 1 electronic copy by e-mail		Block 5: As included in the DO scope, consistent with EA-WI-023 processes					
Technical Manager's Representative 1 electronic copy by e-mail and							
NT3/Gov't Furnished Equip. Branch 1 web based compatible electronic CD							
1 NT3/Gov't Furnished Equip. Branch 1 electronic copy by e-mail							
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
18	Critical Design Review Data Package	RT		See 9		CD	4
7. Data Type: <input type="checkbox"/> (1) Written approval <input checked="" type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manger 1 electronic copy on CD		Block 3: Revisions made to the package during the CDR for completeness or					
Technical Manager's Representative 1 electronic copy on CD and 1 web		clarifications and the record of the review item dispositions are added to the formal					
NT3 Gov't Furnished Equip. Branch based compatible electronic CD		CDR package.					
1 NT3 Gov't Furnished Equip. Branch 1 electronic copy on CD		Block 5: As included in the DO scope, consistent with EA-WI-023 processes					
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
19	Engineering Drawing Change Proposal	AR		As needed		E	5
7. Data Type: <input type="checkbox"/> (1) Written approval <input checked="" type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager 1 electronic copy by e-mail		Block 6: e-mail copy is sufficient with electronic signature approvals					
Technical Manager's Representative 1 electronic copy by e-mail							
NT3/ Government Furnished Equip. Branch 1 electronic copy by e-mail							
Contracting Officer's Technical Representative 1 electronic copy by e-mail							
Contracting Officer 1 electronic w/electronic signature							
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
20	GFE Qualification Test Procedure	RT		See 9		CD/E	1/3
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager 1 electronic copy by e-mail		Block 5: As included in the DO scope, consistent with EA-WI-023 processes.					
Technical Manager's Representative 1 electronic copy by e-mail and 1 web		Submitted to Flight hardware Technical Manager's Representative two weeks prior					
Flight Hardware QE based compatible electronic CD		to start of test.					
1 Flight Hardware QE 1 electronic copy by e-mail							

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

a. Title of Contract, Project, SOW, etc.				b. Contract/RFP No.		c. DRL Date/Mod Date	
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE)				NNJ04HH99B			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
21	Flight Product User's Guide	RT		See 9		CD/E	2/1
7. Data Type:		<input checked="" type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative		1 electronic copy by e-mail 2 electronic copies on CD		Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes Block 8: Technical Manager's Representative will distribute copy for training			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
22	Software Code	AR		See 9		CD/E	1/2
7. Data Type:		<input type="checkbox"/> (1) Written approval	<input checked="" type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative NT3 Government Furnished Equipment Branch		1 electronic copy by e-mail 1 electronic copy on CD 1 electronic copy on CD		Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
23	Information Technology (IT) Security Program Plan and Reports	As defined in JPG 2810.1		See 9		E/HC	3/1
7. Data Type:		<input checked="" type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
IA/Chief Information Office Contracting Officer's Technical Representative Contracting Officer		1 electronic copy by e-mail 1 electronic copy by e-mail 1 electronic and 1 signed hard copy		1. Block 5: Within thirty (30) days after DO award. 2. Additional Submissions: As defined in JPG 2810.1. 3. The final plan, as approved by the Contracting Officer, shall be incorporated in the contract as an Attachment.			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
24	Certification Plan	RT		See 9		CD	4
7. Data Type:		<input checked="" type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative NT3/Govt. Furnished Equip. Branch		1 electronic copy on CD 1 electronic copy on CD and 1 web based compatible electronic CD 1 electronic copy on CD		Block 3: The document is revised when a configuration change is made. Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes			

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)

(Based on JSC -STD-123)

a. Title of Contract, Project, SOW, etc.				b. Contract/RFP No.		c. DRL Date/Mod Date	
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE)				NNJ04HH99B			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
25	Certification Report	RT		See 9		CD/E/HC	3/1/2
7. Data Type:		<input type="checkbox"/> (1) Written approval		<input checked="" type="checkbox"/> (2) Mandatory Submittal		<input type="checkbox"/> (3) Submitted upon request	
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager 1 electronic copy by e-mail Technical Manager's Representative 2 HC, 1 electronic copy on CD and 1 web based compatible electronic CD NT3/Govt. Furnished Equip. Branch 1 electronic copy on CD		Block 3: The report is updated through out the life of the project whenever a configuration change is made Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes					
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
26	Engineering Analysis	AR		See 9		CD	3
7. Data Type:		<input type="checkbox"/> (1) Written approval		<input checked="" type="checkbox"/> (2) Mandatory Submittal		<input type="checkbox"/> (3) Submitted upon request	
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manger 1 electronic copy on CD Technical Manager's Representative 1 electronic copy on CD and 1 web based compatible electronic CD		Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes					
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
27	Acceptance Data Package	OT		See 9		CD/E/HC	3/1/1
7. Data Type:		<input type="checkbox"/> (1) Written approval		<input checked="" type="checkbox"/> (2) Mandatory Submittal		<input type="checkbox"/> (3) Submitted upon request	
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager 1 electronic copy by e-mail Technical Manager's Representative 1 electronic copy on CD and 1 web based compatible electronic CD NT/Quality Record Center 1 electronic copy on CD and 1 HC with flight hardware		Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes Block 7: Submittal to record center as directed by DO.					
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
28	Export Control Audit Results	See 9		See 9		E/CD/HC	2/1/1
7. Data Type:		<input type="checkbox"/> (1) Written approval		<input checked="" type="checkbox"/> (2) Mandatory Submittal		<input type="checkbox"/> (3) Submitted upon request	
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Export Control Office/Center Export Administrator (CEA) 1 electronic copy by e-mail Contracting Officer's Technical Representative 1 electronic copy on CD Contracting Officer 1 electronic copy by e-mail and 1 hard copy		Block 3: Frequency: Annually, at the end of each fiscal year Block 5: After award of 1 st delivery order, yearly on Sept. 30 thereafter					

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

a. Title of Contract, Project, SOW, etc.				b. Contract/RFP No.		c. DRL Date/Mod Date	
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE)				NNJ04HH99B			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
29	Quality Plan	RT		See 9		CD/E	2/1
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager NT2/Government Furnished Equipment Branch Contracting Officer's Technical Representative		1 electronic copy by e-mail 1 electronic copy on CD, 1 electronic copy on CD		Block 3: Changes in the plan submitted by e-mail Block 5: Initial submittal with the proposal, approval at contact award.			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
30	Patent Rights-Retention	AR		See 9		E/CD	1/4
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Contracting Officer Contracting Officers Technical Representative New Technology Office		1 electronic w/ electronic signature 1 electronic on CD See Clause 18-52.227-11		Block 5: 12 months after contract start			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
31	Shuttle/Station Payload Safety Data Package	AR		See 9		CD/E	3/1
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative NT Quality Record Center (copy with flt hw)		1 electronic copy by e-mail 1 electronic copy on CD and 1 web based compatible electronic CD 1 electronic copy on CD		Block 3: A payload may require 4 submittals of the SDP throughout development Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes Block 8: Part of ADP			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
32	Limited Life Systems List	AR		See 9		CD/E/HC	3/1/1
7. Data Type: <input type="checkbox"/> (1) Written approval <input checked="" type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative NT3/Govt. Furnished Equip. Branch		1 electronic copy by e-mail 1 electronic copy by e-mail and 1 web based compatible electronic CD 1 electronic copy by e-mail and 1 hard copy		Block 3: Multiple submittals are required consistent with EA-WI-023 and Delivery Order. Frequent revisions after CDR. Block 5 As included in the DO Scope, Consistent with EA-WI-023 processes			

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

a. Title of Contract, Project, SOW, etc.				b. Contract/RFP No.		c. DRL Date/Mod Date	
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE)				NNJ04HH99B			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
33	Space Station GFE Failure Modes and Effects Analysis and Critical Items List	AR		See 9		CD/E	2/2
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager 1 electronic copy by e-mail		Block 5: Consistent with EA-WI-023 and the scope of the DO or defined in the DO.					
Technical Manager's Representative 1 electronic copy by e-mail and 1 web based compatible electronic CD		Block 3: As included in the DO Scope, Consistent with EA-WI-023 processes with the intent to be early enough to affect the design process. .					
NT52/SMART Executive Secretary 1 electronic copy on CD							
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
34	Space Shuttle GFE Safety and Analysis Report & Hazard Report	AR		See 9		CD/E	2/2
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager 1 electronic copy by e-mail		Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes					
Technical Manager's Representative 1 electronic copy by e-mail and 1 web based compatible electronic CD		Initial submittal 30 days prior to PDR and CDR. Final Submittal 30 days prior to SAR					
NT52/SMART Executive Secretary 1 electronic copy on CD							
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
35	Software Quality Assurance Plan Report	RT		See 9		CD/E	2/2
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager 1 electronic copy by e-mail		Block 5: Submittal 90 days prior to start of software development					
Technical Manager's Representative 1 electronic copy on CD and 1 web based compatible electronic CD							
NT3/ Government Furnished Equip. Branch 1 electronic copy by e-mail							
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
36	ISS Hazard Report	AR		See 9		CD/E	1/4
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager 1 electronic copy by e-mail		Block 3: A complete project may require at least 3 submittals, 30 days prior to PDR, CDR and flight hardware delivery.					
Technical Manager's Representative 1 electronic copy by e-mail and 1 web based compatible electronic CD		Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes					
NT52/SMART Executive Secretary 1 electronic copy by e-mail							
Safety Review Panel Electronic copies as required							

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

a. Title of Contract, Project, SOW, etc.				b. Contract/RFP No.		c. DRL Date/Mod Date	
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE)				NNJ04HH99B			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
37	Reliability and Maintainability Plan	OT		See 9		CD/E	2/1
7. Data Type:		<input type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input checked="" type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager NT3/Government Furnished Equipment Branch Contracting Officer's Technical Representative		1 electronic copy by e-mail 1 electronic copy on CD 1 electronic copy on CD		Block 5: To be delivered with the proposal			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
38	Government Certification Approval Request (GCAR)	AR		See 9		HC/E	1/2
7. Data Type:		<input checked="" type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Technical Manager's Representative NT3 Gov't Furnished Equip. Branch		1 HC and 1 electronic copy by e-mail 1 electronic copy by e-mail		Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes. GCAR is required 2 weeks prior to scheduled certification date.			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
39	Risk Assessment Executive Summary Report (RAESR)	AR		See 9		CD/E	3/1
7. Data Type:		<input checked="" type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative NT3/ Government Furnished Equip. Branch		1 electronic copy by e-mail 1 electronic copy on CD and 1 web based compatible electronic CD 1 electronic copy on CD		Block 3: Up to 3 submittals are required for a full flight hardware project. Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes.			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
40	Problem Reporting and Corrective Action (PRACA)	AR		See 9		E	4
7. Data Type:		<input checked="" type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative NT3/Gov't Furnished Equip. Branch PRACA Center (NT)		1 electronic copy by e-mail 1 electronic copy by e-mail 1 electronic copy by e-mail 1 electronic copy by e-mail		Block 3: Submitted when reportable problems occur of as defined in the DO Block 5: Submit report within 2 business days of problem isolation but no later than 10 days after detection			

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

a. Title of Contract, Project, SOW, etc.				b. Contract/RFP No.		c. DRL Date/Mod Date	
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE)				NNJ04HH99B			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
41	Nonconformance Record	AR		See 9		E	3
7. Data Type:		<input type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input checked="" type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative NT3/Government Furnished Equipment Branch		1 electronic copy by e-mail 1 electronic copy by e-mail 1 electronic copy by e-mail		Block 5: As defined in the DO Block 6: Electronic records submitted by internet. No permanent electronic copies are delivered			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
42	Government Industry Data Exchange Program and NASA Advisory Problem Data	RT		See 9		E	2
7. Data Type:		<input type="checkbox"/> (1) Written approval	<input checked="" type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manger JSC ALERT Coordinator (NX) (ALERT → Acute Launch Emergency Reliability Tip)		1 electronic copy by e-mail 1 electronic copy by e-mail		Block 5: Reported one time when discrepancy occurs Block 6: electronic records submitted by internet.			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
43	Electrical, Electronic, and Electromechanical (EEE) Parts Control Plan	RT		See 9		CD/E	3/1
7. Data Type:		<input checked="" type="checkbox"/> (1) Written approval	<input type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative NX/Advanced Program and Analysis Div.		1 electronic copy by e-mail 1 electronic copy on CD and 1 web based compatible electronic CD 1 electronic copy on CD		Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes Submitted 60 days after award of first DO that requires electronics.			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
44	Certification Data Package	RT		See 9		CD/E/HC	3/1/1
7. Data Type:		<input type="checkbox"/> (1) Written approval	<input checked="" type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)		9. Remarks					
Delivery Order Manager Technical Manager's Representative NT3/Gov't Furnished Equip. Branch		1 electronic copy by e-mail 1 electronic copy on CD and 1 web based compatible electronic CD 1 HC and 1 electronic copy on CD		Block 3: Revisions made by electronic submittal by e-mail Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes Submit concurrently with the GCAR			

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)

(Based on JSC -STD-123)

a. Title of Contract, Project, SOW, etc.				b. Contract/RFP No.		c. DRL Date/Mod Date	
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE)				NNJ04HH99B			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
45	Certification and Acceptance Requirements Document	RT		CDR		CD/E	2/1
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)			9. Remarks				
Delivery Order Manager 1 electronic copy by e-mail Technical Manager's Representative 1 electronic copy on CD and 1 web based compatible electronic CD							
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
46	Wage/Salary and Fringe Benefit Data	See 9		See 9		CD/HC	2/2
7. Data Type: <input type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input checked="" type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)			9. Remarks				
BA2/Contract Labor Relations Officer 1 electronic copy on CD and 1 hard copy Contracting Officer 1 hard copy COTR 1 electronic copy on CD			Block 5: 30 days after issuance of each delivery order				
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
47	GFE Acceptance Test Procedure	OT		See 9		CD/HC	2/1
7. Data Type: <input checked="" type="checkbox"/> (1) Written approval <input type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)			9. Remarks				
Technical Manager's Representative 1 electronic copy on CD NT3/ Government Furnished Equip. Branch 1 electronic copy on CD and 1 HC			Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes. Usually delivered with or before Acceptance Data Package Block 6: Hard copies provided if modifications made are not captured electronically. Actual procedure is maintained as record.				
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
48	Flight GFE Verification & Validation Report	RT		See 9		CD/E	3/1
7. Data Type: <input type="checkbox"/> (1) Written approval <input checked="" type="checkbox"/> (2) Mandatory Submittal <input type="checkbox"/> (3) Submitted upon request							
8. Distribution (Continue on a blank sheet if needed)			9. Remarks				
Delivery Order Manager 1 electronic copy by e-mail Technical Manager's Representative 1 electronic copy on CD and 1 web based compatible electronic CD NT3/Gov't Furnished Equip. Branch 1 electronic copy on CD			Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes				

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

a. Title of Contract, Project, SOW, etc.				b. Contract/RFP No.		c. DRL Date/Mod Date	
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE)				NNJ04HH99B			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
49	Space Shuttle GFE Failure Modes and Effects Analysis (FMEA) and Critical Items List	AR		See 9		CD/E	2/2
7. Data Type:		<input type="checkbox"/> (1) Written approval		<input checked="" type="checkbox"/> (2) Mandatory Submittal		<input type="checkbox"/> (3) Submitted upon request	
8. Distribution <i>(Continue on a blank sheet if needed)</i>		9. Remarks					
Delivery Order Manager Technical Manager's Representative NT52/SMART Executive Secretary		1 electronic by e-mail 1 electronic copy by e-mail and 1 web based compatible electronic CD 1 electronic copy on CD		Block 3: A complete project requires 3 submittals, at PDR, CDR, and at GFE delivery. Block 5: As included in the DO Scope, Consistent with EA-WI-023 processes			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
50	RESERVED						
7. Data Type:		<input type="checkbox"/> (1) Written approval		<input type="checkbox"/> (2) Mandatory Submittal		<input type="checkbox"/> (3) Submitted upon request	
8. Distribution <i>(Continue on a blank sheet if needed)</i>		9. Remarks					
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
51	NASA Contractor Financial Management Reporting	MO		See DRD/SOW		CD/HC	3/4
7. Data Type:		<input type="checkbox"/> (1) Written approval		<input type="checkbox"/> (2) Mandatory Submittal		<input type="checkbox"/> (3) Submitted upon request	
8. Distribution <i>(Continue on a blank sheet if needed)</i>		9. Remarks					
LF6/Cost Accounting Contracting Officer Budget/Program Analyst COTR		1 copy by CD and 1 Hard Copy with signature 1 copy by CD and 1 Hard Copy 1 copy by CD and 1 Hard Copy 1 Hard Copy		Due monthly after award of first DO Monthly letter to state no cost changes/no work in process if no DOs currently active			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
52	Government Property Management Plan	RT		See 9		CD/HC	3/2
7. Data Type:		<input type="checkbox"/> (1) Written approval		<input type="checkbox"/> (2) Mandatory Submittal		<input type="checkbox"/> (3) Submitted upon request	
8. Distribution <i>(Continue on a blank sheet if needed)</i>		9. Remarks					
Property Administrator Contracting Officer COTR		1 copy by CD and 1 Hard Copy 1 copy by CD and 1 Hard Copy 1 copy by CD		Block 5: Initial due with proposal, with updates as required.			

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

a. Title of Contract, Project, SOW, etc.				b. Contract/RFP No.		c. DRL Date/Mod Date	
CREW, ROBOTICS AND VEHICLE EQUIPMENT (CRAVE)				NNJ04HH99B			
1. Line Item	2. DRD Title	3. Frequency	4. As-of-Date	5. 1st subm. date	6. Copies	6a. Type	6b. Number
53	System Safety Plan	0T		See 9		CD/E	2/1
7. Data Type:		<input type="checkbox"/> (1) Written approval	<input checked="" type="checkbox"/> (2) Mandatory Submittal	<input type="checkbox"/> (3) Submitted upon request			
8. Distribution (Continue on a blank sheet if needed)				9. Remarks			
Delivery Order Manager NT3/Government Furnished Equipment Branch Contracting Officer's Technical Representative				1 electronic copy by e-mail 1 electronic copy on CD 1 electronic copy on CD Block 5: Due with proposal			

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Flight GFE Configuration Management Plan	SEPT 2004	01	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
This DRD describes the contractor's plan to control the configuration of flight hardware during development, production, certification, and deployment of both qualification and flight hardware within the contractor's facilities, subcontractor's facilities, and those of NASA JSC.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
EA-WI-027, SSP 50123, NSTS 077000			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: This document describes how the contractor shall maintain configuration control of qualification and flight hardware and software during the design, development, certification, verification, and deployment within its facilities, its subcontractor's facilities and NASA JSC facilities. It defines to the government how the contractor will maintain records, documentation, drawings, and reports necessary for NASA's to assure that configuration management is maintained throughout the life of the flight product.

CONTENTS: It shall address how the contractor's products shall comply with the Engineering Directorate's products defined in EA-WI-027 "Configuration Management Requirements", the Shuttle Program Process NSTS 07700 "Space Shuttle Configuration Management Requirements", and the Space Station Program process reference SSP 50123 "Configuration Management Handbook."

FORMAT: The plan shall be provided in Microsoft Word. The format shall be in the contractor's format.

MAINTENANCE: The Configuration Management Plan shall be defined at the beginning of the contract award. The COTR shall approve the plan and provide notice of acceptance per technical direction. The contractor shall maintain their plan as needed throughout the award period. The plan shall be available for review at any point throughout the contract.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Delivery Order Status Report / Summary Review	SEPT 2004	02	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
Provide information on the contractor's safety, technical, quality, financial, and delivery-to-schedule progress for use by the contract surveillance team consisting of Engineering, Quality, and Administrative personnel.		<input checked="" type="checkbox"/> Technical <input checked="" type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
	DRD 8 Project Schedule		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The monthly Delivery Order (DO) Status Report shall contain information on the contractor's safety, technical, quality, cost, and deliver-to-schedule performance. This report is required for all authorized Cost Plus and Firm Fixed Priced Delivery Orders. This report, along with other contract requirements, serves as the contractor's formal reports given to NASA for contract surveillance. A review shall be held with NASA to discuss the highlights for the month.

FORMAT: The report shall be provided in a business report style with a report body font size that does not exceed 12. The Summary Review shall be a view graph presentation prepared in Microsoft Power Point.

CONTENTS: The contents of the report shall address all the flight hardware products and services defined in the DO(s) held by the contractor that are still active. The structure of the report shall be selected by the contractor and agreed upon by the COTR. The following shall be addressed in the report unless addressed in the DO.

A. SAFETY SUMMARY

- OSHA reportable events as categorized (defined) by OSHA or NASA from the resources of this contract
- Personnel Injuries
- New Flight Hardware Safety DRs and status of all remaining open DRs

B. COST PERFORMANCE SUMMARY (Performance Based)

- Project Actual-to-Date Cost & Projected Total Cost - Last Period
- Project Actual-to-Date Cost & Projected Total Cost - This Period
- Projected Total Cost Addition due to Approved Changes
- Graphics of Initial Cost Projection, Initial Cost Projection + Approved Changes Projection, Full Cost Projection
- Description of the origin of variance not due to approved change whether plus or minus
- Excel Spreadsheets as follows:
 - Delivery Order Summary Listing all Authorized Delivery Orders by Cost Type and Fixed Price Showing Title, Plan/Actuals for Dollars, Hours, and Full-Time Equivalents (FTEs), Period of Performance (POP) and Percent Complete
 - WBS Summary Showing Title, Plan/Actuals for Dollars, Hours, and Full-Time Equivalents (FTEs), and Percent Complete (CPFF only)
 - Individual DO Reports Showing WBS, Title, Plan/Actuals for Dollars, Hours, and Full-Time Equivalents (FTEs), and Percent Complete (CPFF only)
- Additional Data May Be Required by the Government for this Report and will be directed in the DOs

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

C. RESOURCE PERFORMANCE SUMMARY (Performance Based)

For the WBS reporting level requested in the DO, the following summary is to be provided:

- Graphic of the Initial Planned Manpower for each WBS item for the DO, Current Planned Manpower with Approved Changes for the Project, Actual Manpower used to date, and % of WBS task completed.

D. TECHNICAL & QUALITY PERFORMANCE STATUS

- Nominal Technical / Quality Performance Achieved
- Better than Nominal Technical / Quality Performance Achieved
- Nominal Technical / Quality Performance not Achieved
- Action to be taken to resolve unachieved Nominal Performance
- Notice of potential failure to meet future Nominal Performance, identification of causes, along with recommendations as appropriate.
- Other Technical and Quality Subjects as needed

E. PRODUCT PRODUCTION AND SCHEDULE STATUS

- Overall DO Schedule Status
- DO Completed Products and Schedule – Projected in Last Monthly Period
- DO Completed Products and Schedule – Actual This Period
- Projected Next Months Products and Schedule
- Change from last month due to Approved Changes
- Variance not due to approved change and description of cause

F. DEPLOYED HARDWARE STATUS

- Open Anomalies Status (all formal reporting status)
- Corrective Actions Status
- Lessons Learned

G. MANAGEMENT

- Corrective Actions Taken
- Organization
- Efficiencies Implementation
- Outside Dependencies
- Small Business Status Showing Percent and Status of Each Small Business Goal Along with Projections for Meeting Each Goal and Actions Being Taken to Ensure Meeting of Each Goal

H. SUMMARY REVIEW

- The summary review shall be a presentation that contains the highlights of the report. The COTR and the contractor shall agree upon the contents of the review. The Summary Review shall not address the contents of Section C above. The Summary review shall include a listing by DO for all authorized DOs (both CPFF and FFP) with hours, cost and price.

I. Minutes during the Summary Review shall be taken and submitted with the status report

MAINTENANCE: Corrections to a Monthly DO Status Report shall be identified and changes made if applicable in the subsequent Monthly Status Report.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Project Technical Requirements Specification (PTRS)	SEPT 2004	03	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
The PTRS defines the requirements of the Engineering Directorate Customer(s), the SR&QA organization, and the Engineering Directorate for Government Furnished Equipment or payload project team.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
EA-WI-023 "Project Management of GFE Flight Projects"		DRD 10 End Items Specification	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The PTRS contains the performance, functional, environmental, interface, criticality, maintainability, safety, and human factors requirements for the flight Government Furnished Equipment (GFE) including flight payload hardware. This is the formal agreement between the Engineering Directorate and its customer(s). The contractor shall provide all or a part of the engineering effort required to produce this document. The contractor shall survey the multiple sources of GFE flight hardware and/or payload requirements and define those that are essential for mission success.

FORMAT: The format for the PTRS is addressed in EA-WI-023. The electronic link to this Tier 3 document is found under the Quality Management System documentation for the Engineering Directorate (EA) on the JSC Home Page. The version of EA-WI-023 in existence at the time of the Delivery Order (DO) will define the format.

CONTENT: The PTRS shall define the minimum technical requirements and any constraints for the GFE or payload hardware that apply to performance, design, operation, interoperability, reliability, maintainability and transportability. The minimum set of technical requirements shall include all functional requirements that will be used as a measure of mission performance success. A general outline of the content in a PTRS is contained in EA-WI-023. The PTRS is the source of requirements used to develop the detailed design requirements that will be contained in the End Item Specification.

MAINTENANCE: This document is update as required during the "Requirements Definition Phase". A version is presented at the Systems Requirements Review (SRR) as a RIDable document and placed under project control at that point. The final version is presented at the Preliminary Design Review PDR. This final version is to be updated as a result of the review for final signature between the Engineering Directorate and the customer. If the DO requests, the PTRS may be maintained throughout the project as a part of a configuration control management activity. The technically relevant content of the PTRS is captured in the End Items Specification after PDR.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
GFE Systems Requirements Review (SRR) Data Package	SEPT 2004	04	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
This data package provides objective evidence to a multidiscipline NASA team that the requirements on the Engineering Directorate's customer organization, the Engineering Directorate, the SR&QA Directorate, other influencing organizations and supporting organizations have been completely specified for the Government Furnished Equipment which includes payloads.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
EA-WI-023 "Project Management of GFE Flight Projects"		Other DRDs (see below)	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE/CONTENT: The contractor may be required in the Delivery Order (DO) to deliver all or a part of the products required for a SRR Data Package. The SRR Data Package includes up-to-date engineering information defined by other DRDs listed below, SRR specific data, other data defined in the Delivery Order, and a presentation package used for the SRR review. This data package provides the NASA review team evidence that the essential requirements needed for flight hardware performance success have been identified. The guidelines defined in EA-WI-023 provide the needs of the Engineering Directorate.

The presentation materials shall include the following:

- End-item (system, component, payload) description, major elements, expected performance
- Project Deliverables
- Constraints and Guidelines
- Top Level Qualification Approach
- Validation & Verification process
- Specific material requested in the DO

The latest version of these documents is to be provided.

- Interface Control Documents, DRD 09
- Configuration Management Plan, DRD 01
- Software Development Plan, DRD 14
- Project Technical Requirements Specification, DRD 03

FORMAT: Other DRDs have formats defined. The contractor's format shall be used for DO specific data unless a specific format is requested in the DO. The SRR specific information and presentation package shall be provided electronically using Microsoft presentation software.

MAINTENANCE: The SRR Data Package is updated by adding the copy of the RIDs after all RIDs have been closed. This package shall be retained for the Project as a quality record of the SSR. Modifications to documents required by approved RIDs shall be made when appropriate to do so for each of the documents. The updated documents are not retained as part of the SRR package. Any changes to the DO required because of NASA changes to the SRR data products shall require the normal contract DO change process to be followed. The SRR quality record shall be delivered to NASA.

PERFORMANCE: Delivery Date: The data products for the SRR review shall be delivered to a location determined by the COTR two weeks prior to the formal review date defined in the DO. Delivery two (2) Weeks and two (2) days before the formal review will be considered better than normal delivery. Delivery one (1) week and five (5) days or less than the review will be considered less than normal performance. A delivery of one (1) week or less is considered poor performance. Complete Content: Normal performance is that data package contains products that are accepted with little modification required. Little modification means that all issues with the content controllable by the contractor can be resolved within one (1) month of the review. All content issues resolved within three (3) weeks of the review is better than normal performance and content issues longer than five (5) weeks is worse than normal performance.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Flight Hardware Project Requirements and Verification Documentation	SEPT 2004	05	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
This document is delivered instead of the Flight Hardware Project Technical Requirements Specification and the Flight Hardware Verification and Validation Plan when the Flight Hardware requested is simple in nature, a payload, or presents little risk to the crew or NASA assets.		<input checked="" type="checkbox"/>	Technical
		<input type="checkbox"/>	Administrative
		<input type="checkbox"/>	SR&QA
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
EA-WI-023 "Project Management of GFE Flight Products"		DRD 03 Project Technical Requirements Specification DRD 12 Verification and Validation Plan	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: This document defines the requirements for the flight hardware and the verification approach when the requirements have been determined to be suitable to use of JSC 28484 "Program Requirements Document For Johnson Space Center Non-Critical Government Furnished Equipment" by engineering, the customer and SR&QA. Payloads may fall into this category.

CONTENT: This document will contain the functionality of a separate Project Technical Requirements Specification, a Verification and Validation Plan, and the Verification and Validation Report. If requested by the DO, the contractor shall provide all or a portion of this document. The contents shall depend on the nature of the Delivery Order but will include all or some of the content described for the PRVD contained in EA-WI-023.

FORMAT: The PRVD outline described in EA-WI-023 describes the format. The software used to develop this document shall be compatible with Microsoft Word.

MAINTENANCE: This document is updated as required throughout the flight hardware project. The appropriate NASA configuration control board shall approve all changes to this document after initial approval.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Preliminary Design Review Data Package	SEPT 2004	06	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
This data package contains the early engineering, safety, quality and project documentation to be reviewed by the NASA customer and thier designated support in order to assure that the contractor's intended products meet the requirements for safety, cost, performance and schedule.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
EA-WI-023 "Project Management of GFE Flight Products"		See DRDs associate with line items	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The contractor is required to develop engineering data and to deliver all or a part of the products required for the Preliminary Design Review data package described by EA-WI-023 and defined by the content below.

CONTENT:

- a) End-Item Specification,
- b) Interface Control Documents,
- c) Preliminary Engineering Drawings (represents 10% of all drawings that would be required and will be for assessing the primary integration questions)
- d) Software Requirements Specification
- e) Software Design Document
- f) Phase I RAESR and supporting safety documentation
- g) Verification and Validation Plan (Project Requirement and Verification Document for non-critical IVA GFE)
- h) Preliminary EEE Parts List and Analysis
- i) Workmanship Specifications List
- j) Contractor unique Workmanship Specifications
- k) Summary of waivers/Deviations Requested or approved
- l) Design Analysis Reports
- m) Summary PDR Presentation (See EA-WI-023 for sample content)
- n) Change Requests for Cost Efficiency
- o) Project Cost Projection (to submit for NASA only review)
- p) Other data specified in the DO
- q) PDR Minutes

FORMAT: The format of the DRD shall be used. Documentation under this DRD that is not defined by another DRD is to be delivered in the contractor's format. The format of the summary presentation shall be defined by the contractor. A sample of the content for this presentation is contained in EA-WI-023. The software used for electronic submittal shall be Microsoft software. An electronic version of the Summary Presentation shall be delivered to the Technical Manager's Representative and the COTR at least 1 week prior to the PDR Presentation. The Project Cost Projection shall be provided to the Technical Manager's Representative using Microsoft Software stored on permanent CDs. The CDs shall be labeled appropriately.

MAINTENANCE: The PDR Data Package is a one time delivery. The PDR package shall be appended by the RIDs from this review and any additional data submitted during the review. Modifications to drawings or documents as a result of the RIDs are not considered a part of the PDR Data Package. The RIDs serves as documentation of the agreements made during the review. A complete copy of the PDR Data Package shall be maintained as a project quality record in electronic format on a permanent data storage disk. This quality record shall be delivered to NASA at the completion of the contract or 1 month after PDR is completed, whichever comes first.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

PERFORMANCE: 1) Delivery Date: The data products for the PDR review shall be delivered to a location determined by the COTR 2 weeks prior to the formal review date defined in the DO. Delivery 2 Weeks and 2 days before the formal review will be considered better than normal delivery. Delivery 1 week and 5 days or less than the review will be considered less than normal performance. A delivery of 1 week or less is considered poor performance.

2) Complete Content: Normal performance is defined as receiving a data package that contains products that are accepted with little modification required. Little modification means that all issues with the content, controllable by the contractor, can be resolved within 1 month of the review. All content issues resolved within 3 weeks of the review is considered better than normal performance and content issues requiring longer than 5 weeks is considered worse than normal performance.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Flight Hardware Workmanship Specification List	SEPT 2004	07	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
This document defines the list of workmanship specifications that the contractor identifies to be used for the manufacturing of the flight and associated ground support hardware.		<input checked="" type="checkbox"/>	Technical
		<input type="checkbox"/>	Administrative
		<input type="checkbox"/>	SR&QA
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
NASA Technical Standards Program, http://standards.nasa.gov	PDR Data Package DRD 06 CDR Data Package DRD 18		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: This list contains all applicable workmanship specifications that are applied as fabrication requirements or software development requirements. This list establishes the lowest level of requirements to be met to assure quality products are delivered for flight.

CONTENT: This list is presented for NASA review and approval. Many workmanship specifications are identified by NASA, and if used, shall provide acceptable flight hardware products. These may be standard industry specifications, military specifications or NASA specifications. Use of alternate contractor specifications requires that they meet all specifications required for the Project and they not include proprietary processes. This list requires NASA approval.

FORMAT: This list shall be provided in electronic format compatible with Microsoft EXCEL software.

MAINTENANCE: The initial submittal is at PDR. This list can be modified by the contractor as required with NASA approval.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Project Schedule	SEPT 2004	08	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
Provide schedule information to NASA so that interdependent program activities can be planned and critical milestones monitored.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
	DRD 02		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The schedule shall serve as the basis for communications between the Contractor and NASA concerning essential schedules. The detail breakdown required depends on the type of products and services requested and will be defined in the Delivery Order (DO). Current Schedules are reviewed Monthly.

CONTENTS: Project schedules shall be prepared using the Critical Path Method and include a detail network analysis and graphical representation to illustrate order and interdependence of activities and sequence of work based upon the Work Breakdown Structure in the DO. The project schedule shall provide the percentage of the original schedule completed and the percentage of the original planned resources used. The DO may require a complete project schedule or a schedule for a portion of a project. As a minimum the following detail is required.

Title, Type of hardware, WBS number, Key Milestones (e.g. SRR, PDR, CDR, SAR, sign-off, GCAR delivery, CARD sign-off, hardware delivery), key product deliveries, design activity, manufacturing activity, test activity and milestones, delivery and return from remote facilities, actual event, start and finish dates that accompany the graphics, assembly time, slack time, major external project milestones not controlled by the contractor.

FORMAT: All schedules will be submitted using Microsoft Project.

MAINTENANCE: Schedules change throughout the project and frequent modifications will be required. The initial schedule that has been approved by the Technical Manager's Representative shall be set as the baseline. Changes and additions will be maintained on this schedule and noted as to the reason for the change.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Flight Hardware Interface Control Document	SEPT 2004	09	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
This document defines the requirements for the interfaces between the Government Furnished Equipment or payload and program interfaces required to make the hardware fully functional.		<input checked="" type="checkbox"/>	Technical
		<input type="checkbox"/>	Administrative
		<input type="checkbox"/>	SR&QA
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
EA-WI-023 "Project Management of GFE Flight Projects"			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The ICD is the formal definition of the interfaces between end items, other systems, and/or payloads. Depending on the nature of the flight hardware, multiple ICDs using different formats may be required. The ICD shall fully describe the quality characteristics of the interface so that the hardware is fully functional upon integration.

FORMAT: See EA-WI-023 for the format of the ICD for major GFE or payload projects. The electronic link to the Tier 3 documents under the Quality Management System for the Engineering Directorate on the Home Page for JSC provides the latest version on this Work Instruction. The version in place when the Delivery Order is initiated is the version applied to work under the DO. For partial flight hardware projects, this general format shall be used but end item to end item interfaces are described using the contractor format instead of system to vehicle interfaces described in EA-WI-023. If requested by the DO, ICDs using International Space Station or Shuttle Program formats may be required.

CONTENT: The document is a complete description of the interface requirements and interface design details necessary to assure that the hardware is functional when integrated. It addresses the engineering design parameters associated with mechanical, biological, chemical, electrical, fluid, electronic, human factors, and software design.

MAINTENANCE: Initial version at the Preliminary Design Review; update as required through the appropriate GFE configuration control processes throughout the project. An up-to-date revision is required at Critical Design Review and a final revision for hardware certification and delivery.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
GFE End Item Specification	SEPT 2004	10	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
The End Item Specification (EIS) defines the engineering requirements to be used that capture all NASA Program, SR&QA organization, and NASA Engineering requirements. It also provides technical metrics for the acceptability of the flight hardware products.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
EA-WI-023 "Project Management of GFE Projects"		DRD 3, Project Technical Requirements Specification	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The contractor may be required in the Delivery Order (DO) to deliver all or a part of the products required for the EIS. The EIS shall define all technical requirements and all constraints for the GFE (including payload) that apply to the safety, performance, design, operation, interoperability, reliability, maintainability, verifiability, and transportability of the flight hardware.

CONTENT: The EIS contains the performance, functional, environmental, interface, maintainability, reliability and safety requirements for the Government Furnished Equipment system or end items. All requirements contained in the Project Technical Requirements Specification are addressed along with the detailed design constraints, requirements arising from the reality of the certification and verification approaches, and other requirements that are needed in order to meet the program level requirements.

FORMAT: See EA-WI-023 for the standard format used by the Engineering Directorate for system level projects. For partial projects or one component of a larger system or payload, the contractor's format for the EIS may be used. This EIS shall provide the information needed as a partial element of the relevant system level EIS.

MAINTENANCE: Update of this document will be required frequently through the requirements definition phase. It is approved at the Preliminary Design Review and modified after PDR through approval from the responsible NASA configuration control boards.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Flight Hardware Failure Analysis Report	SEPT 2004	11	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To provide and document the detailed data generated during the testing and analysis of defective hardware returned to the supplier.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
ANSI/ASQC Q9001-1994			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The report documents the test and analyses conducted during an investigation of defective hardware returned to the supplier to identify the root cause of the failure. It also records the contractor's recommended corrective action required to prevent another occurrence of the same failure.

CONTENT: The report shall contain the following information as a minimum:

1. Description of when, where, and how the hardware failed along with supporting evidence.
2. Documentation on how the hardware was transported to the vendor.
3. Documentation of how the hardware was received and processed by the vendor.
4. Documentation of tests performed, success criteria and actual test results obtained in order to assess the failure
5. Documentation of the analysis performed and results obtained to assess the failure.
6. Documentation on verification of the original certification data and any discrepancies found.
7. Method used to arrive at root cause of the failure.
8. Rational used to arrive at recommended corrective action.
9. Plan for implementation and estimated cost of corrective action for the contractor.

FORMAT: The contractor's format shall be used. The software used shall be compatible with Microsoft Word.

MAINTENANCE: The report is updated as required.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Flight GFE Verification and Validation Plan	SEPT 2004	12	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
This plan defines the approach to verifying and validating that the Government Furnished Equipment meets the design requirements and can be qualified.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
EA-WI-023 Project Management of GFE Flight Projects		Project Technical Requirements Specification, DRD 3 End Item Specification, DRD 10 Flight Software Requirements Specification, DRD 9	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: This plan defines the Verification and Validation (V&V) activities planned to confirm that the GFE (including GFE payloads) comply with their specifications, function properly in the complete integrated environment with other actual flight hardware and payload products, and are ready for flight use for a human rated environment.

CONTENT: EA-WI-023 contains a definition of the objectives of the V&V Plan and gives the detailed content for the NASA to NASA System Level V&V Plan. If the DO requests, the contractor shall produce all or a part of the products for this document. For Flight Hardware GFE or payloads that are not full systems, the contractor shall produce a V&V Plan that provides the relevant information described in the EA-WI-023. The relevant content addresses how the requirements in the End Item Specification are to be verified.

FORMAT: The format for the V&V Plan described within EA-WI-023 shall be used to develop a System Level document for NASA to use at the Program Level. For components of a system or payloads, relevant sections of the V&V Plan described in EA-WI-023 shall be used using the contractor's format. The COTR shall approve the contractor's format.

MAINTENANCE: The initial plan is provided at PDR and requires NASA approval. At CDR a fully developed V&V Plan is submitted and requires NASA approval. The V&V approach is changed after CDR by approval of the appropriate NASA configuration change board.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
GFE Software Requirements Specification	SEPT 2004	13	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
Documents the functional, performance, and interface requirements that are to be met by the software design used in flight GFE.		<input checked="" type="checkbox"/>	Technical
		<input type="checkbox"/>	Administrative
		<input type="checkbox"/>	SR&QA
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
EA-WI-018 Use of Off-the-Shelf Software in Flight Projects, EA-WI-025 GFE Flight Project Software and Firmware Development	Project Technical Requirements Specification, End Item Specification, Flight Hardware Interface Control Document,		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: Documents the functional, performance, and interface requirements for software used in flight GFE to enable review and approval prior to detailed design and production. This document also serves as the record for changes that may be made for a variety of reasons throughout the project. Software requirements are derived from the PTRS, the End Item Specification, the Specific Design Requirements Document, the Certification and Acceptance Requirements Document and the Flight Hardware Interface Control Document.

CONTENT: This specification defines the detailed functional, performance and interface requirements and implementation constraints for the software required to command, control, or monitor flight GFE.

FORMAT: The format of the SRS described in EA-WI-025 shall be provided unless specified otherwise in the DO. The contractor's format shall be approved by the Technical Manager's Representative.

MAINTENANCE: The first submittal of the SRS is at the Preliminary Design Review and approval by NASA is required. This document is RIDable as defined in EA-WI-025. A version is reviewed again at Critical Design Review and approval is required. Changes shall be made to this document as the flight hardware or software configuration is changed through the appropriate NASA design review board.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
GFE Flight Software Development Plan	SEPT 2004	14	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
The Software Development Plan defines the contractor's approach to software acquisition, development, certification, verification, and delivery		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
EA-WI-018, Use of Off the Shelf Software in Flight Projects Work Instruction (cont in # 8)			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The Software Development Plan documents the contractor's planned approach to software acquisition, development, certification, verification, delivery, and operational utilization. It describes the software management approach and the implementation of quality assurance throughout the effort.

CONTENTS: The plan shall address the approach to controlling the configuration of the software after CDR compatible with Engineering's configuration management processes defined in EA-WI-027. It shall address the compatibility of the contractor's products with the products required by Engineering that are described in EA-WI-025. The plan shall describe the contractor's use of Off-The-Self (OTS) software, which is compatible with Engineering process EA-WI-018. If requested in the DO, parts or all of the Engineering Directorate's Software Development Plan shall be provided.

FORMAT: The contractor's Software Development Plan shall be developed to the contractor's format. The plan shall demonstrate that the products produced shall be consistent with the content required in Engineering's Software Development Plan described in Appendix D of EA-WI-025. If requested in the DO to provide parts for all Engineering versions of the Software Development, the format in Appendix D of EA-WI-025 shall be used as the format.

MAINTENANCE: The contractor's Software Development Plan is maintained for contractor's internal use. The document can be reviewed at any time upon request. If requested by the DO, a Software Development Plan, generated as a deliverable for Engineering to their customer, shall be updated as required and shall not exceed 4 updates unless otherwise specified in the DO.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
GFE Flight Software Design Document	SEPT 2004	15	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
The purpose of the Software Design Document is to formally report the software design to NASA.		<input checked="" type="checkbox"/>	Technical
		<input type="checkbox"/>	Administrative
		<input type="checkbox"/>	SR&QA
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
EA-WI-025, GFE Flight Project Software and Firmware Development ; EA-WI-018 Use of Off-the Shelf Software in Flight Projects			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: This document describes the design of the software in sufficient detail that the software could be understood and modified by another knowledgeable programmer other than the developer.
 This document describes the rationale for the selected design.

CONTENT:

- Software structure
- Module definitions and functions
- Algorithms
- High level interface descriptions
- Threads of control
- Decomposition into compilation and code units.
- Design of the Interfaces.
- Consideration given to the changes that may be required during flight operation by non-programmers.
- Mapping between the logical or functional design of the software and its detailed design units.

MAINTENANCE: A preliminary version is presented at PDR for approval. The document is updated as required to represent the approved configuration and is again formally reviewed at CDR. Modifications of the document after CDR are controlled by the appropriate NASA GFE configuration control board. A variety of software types may be required by a DO and require different flight program review processes.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Engineering Drawings	SEPT 2004	16	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To provide the design data used to manufacture, install, verify, operate, modify, and maintain the products delivered under this contract.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
JPG 8500.4 Engineering Drawing Systems Manual Web Site: http://www4.edcc.jsc.nasa.gov			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: This DRD establishes the requirements for content, format, control, and maintenance of drawings and associated lists prepared by the contractor and/or obtained from subcontractors or vendors for all products designed under this contract.

CONTENT: All drawings shall be submitted to NASA in electronic format through the Electronic Drawing Control Center unless otherwise addressed in the DO. The contractor shall have the ability to submit and receive CAD generated solid models, electrical/electronic schematics, and printed circuit board layouts. The contractor shall understand and participate as required in the review process that NASA follows in order to approve flight hardware drawings, considered a part of the Engineering Drawings delivery.

FORMAT: Solid models shall be submitted in ProEngineer. All solid models shall be full parameterized in the ProEngineer format. Electrical/electronic schematics and printed circuit board layouts shall be transferred in ORCAD. The format of the drawing shall comply with the guidelines in JPG 8500.4. A request may be made by the contractor to the JSC Contracting Officer to use an existing drawing system that is in place. In accordance with the guidelines set forth in JPD8500.2H, the JSC Contracting Officer and the Technical Monitor may determine that the system is adequate and approve its use. Manufacturing processes shall be referenced to the appropriate specifications or industry standard (e.g. ASME, ANSI).

When a contractor standard or process is referenced, the full standard or process shall be provided as part of the drawing package. Contractor proprietary processes that cannot be submitted cannot be used in support of this contract. COTS hardware shall be identified by the vendor's part number, cage code (if available) and manufacturer's name and address. The parts list shall be submitted in Microsoft Excel and Design Change Notices shall be submitted in Microsoft Word.

MAINTENANCE: Updated as required prior to CDR. All updates are submitted for approval by the appropriate configuration control board prior to obtaining authorization after CDR. Upon completion of the DO, all original drawings and native engineering models created or revised by the contractor or sub-contractors along with the serialization records for all the hardware built to those drawings under the DO shall be delivered to JSC.

PERFORMANCE STANDARD: Drawings are complete and are approved through the NASA process through the Engineering Drawing Control Center on initial submittal. Acceptable performance: up to 10% of the drawings require modifications and re-submittal. Unacceptable performance: 25% or more require re-submittal. Better than normal performance: 6% or less require re-submittal.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Electrical, Electronic, and Electromechanical (EEE) Parts List and Analysis Report	SEPT 2004	17	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
Report to document the analysis used to verify that the selected electrical parts are not overstressed in worst case environments, operating conditions, and duty cycles.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
NSTS 5300.4 (1D-2) SSP 30321	Preliminary Design Review, DRD 06 Acceptance Data Package, DRD 27 Certification Report, DRD 25		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The contractor shall deliver an EEE parts list and all or a part of the products required for EEE Parts Analysis. This report documents the analysis used to verify the appropriate de-rating and stress considerations of the EEE parts selected to meet the full functional performance when used within a system operation under all environmental conditions after worst case impacts of manufacturing, assembly and handling processes. This analysis is also used for system reliability predictions and trends for operation problems.

FORMAT: The contractor's format shall be used. The software used shall be compatible for submittal to NASA.

CONTENT: Analysis for all parts in the EEE Parts, As-Designed Parts List and the bill of materials associated with the complete product. After manufacture, the report shall be updated by including all changes identified in the EEE Parts, As-Built Parts List. This report shall include:

- Analysis of the worst case electrical, mechanical, and high and low temperature thermal stresses by parts from purchase through manufacturing to their use in the intended application
- Data verifying that NASA's de-rating requirements have been complied with
- Electrical drawing with input/output functions (signals, sources and loads and frequencies)
- Environmental and mechanical conditions placed on the hardware
- Analysis to define the environmental and mechanical conditions if required because of the placement of the hardware relative to other influencing hardware
- Tabulation of the worst case stress ratios for the parameters contained in the programs parts de-rating requirements. The tabulation is referenced to designators on the drawings. It identifies the part number, parameters to be verified, device's parametric rating, parameter's worst case calculated induced stress level, specific application, and ratio of the calculated stress level to device rating for the parameter.
- A separate section that identifies parts that were accepted for use even though they did not meet the defined de-rating requirements. The rationale for acceptance of their use and the NASA approval document reference is recorded here.

MAINTENANCE: This document is modified whenever the hardware configuration is changed sufficiently to require additional analysis

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Critical Design Review Data Package	SEPT 2004	18	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
This data package contains the mature engineering, safety, quality and project documentation to be reviewed by the NASA customer and thier designated support in order to assure that the contractor's intended products meet the requirements for safety, cost, performance and schedule.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
EA-WI-023 "Project Management of GFE Flight Projects"		Preliminary Design Review, DRD 06 See other DRDs below	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The contractor may be required in the Delivery Order (DO) to deliver all or a part of the products required for a Critical Design Review data package as described in EA-WI-023. Content that is not required will be defined in the DO.

CONTENT:

- a. Summary of PDR Review Items Disposition that had actions to be completed by or prior to CDR.
- b. End-Item Specification, DRD 10
- c. Interface Control Documents, DRD 9
- d. Engineering Drawings (90% of final drawings), DRD 16
- e. Software Design Document, DRD 15
- f. Phase II RAESR and supporting safety documentation, DRD 39
- g. Verification and Validation Plan (Project Requirement and Verification Document for non-critical GFE), DRD 12
- h. Certification and Acceptance Requirements Document (for EVA Projects only) DRD 45
- i. EEE Parts List and Analysis Report, DRD 17
- j. Limited Life Items List, DRD 32
- k. Workmanship Specifications List, DRD 7
- l. Contractor unique Workmanship Specifications
- m. Summary of waivers/Deviations Requested
- n. Design Analysis Reports, DRD 26
- o. Plan for the User's Guide, DRD 21
- p. Sustaining Engineering Plan
- q. Summary Presentation (See EA-WI-023 for content)
- r. CDR Minutes

FORMAT: The format of each deliverable above that is defined by a DRD is to be delivered in the format specified in that DRD. The format of the summary presentation (item q) shall be defined by the contractor after consideration of the content for this presentation contained in EA-WI-023. The software used shall be Microsoft's Power Point or Microsoft's Word. An electronic version on CD of the Summary Presentation shall be delivered to the Flight Hardware Technical Management Representative (TMR) and to the COTR at least 3 working days prior to the CDR Presentation for early distribution to the review team.

MAINTENANCE: The CDR Data Package is a one time delivery. The package shall be appended by the RIDS from this review. A complete copy shall be maintained as a project quality record in electronic format on a permanent data storage disk. This quality record shall be delivered to NASA at least two months after the CDR review or at the end of the Delivery Order, whichever occurs first.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

PERFORMANCE: 1) Delivery Date: The data products for the CDR review shall be delivered to a location determined by the COTR or the Technical Manager's Representative two weeks prior to the formal review date defined in the DO. Delivery two Weeks and two days before the formal review will be considered better than normal delivery. Delivery one week and five days or less than the review will be considered less than normal performance. A delivery of one week or less is considered poor performance for this product. 2) Complete Content: Normal performance is considered if the data package contains products that are accepted with little modification required. Little modification means that all issues with the content controllable by the contractor can be resolved within 1 month of the review. All content issues resolved within three weeks of the review is considered better than normal performance and content issues resolved longer than eight weeks is considered poor performance.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Engineering Design Change Proposal	SEPT 2004	19	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
Define contractor proposed changes to controlled NASA requirements or product configuration.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
EA-WI-027			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: This DRD provides a description of the minimum information required to be submitted to NASA when a change to NASA requirements is believed by the contractor to save money, reduce risk, increase efficiency, improve performance, or improve safety.

CONTENTS: The Engineering Design Change Proposal (EDCP) shall contain the following data as a minimum. It is acceptable for the contractor to submit a change using the forms provided by the appropriate NASA change board.

1. Contractor EDCP number, date, and title
2. Description of change including technical impacts and technical impacts if not changed.
3. Justification for change
4. Effectivity of the change specified in terms of deliverable subcontract end items and affected serial number.
5. Retrofit requirements and proposed incorporation/action shall be provided when applicable.
6. Documents Affected
7. Estimate of cost impact
8. Impact to Schedule
9. Impacts to Safety

FORMAT: The contractor's format shall be used unless a NASA configuration control board form is used. Changes to NASA controlled documentation shall be submitted with the current "From" text or drawing and the proposed "To" text or drawing.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Flight Hardware Qualification Test Procedures	SEPT 2004	20	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To define all procedures and success criteria for testing new flight hardware or modified flight hardware and qualify that the GFE meets design requirements.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
Task Performance Sheet (TPS), NT-CWI-001 http://www4.jsc.nasa.gov/eaprojects/EA-ISO9000/NT-CWI-001.doc		Verification and Validation Plan, DRD 12 End Item Specification, DRD 10 Flight Hardware Software Requirements Specification, DRD 13 Certification and Acceptance Document, DRD 45	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: To document the detailed procedures used to test GFE flight products in order to assure that engineering processes and assumptions used are adequate for qualification.

CONTENTS: The procedures shall contain the following:

1. Identification of the specific End Item being tested
2. Detail description of the test objective
3. Description of all relevant test equipment and facility used
4. Full set of procedures
5. Criteria for passing or failing each test
6. Specification of the tolerances on all operational parameters with go, no-go criteria
7. Initial Settings for all Controls, Power Supply Voltages, etc.
8. Safety hardware that is mandatory to be verified operational prior to testing, with reference to procedures used.

FORMAT: A Test Preparation Sheet shall be used to document and control the detailed instructions needed to actual perform the procedure.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Flight Product User's Guide	SEPT 2004	21	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To provide all necessary information on how the flight product or ground support hardware is to be operated, serviced and maintained.		<input checked="" type="checkbox"/>	Technical
		<input type="checkbox"/>	Administrative
		<input type="checkbox"/>	SR&QA
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
EA-WI-023 "Project Management of GFE Flight Products" EA-WI-025 GFE Flight Project Software and Firmware Development			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The User's Guide is a compilation of information that is required for the user to operate, service and maintain the hardware and software without assistance from the providing contractor.

CONTENTS: The guide shall define procedures that assure safe and efficient handling of the hardware and software. It shall identify hazards that may be encountered throughout the procedures along with all controls for the hazard.

FORMAT: The User's Guide may contain text, graphics, video, or photographic content. The contractor shall use the contractor's formats for the written portions of the guide. Those portions of the guide that may be used by the flight crew shall have a flight crew representative assessment of the final product and corrections made prior to final submittal. Electronic graphical procedures shall be provided in ProE format. A suggested format for software can be found in EA-WI-025 GFE Flight Project Software and Firmware Development.

MAINTENANCE: The User's guide shall be updated for up to two years after hardware acceptance by NASA. Flight crew experiences when using the guide and corrections of technical content may be some of the sources for updates.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Software Code	SEPT 2004	22	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
EA-WI-027 Configuration Management Requirements; EA-WI-025 GFE Flight Project Software and Firmware Development		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
EA-WI-027 Configuration Management Requirements; EA-WI-025 GFE Flight Project Software and Firmware Development	Flight Hardware Software Design Document, DRD 15		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: Software, like hardware, is an essential element of GFE performance. The software for GFE is to be documented and placed under configuration controlled (See EA-WI-025)

CONTENT: Software includes all source code files, header files, data files, and derived products.

MAINTENANCE: Throughout the life of a project, it can be expected that software will undergo multiple configuration changes. The software files will be modified after consideration by the appropriate EA and program configuration control boards.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Information Technology (IT) Security Program Plan and Reports	SEPT 2004	23	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To meet IT security reporting requirements		<input checked="" type="checkbox"/>	Technical
		<input type="checkbox"/>	Administrative
		<input type="checkbox"/>	SR&QA
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
NFS 1852.204-76 (July 2001) NPG 2810.1 JPG 2810.1			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: All contracts that purchase, lease, network to, or otherwise utilize government-funded IT (as defined by the Clinger-Cohen Act of 1996) must comply with the NASA IT Security Requirements.

CONTENT:

SECURITY PROGRAM PLAN:

This plan shall contain the overall security policies, as required, for each system and application in a form compatible with the NASA Information Technology System (ITS) Security Program and the security and policies of the Center at which the work is being performed. For work being performed at JSC or at remote contractor sites not located at a NASA field center, the plan shall be in accordance with JPG 2810.1, JSC IT Security Handbook.

This plan shall also address the contractor's approach for ensuring verification of compliance with Section 508 of the Rehabilitation Act of 1974.

SECURITY STATUS REPORT:

This report shall document the security status of all ITS, including any suspected security violations or infractions.

INFORMATION ON EMPLOYEES IN SENSITIVE POSITIONS/ASSIGNMENTS REPORT:

The Information on Employees in Sensitive ITS Positions/Assignments Report shall provide information for personnel screening as required by JPG 2810.1.

SYSTEM ADMINISTRATOR SECURITY CERTIFICATION PROGRAM:

This Agency-wide program applies to all lead system administrators administering systems on NASA IP address space.

All individuals who perform tasks as a system administrator or have authority to perform tasks normally performed by system administrator shall be required to demonstrate knowledge appropriate to those tasks. This demonstration, referred to as the NASA System Administrator Security Certification, is a NASA funded two-tier assessment to verify that system administrators are able to –

1. Demonstrate knowledge in system administration for the operating systems for which they have responsibility.
2. Demonstrate knowledge in the understanding and application of Network and Internet Security.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

Certification is granted upon achieving a score above the certification level on both an Operating System test and the Network and Internet Security Test. The Certification earned under this process will be valid for three years. The criteria for these skills assessments has been established by the NASA Chief Information Officer. The objectives and procedures for this certification can be obtained by contacting the IT Security Awareness and Training Center at (216) 433-2063.

A system administrator is one who provides IT services, network services, files storage, web services, etc. to someone else other than themselves and takes or assumes the responsibility for the security and administrative controls of that service or machine. A lead system administrator has responsibility for information technology security (ITS) for multiple computers or network devices represented within a system; ensuring all devices assigned to them are kept in a secure configuration (patched/mitigated); and ensuring that all other system administrators under their lead understand and perform ITS duties. An individual that has full access or arbitrate rights on a system or machine that is only servicing themselves does not constitute a "system administrator" since they are only providing or accepting responsibility for their system. An individual only servicing their own IT system, is not required to obtain a System Administrator Certification.

MAINTENANCE: As defined in JPG 2810.1

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Certification Plan	SEPT 2004	24	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
The Qualification Plan formally presents the approach to qualifying the first unit delivery of GFE		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
EA-WI-023 Project Management of GFE Flight Projects JSC 26626 EVA Hardware Generic Design Requirements Document		DRD 12 Verification and Validation Plan DRD 45 Certification and Acceptance Requirements Document	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The Certification plan documents the approach to qualifying GFE products for flight. It describes in detail how the processes of testing, analysis, demonstration and inspection shall be used to certify that contracted requirements are met. The requirements addressed by the Certification process are typically those that need to be addressed only one time in order to prove the design has met the intent.

CONTENT: The Certification Plan defines how the GFE products are qualified to meet the design requirements that have applied to the end item. Analysis, Test, Inspection, Demonstration, a combination of methods, or other methods may be used. The Certification Plan addresses those engineering design aspects that need to be verified on the first delivery only in order to verify that a requirement has been met. This is typically performed on dedicated certification products. In some cases the products may be used for flight if it can be shown that the certification process did not degrade the product.

MAINTENANCE: This document is maintained throughout the life of the project after the initial submittal at CDR. Revisions to the plan may be required every time there is a change to the configuration of the GFE. All versions of the plan shall be retained throughout the life of the GFE product.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Certification Report	SEPT 2004	25	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
Documents the results of the Certification process. This documentation is used to complete a portion of the overall verification of the GFE. It is modified through the life of the products as configuration changes are made that require additional Certification or re-qualification.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
EA-WI-023 "Project Management of GFE Flight Products" EA-WI-025 GFE Flight Project Software and Firmware Development		Verification and Validation Plan, DRD 12 Certification and Acceptance Requirements Document DRD 45 Certification Plan, DRD 24 EEE Parts List and Analysis, DRD 17 Flight Hardware Certification Test Procedures, DRD 20	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: Documents the results of certification testing, analysis, inspections, and demonstrations used to verify one time the design and performance of GFE Flight products. This report addresses all objectives defined in the Certification Plan.

CONTENT: The Certification Report contains all records used to verify that the GFE flight products met all the requirements that were allocated to the certification process in the Verification and Validation Plan. It contains the certification test results, the analysis results, results of demonstrations, results of inspections that are performed initially when hardware is first delivered and may be performed again when a configuration change is made. The detailed records of test procedures, analytical runs, inspections procedures, and demonstration procedures that support the results are to be available to the NASA as a part of this DRD.

MAINTENANCE: The Certification Report is updated every time a configuration change is made that would have affected the certification process had it been a part of the original design. Additional certification testing, analysis, inspection and demonstration will be required. A change record is maintained as part of the document.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Engineering Analysis	SEPT 2004	26	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
Engineering analysis is performed to provide design facts that are used as part of the 1 st item certification, certification of design changes, and certification of existing designs that are used beyond original certification limits. Analysis is relied upon to assure safety and to understand failures.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
EA-WI-023 "Project Management of GFE Flight Projects"	DRD 06 PDR Data Package DRD 18 CDR Data Package DRD 39 RAESR DRD 44 Certification Data Package		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: Engineering work required to be performed to support the programs requires analyses at all stages throughout a project as defined in EA-WI-023 and EA-WI-025. Analysis can be explicitly identified in a Delivery Order or implicitly identified by requiring whole projects or phases of project as defined in the work instructions.

CONTENT: Engineering analysis required for design, performance prediction, and off-nominal assessment will be required. Some types of analysis that are frequently required in complex flight hardware are:

- Process Performance, and Control
- Stress and fracture control
- Thermal Stress Analysis
- Electromagnetic Effects
- EEE Parts Stress and de-rating
- Operational life
- Systems Integration and Off-Nominal Performance
- Stored Energy Impact and Isolation
- Materials Compatibility [off-gassing, corrosion, flammability, toxicity, performance, life]
- Safety [Hazard, Operability, Ground Handling]
- Failure Modes and Effects Analysis
- Failure Investigation Analysis
- Reliability Analysis

The analysis performed and report shall include a description of the assumptions made, sufficient technical details that analysis experts in the specific technical discipline can understand to determine the adequacy of the analysis, and a description of the software.

FORMAT: The format for reporting the results of some analyses may be dictated by a program. The contractor shall identify the need for a specific format from the configuration management information maintained on the program's web site. If a specific format is not requested, the contractor's format is to be used.

MAINTENANCE: Analyses may need to be performed as a result of design changes or changes in the intended use of hardware or software. The need for revisions to analyses and amendments to analysis reports can be expected throughout the duration of the Delivery Order.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Acceptance Data Package	SEPT 2004	27	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
The ADP is a collection of documents that define the current status of a GFE flight products at the time of acceptance by NASA representatives.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
ISS: SSP 30695 "Acceptance Data Package Requirements Specification" EA-WI-023 "Project Management of GFE Flight Projects"			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The ADP is the collection of documentation that provides information that established a complete status of the certified and verified deliverable flight products or support products for flight products. It provides documentation of the "as-built" configuration. An ADP shall be submitted with shipment/transfer of each flight hardware/software product. The ADP is maintained throughout the life of the flight hardware/software in order to retain a record of the current status.

FORMAT: The format will vary depending on the program that the hardware supports. For ISS, the format is defined in SSP30695. The format to be used shall be defined at PDR for the flight products.

CONTENT: The information required in a specific ADP is dependent on the nature of the products to be provided. The need for and the content of the ADP shall be determined by the review team at PDR or shall be specified in the DO. Items which may be contained in the ADP are given below. The Space Shuttle Program accepts the ISS requirements for ADPs.

- a. Signed DD Form 250/1149 or equivalent signifying that NASA accepts that the products and supporting information that is provided meet the contracted obligation for the flight products. The DD250 is approved by the Contracting Officer's Technical Representative.
- b. Historical Log/note/comments (see JSC Form 772 "Functional Equipment Historical Record")
- c. Waivers/deviations
- d. Unexplained Anomalies
- e. List of Shortages
- f. Unplanned/Deferred Work
- g. Pre-planned Assigned Work
- h. Identification – As-Designed List; As-Built List
- i. Operating Time/Cycle (if certified life and operating cycles are limited)
- j. Age-Sensitive/Time-Action Items
- k. Non-Standard Calibration Record
- l. Discrepancy Reports requiring Material Review Board approval
- m. Repair Limitations
- n. Pressure Vessel Data, including pressure cycle data (if certification limited)
- o. Non-Flight Hardware Temporary Installation (e.g. CAPS for shipping which are removed before flight)
- p. Materials Safety Data Sheets
- q. Selected Engineering drawings (e.g., assembly level drawings)
- r. Software/Firmware Version Description Document (VDD) (see EA-WI-025)
- s. Special instructions to maintain safety and functionality of the GFE during storage, handling, maintenance and disposal
- t. Certification (including reference to completed documentation indicating that qualification of design and design changes and acceptance requirements have been satisfied, acceptance test procedures (ATP) numbers and ATP report numbers)
- u. Users Guide or Systems Operating Manual for hardware and software - DRD 21
- v. Energy Storage Products Log and Qualification References (Pyrotechnics, batteries, springs, etc.)

JSC DATA REQUIREMENT LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

MAINTENANCE: The data package is maintained throughout the life of the product. As additional use, certification testing, analysis, etc. is undertaken, these results are added to the data package.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Export Control Audit Results	SEPT 2004	28	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To provide insight into the Contractor's Export Control processes		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
NFS 1852.225-70 and Clause H.4			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: Audits should include a thorough examination of all export control processes (as outlined in the Contractor's Export Control Plan) associated with this contract, areas for improvement (if any), and corrective action plans for identified areas of improvement. Affected subcontractors are required to do their own self-audits and report the results of the audit to NASA through the contractor. Prior to audit completion, inclusion on the audit process thru informal statuses to the JSC Export Services Team or Center Export Administrator is optional and might prove useful in the success of this effort.

CONTENT:

- (a) Define your current audit processes
- (b) Document the export control processes audited and audit findings
- (c) Based on audit findings, the contractor/subcontractor shall include corrective action plans for any processes identified for improvements and notification of when the correction of any non-conformances has been completed.

MAINTENANCE: The document shall be maintained electronically.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Quality Plan	SEPT 2004	29	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
The Quality Plan is used to document the specific details of the contractor's Quality Management System (QMS) related to a specific product or process.		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: A contract specific Quality Plan shall be prepared which identifies activities performed to ensure the quality of products and services. The Quality Plan is to be submitted with the Contractor's proposal. The plan will be approved by the Contracting Officer concurrent with Contract award.

FORMAT: The Quality Plan format shall match the elements of the SAE, AS9100 - Model for Quality Assurance in Design/Development, Production, Installation, and Servicing and Supplements contained in the Statement of Work, Quality Assurance section.

CONTENTS: The quality plan shall address each element of the SAE, AS9100 - Model for Quality Assurance in Design/Development, Production, Installation, and Servicing in enough detail to describe how requirements will be implemented for this contract.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Patent Rights-Retention	SEPT 2004	30	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
Identification of any subject inventions including information on patent applications and related filings.		<input type="checkbox"/> Technical <input checked="" type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
NFS Clause 18-52.227-11			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: Inventions by the Contractor as part of their performance on this government contract.

CONTENT: The content of the deliverable shall include:

- a. A listing every twelve (12) months of all subject inventions required to be disclosed during the period.
- b. A final report prior to closeout of the contract listing all subject inventions or certifying that there were none.
- c. Upon request, the filing date, serial number and title, a copy of the patent application, and patent number and issue date for any subject invention in any country in which the contractor has applied for patents.

FORMAT: The electronic or paper version of NASA form 1679, Disclosure of Invention and New Technology (Including Software) to disclose subject Invention

FIRST SUBMISSION DATE: 12 months after contract start

Frequency Of Submission: Once a year

Additional Submissions: Final report at contract closeout.

MAINTENANCE: Updated annually by the Contractor and submitted in printed form.

13. REMARKS: None

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Shuttle/Station Payload Safety Data Package (SDP)	SEPT 2004	31	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
This DRD defines the payload safety review process and data required to assist the Shuttle/ISS Payload Organizations in documenting compliance with the payload safety requirements		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
NSTS/ISS 13830			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE/CONTENT/MAINTENANCE:

The contractor shall submit Safety Data Packages (Phases 0-III) and other supporting documentation as required by NSTS/ISS13830. The payload Safety Process as defined by NSTS/ISS 13830 shall be followed using the latest Revision, which can be found at the following URL's

<http://jsc-web-pub.jsc.nasa.gov/psrp/> (Public Access, JSC Internal Homepage access not required)

<http://wwwsrqa.jsc.nasa.gov/pce/> (JSC Internal Homepage access required)

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Limited Life Items List	SEPT 2004	32	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
The purpose of this DRD is to provide the necessary information and definitions to consistently and clearly identify limited life components to maintain GFE in a use ready condition. This information permits operations, logistics and maintenance organizations, to plan for the timely removal and replacement of hardware identified with limited life so as to ensure continuation of proper operation.		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
See "Reference Documents" under item 8 below.			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

REFERENCE DOCUMENTS:

JSC 17057, GFE Limited Cycle Time/Age Life Item Requirements
 NSTS 22206, Requirements for Preparation and Approval of Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)
 SSP 30234, Instructions for Preparation of Failure Modes and Effects Analyses and Critical Items List for Space Station

SCOPE: Limited life includes limited shelf life, limited operating life, time-action control sensitive (including maintenance activities), or a combination of these.

CONTENT: At a minimum, the following data shall be provided:

A. Deliverable item:

1. Name;
2. Part Number;
3. Serial number;
4. Contractor and Government Entity (CAGE) code;
5. Life limiting parameter, material, or function (including analyses);
6. Restrictions or limitations on refurbishments;
7. Mean Time Between Failures (MTBF) (only for items identified as criticality 1, 1R, or 2 per NSTS 22206 or SSP 30234); and
8. MTBF units (e.g. hours).

B. For deliverable items which are, or contain, operating time/cycle sensitive items, these additional data shall be provided:

1. Time/cycle item part name;
2. Time/cycle item part number;
3. Time/cycle item part serial number;
4. Time/cycle item part CAGE code;
5. Specification requirement (allowable time/cycles); and
6. Remaining time/cycles from point of delivery.

C. For deliverable items which are, or contain, age-sensitive/time-action items, these additional data shall be provided:

1. Age-sensitive/time-action item part number;
2. Age-sensitive/time-action item part serial/lot number;
3. Age-sensitive/time-action item part CAGE code;
4. Age-sensitive/time-action item part birth date;
5. Age-sensitive/time-action item part expiration date (action due date);

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

6. Type of action required (i.e., replace, service, inspect, etc.);
7. Last operation and/or servicing date (time-action items only); and
8. Next operation and/or servicing date (time-action items only).

FORMAT: Electronic tables for entry into NASA databases. Analyses (item A.5 above) may be provided via hardcopy, in contractor format. For multiple GFE deliveries, analyses is not required for deliveries subsequent to the initial delivery unless there is a change.

MAINTENANCE: Update as required

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Space Station GFE Failure Modes Effects and Analysis (FMEA) and Critical Items List	SEPT 2004	33	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To identify failure modes and effects, and critical items to support risk assessment, additional design action, safety analysis, hardware/software interface analyses, test planning, mission planning, preparation of mandatory inspection points, fault detection and isolation, maintainability analyses and planning, maintenance planning and logistics planning		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: Identification of failure modes and effects, and critical items to support risk assessment, additional design action, safety analyses, hardware/software interface analyses, test planning, mission planning, preparation of mandatory inspection points, fault detection and isolation, maintainability analyses and planning, maintenance planning, and logistics planning.

The flight hardware and Ground Support Equipment FMEA/CIL shall be documented in accordance with SSP 30234, "Instructions for Preparation of Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL) for the International Space Station." If the GFE is defined as a criticality 3 using an Initial Assessment of Criticality, JSC 28484 methodology can be used.

FORMAT: The flight hardware FMEA/CIL worksheets shall be prepared in accordance with SSP 30234. Other information supporting the FMEA/CIL (summary tables, ground-rules and assumptions, reliability block diagrams, incomplete design areas) will be part of the RASER.

A Critical Items List (CIL) for Ground Support Equipment (GSE) shall be submitted in hardcopy form only, in subcontractor format, as part of the RASER.

FMEA/CIL worksheets shall be submitted electronically per SSP 30234.

NEED DATE or MILESTONE REQUIRING FMEA/CIL DATA SUPPORT:

The FMEA/CIL data requirements apply to all flight (including OSE, FSE) hardware.

The data provided for the first applicable IDR may be preliminary data (data integrity equivalent to that expected at a PDR). If the initial submittal is preliminary data, final data must be provided to support a subsequent IDR (data integrity equivalent to that expected at a CDR).

Multiple deliveries of the GFE do not require corresponding data deliveries.

Note: This DRD also applies to GSE required to support the flight hardware.

JSC DATA REQUIREMENT LIST (DRL)/DATA REQUIREMENT DESCRIPTION (DRD)
(Based on JSC -STD-123)

SDRL Specifications:

SEQUENCE NUMBER:

TITLE OR DESCRIPTION OF DATA: Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)

CONTRACT NUMBER:

STATEMENT OF WORK PARA:

AUTHORITY: (DID/SDS No.) 6

NASA OFFICE OF PRIME RESPONSIBILITY: S&MA

TRANSMITTAL BY:

NASA DOCUMENT TYPE:

ELECTRONIC SUBMITTAL REQUIRED: Yes

FREQUENCY:

AS OF DATE:

DATE OF 1ST SUBMISSION:

DATE OF SUBSEQUENT SUBMISSION / EVENT ID:

DISTRIBUTION AND ADDRESSES:

Remarks:

Applicable Code: Critical item worksheets (Flight Hardware and GSE Hardware) shall be Type 1. Remainder of document shall be Type 3.

Frequency, Date of first Submission, and Date of Subsequent Submission/Event ID: Initial Submittal shall be early enough to affect the design process.

Subsequent submittals shall be thirty (30) days prior to program milestone reviews as determined by program milestone review plan. Quarterly delivery of working files provided electronically in a delimited flat ASCII database file per SSP 30234.

A Critical items list (CIL) for Ground Support Equipment (GSE) shall be submitted in hardcopy form only, in Product Group format.

Note: FMEA/CIL supporting information (summary tables, ground rules and assumptions, reliability block diagrams, incomplete design areas) are reported as part of SS-SM-005 (R&M Predictions Report).

JSC DATA REQUIREMENT LIST (DRL)/DATA REQUIREMENT'S DESCRIPTION (DRD)
(Based on JSC -STD-123)

INTERNATIONAL SPACE STATION
FAILURE MODE AND EFFECTS ANALYSIS
WORKSHEET HEADER PAGE

PREPARED BY DESIGN
PREPARED BY RELIABILITY
FMEA WORKSHEET NUMBER:

ORIGINAL DATE:

FLIGHT/GSE:

END ITEM:

SYSTEM:

SUBSYSTEM:

SEGMENT FUNCTION:

END ITEM FUNCTION:

SOFTWARE INTERFACE:

ORU NAME:

ORU NO:

CRITICALITY 1 DURING MAINTENANCE:

SUCCESS PATHS:

SUCCESS PATHS REMAINING:

PART NAME:

PART NUMBER:

DRAWING NUMBER:

LCN/REF.DES:

QTY:

ITEM FUNCTION:
WORKSHEET NUMBER:
FAILURE MODE CODE:
FAILURE MODE TEXT:

CRITICAL ITEM (Y/N):
IS FUNCTION RESTORABLE ON-ORBIT:
CHECKOUT PRELAUNCH:
CHECKOUT ON-ORBIT:
DETECTABILITY GROUND CREW:
DETECTABILITY FLIGHT CREW:
LOSS OF REDUNDANCY FROM A SINGLE CAUSE:
CAUSE: 1:
CAUSE: 2:
CAUSE: 3:
CAUSE: 4:

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

CAUSE: 5:
CAUSE: 6:
STAGE(S) AFFECTED:

ORU/ASSEMBLY
MISSION PHASES FAILURE EFFECT
A. PRELAUNCH
B. TRANSPORTATION
C. ASSEMBLY
D. OPERATIONS
E. RETURN

SUBSYSTEM/NEXT ASSEMBLY
MISSION PHASES FAILURE EFFECT
A. PRELAUNCH
B. TRANSPORTATION
C. ASSEMBLY
D. OPERATIONS
E. RETURN

END ITEM/SEGMENT
MISSION PHASES FAILURE EFFECT
A. PRELAUNCH
B. TRANSPORTATION
C. ASSEMBLY
D. OPERATIONS
E. RETURN

CREW/ISS/ACRV/ORBITER
MISSION PHASES FAILURE EFFECT
A. PRELAUNCH
B. TRANSPORTATION
C. ASSEMBLY
D. OPERATIONS
E. RETURN

SOFTWARE INTERFACE EFFECT:
TIME TO EFFECT: QTY: UNITS:
TIME TO DETECT: QTY: UNITS:
CRITICALITY: MSN PHASES:
CORRECTIVE ACTION:

FAILURE DET/VERIF:

WORKSHEET REMARKS:
HAZARD:
HAZARD DOCUMENT ORGANIZATION CODE:
HAZARD NUMBER:
HAZARD DOCUMENT

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Space Shuttle GFE Safety Analysis Report (SAR) and Hazard Report (HR)[HR_1]	SEPT 2004	34	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
The SAR is used to document the safety analysis performed on a system Subsystem or operation. The HR is the output of the hazard analysis and is used to provide program management a summary of risk in terms if cause, control and verification.		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
See "Reference Documents" under item 8. below	GCAR		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

Reference Documents:

- a. NSTS 5300.4 (1D-2), "Safety, Reliability, Maintainability and Quality Provisions for the Space Shuttle Program"
- b. JSC 17481A, "Safety Requirements Document for JSC Space Shuttle Flight Equipment"
- c. NSTS 07700, Vol. V, "Information Management"

SCOPE: A SAR and HR 's are applicable to all Government-furnished equipment (GFE) classified flight hardware.

FORMAT: The format of the SAR and HR's shall be in accordance with NSTS 22254 "Methodology for Conduct of Space Shuttle Program Hazard Analyses"

CONTENTS: The hardware provider shall provide the SAR and HR 's for program management visibility.

a. SAR: A safety analysis shall be performed in accordance with NSTS 22254 and a SAR shall contain the following as a minimum:

- (1) System, subsystem, assembly, or item identifier
- (2) Event and mission phases considered.
- (3) Page, date, and revision number.
- (4) Identification of the preparer and approvals with signatures.
- (5) Description of the type of hazard analysis performed.
- (6) Analysis of each generic hazard listed in JSC 17481A and unique hazards showing applicability or inapplicability, controls, and verifications.
- (7) Safety matrix relating equipment subsystems to generic hazards.
- (8) Hazard list providing HR number, title, status, and classification for any baselined hazards.
- (9) Summary of open HR 's with actions required for closure.
- (10) Summary of candidate accepted risks with acceptance rationale.

The SAR may be sufficed by a properly and completely filled out hazard analysis worksheet or Government Certification Approval Request (GCAR) in situations where the system, subsystem, assembly, or item is non-critical, low cost, and not complex in design.

b. HR 's: If HR 's are required based on the safety analysis performed, the HR's shall comply with the requirements of NSTS 07700, volume V and NSTS 22254. The HR 's shall contain, by attachment, documentation of work performed to support closure.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Software Quality Assurance Plan, Reports	SEPT 2004	35	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
Software assurance planning is used to document the software assurance activities to be performed during the life cycle phases. Reports document the status of the activities.		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
See "Reference Documents" in Box 8 below.	Certification Data Package (CDP); Problem Reporting and Corrective Action (PRACA)		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

REFERENCE DOCUMENTS:

- a) NASA-STD-2201-93, Software Assurance Standard
- b) NPD 2820.1, NASA Software Policies
- c) NASA-STD-2100-91, NASA Software Document Standard
- d) SAE, AS9100 - Model for Quality Assurance in Design/Development, Production, Installation, and Servicing
- e) Other approved vendor/contractor, international, U.S., or Military Standards
- f) Project planning documents per the SOW (Statement of Work)
- g) JSC 27291, GFE Software Design, Development, Test and Evaluation Work Instruction

SCOPE: Software Assurance includes Quality Assurance, Quality Engineering, Verification and Validation, Nonconformance Reporting and Corrective Action, Safety Assurance, Software Reliability and Security Assurance. Software Assurance activities are conducted during the software development life cycle. The phases of the software development life cycle are:

- a) Concept and Initiation Phase
- b) Requirements Phase
- c) Design Phase
- d) Implementation Phase
- e) Integration and Test Phase
- f) Acceptance and Delivery Phase
- g) Operations/Maintenance Phase

DEFINITIONS: Software Quality Assurance applies to all software developed for NASA, including:

- a) deliverable software,
- b) software included as part of deliverable hardware (including firmware),
- c) non-deliverable software (Commercially available or user-developed) used for development, fabrication, manufacturing process control, testing, or acceptance of deliverable software or hardware (test and acceptance software; software design, test, and analysis tools; compilers, etc.)
- d) Commercially available (COTS), reused, or government-furnished software (GFS)

CONTENT: Contractor shall provide a Software Assurance Plan in accordance with M400 as contained in NASA-STD-2100-91. The Software Assurance Plan shall identify the software assurance approval authority responsible for the establishment and composition of all software baselines and any changes to the baseline. (Per NASA-STD-2201-93 section 3.2.6.)

Contractor shall provide software assurance activity reports in accordance with R008 in accordance with NASA-STD-2100-91.

MAINTENANCE: Review annually at a minimum.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Space Station Hazard Reports (HR's)/System Descriptions [HR_2]	SEPT 2004	36	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
Station GFE HR's and System Descriptions are used by the Prime Contractor to prepare an integrated Stage Hazard Analysis which will entail the analysis of the interfaces between End Items on-orbit for each mission in support of the Safety Review Panel and Ground Safety Review Panel (GSRP).		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
		GCAR	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE/CONTENT/MAINTENANCE: This requirement shall consist of system descriptions with Hazard Reports and their supporting data. The hazard reports and system description will cover each GFE end item for all phases.

The System Description shall describe the GFE (FLT, OSE, FSE, & GSE) end-items and their systems and associated ground systems and support equipment. The system description shall also include on-orbit assembly, on-orbit operations and start-up sequences. Top-level schematics/functional block diagrams that depict safety features shall be provided.

The flight hazard reports shall address interfaces with element level end items other GFE, and CFE. For each subsequent revisit to the station, each GFE provider will assess on-orbit configurations changes to their End Item which may affect the safety of the station and submit as applicable. A contract letter stating no impact is acceptable. The GFE and Ground Operations hazard report will cover the Support Equipment (GSE/TSE) interfacing with flight hardware at KSC as well as the operations to process the flight hardware through KSC for integration into the Orbiter.

CONTENT: Flight Hazard Reports and system descriptions shall be submitted on each GFE end-item and shall address hazards from launch through return/decommissioning. The Hazard Reports document the results of the safety analysis which is performed to identify hazards and their causes, identify specific safety requirements and non-conformances, specify control methods in the design, and identify verification activities.

Ground Hazard Reports and System descriptions shall address all hazards associated with launch processing and includes the Ground Safety Checklist (JF970).

These submittals shall include the additional forms in Appendix C as appropriate.

Hazard Reports shall be submitted with a level of maturity commensurate with the hardware, software, and operations that are being reviewed.

Each review will address products with different levels of maturity. The following table shall apply:

Product Maturity	Review Phase	Report Content
PDR	I	Hazards identified
CDR	II	Controls documented
Launch - 1 year	III	Verification complete*

* All verifications that are not complete at the Phase III level review shall be documented in a verification matrix to be identified in block 5 "status of open work" of the hazard report.

The final submittal of hazard reports and system descriptions shall be grouped by mission. This grouping is necessary to support FRR.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

Hazard reports and their supporting documentation for contractor furnished equipment shall be delivered 90 days prior to the phase safety review for which it is first manifested.

FORMAT: Formats for the Hazard Reports are contained in appendices to this DRD. S&MA-4 shall be submitted in hard copy and in Microsoft Word.

Appendix A: Flight Hazard Analysis Report and System Description content (See JF1366 and JF1477)

Appendix B: Ground Hazard Analysis Report and System Description content (See JF970)

Appendix C: Additional Forms

Appendix D: Hazard Report Format

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

Appendix A

Flight Hazard Analysis Report and System Description Format and Content

1.0 Scope

Identify the hardware that was analyzed and the maturity (Phase 1, 2, 3) of the analysis.

2.0 System Description

Describe the major end-items and their systems and associated ground systems and support equipment. The system description shall also include on-orbit assembly, on-orbit operations and start-up sequences. Top level schematics / functional block diagrams that depict safety features shall be provided.

3.0 Supporting Data

This section contains data that is important to the analysis and does not fit in other sections. The contractor may determine how this section is arranged.

4.0 Hazard Reports and Substantiating Data

This section shall include all hazard reports applicable for the mission, supporting data, and additional forms as defined in Appendix C.

5.0 Ground Safety Checklist - Attach form JF970.

Appendix B

Ground Hazard Analysis Report and System Description Report

GROUND HAZARD ANALYSIS REPORT AND SYSTEM DESCRIPTIONS

FOR

PG-X

Prepared By:

Name of Tier I Subcontractor

Approved By:

Tier I Safety Manager

Date:

**Tier I Subcontractor
Vehicle AIT Manager
Date:**

**Tier Program Manager
Date:**

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

Ground Hazard Analysis Report and System Description Format and Content

- 1.0 Scope. Identify the hardware that was analyzed and the maturity of the analysis.
- 2.0 GSE Design and Ground Operations. This section will be completed for each supported launch. This section includes:
- 1) Cargo element/launch package description and brief mission scenario.
 - 2) Descriptions of GSE, cargo element/launch package subsystems that are safety critical during ground processing, and their ground operations. Schematics and block diagrams with safety features, inhibits, etc., identified should be included.
 - 3) Ground operations scenarios or a brief description of the in-line and off-line sequencing of ground processing tasks, including transport, receipt, assembly, test/checkout and ultimate usage.
- 3.0 Supporting Data. This section contains data that is important to the analysis and does not fit in other sections. Tier 1 contractor may determine how this section is arranged.
- 4.0 Hazard Reports and Substantiating Data. This section shall include all hazard reports applicable for the mission.

Appendix C

Additional Forms

Appendix D

Hazard Report Form

Format and Content

D-1. Hazard Reports shall be delivered in Microsoft Word format.

D-2. The following format and structure shall apply.

TEAM NAME
International Space Station

Hazard Report Number _____

1. HAZARD TITLE:

- a. Review Level:
- b. Review Date:
- c. Scope:

2. HAZARD CONDITION DESCRIPTION:

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

Hazard Report Number _____

CAUSE

1 HAZARD CAUSE DESCRIPTION:
SEVERITY LIKELIHOOD:

2 CONTROL(S):

Control 1

Control 2

Control 3

3 METHOD FOR VERIFICATION OF CONTROL(S):
Verification of Control 1

Verification of Control 2

Verification of Control n

4 SAFETY REQUIREMENT (S):

Document: Paragraph:
Title

Document: Paragraph:
Title

5 MISSION PHASE (S):

Launch Processing
Launch
Rendezvous/Docking
Deployment
Orbital Assembly & Checkout
On-Orbit Operation
On-Orbit Maintenance
Return/Decommissioning

6 PROGRAM STAGE(S):

7 DETECTION AND WARNING METHOD(S):

8 CAUSE REMARKS:

9 CIL REFERENCE:

10 POINT OF CONTACT:

Name: Telephone:

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

Hazard Report Number _____

CAUSE

1 HAZARD CAUSE DESCRIPTION:

SEVERITY LIKELIHOOD:

2 CONTROL(S):

Control 1

Control 2

Control 3

3 METHOD FOR VERIFICATION OF CONTROL(S):

Verification of Control 1

Verification of Control 2

Verification of Control n

4. SAFETY REQUIREMENT(S):

Document: Paragraph:
Title:

Document: Paragraph:
Title:

5. MISSION PHASE(S):

Launch Processing
Launch
Rendezvous/Docking
Deployment
Orbital Assembly & Checkout
On-Orbit Operation
On-Orbit Maintenance
Return/Decommissioning

6. PROGRAM STAGE(S):

7. DETECTION AND WARNING METHOD(S):

8. CAUSE REMARKS:

9. CIL REFERENCE:

10. POINT OF CONTACT:

Name: Telephone:

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENT DESCRIPTION (DRD)
(Based on JSC -STD-123)

SDRL Specifications:

SEQUENCE NUMBER

TITLE OR DESCRIPTION OF DATA: Hazard Analysis Report and System Description

CONTRACT NUMBER:

STATEMENT OF WORK PARA:

AUTHORITY: (DID / SDS No.) SMA-4

NASA OFFICE OF PRIME RESPONSIBILITY: S&MA

TRANSMITTAL BY: (DD Form 250 / 1149 / Letter)

NASA DOCUMENT TYPE: (Type 1 / 2 / 3) Type 3

ELECTRONIC SUBMITTAL REQUIRED: Y

FREQUENCY:

AS OF DATE:

DATE OF 1ST SUBMISSION:

DATE OF SUBSEQUENT SUBMISSION / EVENT ID:

DISTRIBUTION AND ADDRESSES:

- Submittal of S&MA-4 is forty-five (45) days prior to each IDR *.
- Hazard reports shall be delivered in Microsoft Word**.
- Hazard reports and their supporting verification documentation for each intersite deliverable item shall be delivered ninety (90) days prior to the safety review for which it is first manifested *.

* Note: Safety reviews will be accomplished during, and in conjunction with the IDRs.

**Note: Supporting data to each hazard report may be submitted by hard copy.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Reliability and Maintainability (R&M) Plan	SEPT 2004	37	NNJ04HH99B
4. Use (<i>Define need for, intended use of, and/or anticipated results of data</i>)		5. DRD Category: (<i>check one</i>)	
Used to assure proper implementation of R&M quantitative requirements. Used by program management to verify predictions, allocations, etc., are consistent with program requirements.		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (<i>Optional</i>)	7. Interrelationships (<i>e.g., with other DRDs</i>) (<i>Optional</i>)		
NSTS 5300.4 (1D-2)			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: Formulate an R&M Plan to serve as a master planning, program definition, and control document to govern the R&M quantitative-related activities required for the project.

FORMAT: Each quantitative requirement shall be addressed in narrative form and in sufficient detail to describe the philosophy and approach for implementation. Existing policies and procedures can be used if in total compliance with the requirements stated below.

CONTENTS: The plan shall identify and define the following as a minimum:

- a) The work to be accomplished for each applicable task.
- b) The time phasing and staff loading involved.
- c) The organizational element assigned responsibility and authority for implementing the required task.
- d) Lines of communication between the organizational element responsible for implementing the task and other interfacing organizational elements.
- e) Appropriate NASA-contractor program milestone review points.
- f) Method of control over subcontractor and vendor-related tasks.
- g) The purpose and expected results of each task. Planned methods for monitoring, assessing, reporting, and taking appropriate action regarding status, accomplishments, and problems.
- h) Specific techniques for allocating quantitative requirements to lower level functional elements of the system, subsystem, assembly, or components.
- i) Specific techniques for making R&M predictions.
- j) The method of data collection and analysis, and plan for ensuring an effective corrective action system.
- k) Data base requirements.
- l) Contents and submittal schedules of the prediction, allocation, assessment, and verification reports.
- m) Means by which demonstration and verification will be accomplished.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Government Certification Approval Request	SEPT 2004	38	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To establish the joint JSC and hardware provider agreed upon requirements to be used for acceptance and certification of flight hardware.		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The GCAR is a form that documents the certification information for an item.

FORMAT: The GCAR form JF 1296 with instructions at <http://wwwsrqa.jsc.nasa.gov/gcars/instructions.htm>.

CONTENTS: See the instructions at the above website for details.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Risk Assessment Executive Summary Report (RAESR)	SEPT 2004	39	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To provide management with a single report summarizing S&MA risks.		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
See "Reference Documents" under item 8 below.		GCAR; HR; CARD; FMEA; CIL	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

Reference Documents:

- a. NSTS 5300.4 (1D-2), "Safety, Reliability, Maintainability and Quality Provisions for the Space Shuttle Program"
- b. NSTS 07700, Vol. V, "Information Management"
- c. NSTS 22254, "Methodology for Conduct of Space Shuttle Program Hazard Analyses"
- d. JSC 17481A, "Safety Requirements Document for JSC Space Shuttle Flight Equipment"
- e. NSTS 22206, "Instructions for Preparation of Failure Modes and Effects Analysis and Critical Items List"
- f. SSP 30309, Revision E, "Safety Analysis Requirements Document"
- g. SSP 50021, "Space Station Safety Requirements"
- h. SSP 30599, Revision A, "Safety Review Process"
- i. SSP 30234, Rev. E.; "Instructions for Preparation of Failure Modes Effects & Analysis & Critical Items List for ISS"

SCOPE: The RAESR documents the results of the risk assessment performed for flight hardware/software and operations and provides management visibility of the total risk picture. The RAESR consists of four major sections: the system description; the results of the Safety Analysis including operational safety; the Failure Modes and Effects Analysis (FMEA), and the Risk Reports which includes the combination of Hazard Report and Critical Items List (CIL) data.

FORMAT and CONTENTS:

Outline

- i. Cover Page
- ii. Signature Page
- iii. Table of contents

- 1.0 Introduction
 - 1.1 Purpose/Scope
 - 1.2 Background
 - 1.3 System Description
 - 1.4 Documentation
 - 1.4.1 Safety Requirements Documents
 - 1.4.2 Reference Documents

- 2.0 Safety Analysis
 - 2.1 Assumptions
 - 2.2 System Safety Analysis
 - 2.3 Operational Safety Analysis

- 3.0 Failure Modes and Effects Analysis
 - 3.1 Ground Rules
 - 3.2 Failure Modes and Effects Analysis Worksheets

4.0 Risk Summary

- Appendix A
Risk Reports (HR/CIL combination)
- Appendix B
Government Certification Approval Request (SMACAR)

Appendix C
Definitions

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Problem Reporting and Corrective Action (PRACA) for Johnson Space Center (JSC) Government Furnished Equipment (GFE)	SEPT 2004	40	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To report problems and to document their subsequent resolution and approval.		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
JSC 28035, NSTS 22206, SSP 30234	Nonconformance Record DRD		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: Nonconformances requiring JSC GFE PRACA reporting are defined in JSC 28035. PRACA reporting is limited to flight equipment, equipment that is representative of flight equipment (flight-like) and critical ground support equipment.

CONTENTS: A. The following data is mandatory for the initial reporting of a problem. The initial report shall be transmitted to the JSC PRACA Center within 2 business days after isolation to a configuration item but no later than 10 business days after occurrence/detection.

1. PRACA Number [a unique tracking number assigned to the PRACA report]
2. Nonconformance Number [a unique local nonconformance number]
3. Detect Date [The date (mm/dd/yyyy) nonconformance occurred or was detected]
4. Location [The location where the nonconforming item was at, at the time of occurrence/detection]
5. Program [The affected NASA program (SSP, ISS, or both)]
6. Project Office [The responsible NASA Project Office (EVA, FCE, Life Sciences, Orbiter, RMS, Other _____)]
7. Contact [The technical point of contact, organization, and phone number]
8. Report Date [Date the PRACA report was initiated]
9. Detected During [The specific test or operation performed when the nonconformance occurred]
10. Title [A brief, but descriptive, title for the problem]
11. Description [A narrative description of the problem including the observed event(s) as well as the expected event(s).]
12. Identification of the Configuration Item by:

- a. Part name
- b. Part number
- c. Serial number, lot number, or version
- d. Manufacturer's name
- e. Manufacturer's Contractor and Government Entity (CAGE) code

B. The following data shall be provided when it becomes known (with the exceptions noted). This data shall be provided as updates to the initial PRACA report. This data is mandatory for the closure of the report.

13. The end item (if not the configuration item), specific subassemblies, and the nonconforming article shall be identified

- a. Part name
- b. Part number
- c. Serial number, lot number, or version
- d. Manufacturer's name
- e. Manufacturer's CAGE code

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

14. FMEA No. [Failure Mode and Effects Analyses number. Note: if the hardware is used by the Space Station and the Space Shuttle Programs, provide both FMEA numbers.]

15. FMEA Criticality [criticality per NSTS 22206 or SSP 30234. This data is required within 10 calendar days of opening the problem report.

Note: if the hardware is used by the Space Station and the Space Shuttle Programs, provide both FMEA criticalities.]

16. FMEA/CIL Impact [yes or no, is the FMEA/CIL retention rationale impacted by the occurrence of this problem?]

17. Out-of-Family Problem [yes or no, based on the definitions of In-Family and Out-of-Family in JSC 28035.]

18. Fracture Critical [yes or no, is the material involved fracture critical?]

19. ECD [Estimated Completion Date for submitting a final closure of the problem. This data is required within 30 calendar days of opening the problem report.]

20. Process Escape [yes or no, per the definition of process escape in JSC 28035]

C. The following data shall be provided to close the report:

21. Final report [A final report documenting the specific information required for closure per JSC 28035, i.e. final closure with corrective action (this is preferred) or final closure without corrective action (explanation)]

22. Approval signatures

23. Date Approved

D. The contractor shall maintain a status list on all open problems including estimated completion date. This status shall be submitted to the Technical Manager Representative and the JSC PRACA Center on a monthly basis during the contract.

FORMAT: The contractor's format is acceptable; however, data shall be easily identifiable to the data labels specified in Contents.

JSC Form 2174 is a preferred document for initiating problem reports.

Reports shall be sent to: Johnson Space Center
2101 NASA Parkway
JSC PRACA Center
Mail Code NT-52
Houston, TX 77058

Email (preferred): Primary gfpraca@jsc.nasa.gov
cc terry.l.miller1@jsc.nasa.gov

Voice: Primary 281-244-1941
Secondary 281-244-1935

Facsimile: Primary 281-244-2854

Hours of operation: 8:00 a.m. - 4:30 p.m. Central, Monday through Friday

MAINTENANCE: Update as required.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Nonconformance Record	SEPT 2004	41	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To provide that all nonconformance are documented in consistent manner and to assure that all the necessary data is included and available.		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
	Problem Reporting and Corrective Action (PRACA) for Johnson Space Center (JSC) Government Furnished Equipment (GFE)		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: This DRD establishes the minimum data elements necessary to provide records of the closed loop system for the control of nonconforming products. Nonconformance reporting shall commence with the manufacturing of the certification or production hardware and continue through all phases of the project. The reporting shall include all problems associated with the GSE for the hardware. Nonconformance reporting for materials to be used in Class I or II hardware shall commence with the initial receipt of materials.

A nonconformance is defined as when an item fails to meet a specified requirement.

CONTENTS: The record shall contain the following data elements:

1. A unique and traceable number;
2. Identification of the nonconforming article or material:
 - a. Nomenclature
 - b. Part identification number
 - c. Serial no./Lot no./Version
 - d. Manufacturer's name or the Manufacturer's Contractor and Government Entity (CAGE) code (preferable)
3. The date the nonconformance was discovered;
4. The name of the initiator of the nonconformance record;
5. A description of the nonconformance including a description of the required characteristics or specification;
6. The type of activity being conducted (e.g., fabrication, assembly, qualification test, system test, pre-delivery or pre-installation test, etc.). Reference must be made to applicable procedure numbers;
7. When appropriate, identification of the next higher assembly:
 - a. Nomenclature
 - b. Part identification number
 - c. Manufacturer's name or the Manufacturer's CAGE code (preferable)
8. Disposition of the nonconforming article or material;
9. The signatures of the personnel authorized to provide disposition;
10. Verification that the prescribed disposition was acceptably completed; and
11. When applicable, a cross-reference to an associated PRACA report.

FORMAT: The contractor's format is acceptable.

MAINTENANCE: Update as required. These records shall be available upon request.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
GIDEP and NASA Advisory Problem Data Sharing and Utilization Program Documentation and Reporting	SEPT 2004	42	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
See Below.		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
SO300-BT-PRO-010 GIDEP Operations Manual SO300-BU-GYD-010 GIDEP Requirements Guide NPG 8735.1 NASA Procedure and Guidelines	See Below		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

USE: This DRD provides the minimum information to be incorporated in the contractor and subtier contractor implementation procedures and contractual data-reporting requirements to comply with the program requirement to participate in the GIDEP and NASA Advisory Problem Data Sharing and Utilization Program. The types of data include:

- a. Contractor and subtier implementation procedures.
- b. Preparation and submittal of GIDEP documents.
- c. Preparation and submittal of NASA Advisories.
- d. Task management, control, and tracking status.
- e. Milestone/mission support (assessment/impact status reports).
- f. Cost data on special problems (involving criminal investigations).

Applicable Documents.

- a. SO300-BT-PRO-010, GIDEP Operations Manual and Policy.
- b. SO300-BU-GYD-010, GIDEP Requirements Guide.
- c. NPG 8735.1, NASA Procedure and Guidelines, "Procedure for Exchanging Parts, Materials, and Safety Problem Data Utilizing the Government-Industry Data Exchange Program and NASA Advisories."

Interrelationships: Non-Conforming Parts and Materials Reports - Incidents involving non-conforming products or materials are to be reported through the GIDEP Reporting System to comply with Government Policy as defined by Office of Federal Procurement Policy, Policy Letter No. 91-3 (Appendix D of GIDEP Operation Manual, SO300-BT-PRO-010).

DISTRIBUTION: Distribution will comply with the DRL or Contracting Officer letter (must include the JSC GIDEP/NASA Advisory Coordinator as a minimum).

INITIAL SUBMITTAL.

- a. Contractor and subtier Implementation procedures (60 days after contract award).
- b. Release of GIDEP documents (in compliance with GIDEP Operations Manual and Policy).
- c. Release of NASA Advisories (in accordance with NASA policy).
- d. Problem data assessments (30 days after receipt of the problem data).
- e. Milestone/mission support (as required to support the milestone or mission events).
- f. Cost data (as required for special problems involving criminal investigations).

SUBMITTAL FREQUENCY. As required.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
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REMARKS. Special controls shall be implemented to comply with the confidentiality of the problem reports involving criminal investigations. The implementation procedures must address this special need for the control of information with the restricted distribution as well as the need to track and report the cost of the problem investigation and resolution.

SCOPE:

Generic problems reported by GIDEP or NASA Advisory distribution networks shall be assessed to determine if there is a real or potential impact on the program or program assets. Generic problems experienced by the program or by program assets shall be reported in the GIDEP or NASA Advisory network, as appropriate. Management documentation shall be adequate to ensure that (1) the subject problem data are received, properly distributed, and thoroughly assessed for potential impact; (2) identified impact issues are resolved or corrected with NASA program management concurrence; (3) cost data for special problem issues are accumulated and reported; and (4) all this information is captured and retained in a database

CONTENT:

- a. The contractor and subtier Implementation procedures shall provide details that will ensure that the contractor understands and will implement these procedures, which cover the scope; task importance; management responsibilities; technical expertise to identify and resolve any impacts; "special problem" information sensitivity; and documentation necessary to comply with GIDEP and NASA policies.
- b. GIDEP documents are to comply with the GIDEP Operations Manual and Policy requirements for the appropriate document being prepared and released.
- c. NASA Advisories are to comply with contents as required to complete the JSC NASA Advisory Form, JSC Form 1159 (JF1159), and to accurately report the problem and conditions.
- d. Implementation documentation shall include an index of problem reports received and assessed for impact; hardware/systems/subcontractors subject to the assessments; status of the impact assessments by problem report by hardware/system/subcontractor; and corrective actions for problems with identified impacts, including (1) NASA program management involvement and concurrence, (2) required supporting documentation for all problems experienced on the program/project that meet the criteria for release of a GIDEP report or NASA Advisory and the released GIDEP reports and NASA Advisories, and (3) any other data required to comply with the applicable GIDEP and NASA documents.
- e. Details of the required milestone/mission support efforts and reports with the associated roles and responsibilities shall be provided.
- f. Financial data to justify and substantiate any reported "cost impacts" are to be included.

Format. Electronic submittal is the preferred medium for providing access to or submittal of information and data under this DRD. Format guidelines are as follows:

- a. The contractor's format is acceptable for their internal implementation procedures.
- b. GIDEP documents are to be prepared on the appropriate GIDEP form found in the GIDEP Operations Manual.
- c. NASA Advisories are to be prepared on the JSC NASA Advisory Form, JF1159.
- d. The contractor's format is acceptable for providing the "Task Management, Control, and Tracking Status," as long as it includes all the necessary information. An electronic database with access permission to appropriate NASA personnel is preferred.
- e. Formats for these reports are to comply with the applicable milestone/mission event.
- f. Cost data are to be provided as required by the financial management reporting system and as necessary to substantiate the data being submitted in support of criminal investigations.

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(Based on JSC -STD-123)

MAINTENANCE: Data shall be maintained as required to:

- a. Document the current implementation procedures and GIDEP and NASA Advisory policies.
- b. Ensure that the released GIDEP information is complete, factual, accurate, and up to date.
- c. Ensure that the released NASA Advisory information is complete, factual, accurate, and up to date.
- d. Tracking status provided periodically to demonstrate complete accomplishment of the task.
- e. Stay current and accurate or as requested to support management activities.
- f. Substantiate submitted costs or to include additional costs as they are identified.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC-STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Electrical, Electronic, and Electromechanical (EEE) Parts Control Plan	SEPT 2004	43	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To define and document the contractor's requirements, system and implementation plan for controlling the selections, acquisitions, traceability, testing, handling, packaging, storage and application of Electrical, Electronic and Electromechanical (EEE) Parts for flight and critical ground support equipment.		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
NPD 8730.2, NPG 7120.5 (Para.4.5), NSTS 5300.4(1D-2) and SSP 30312	Non-Conforming Parts and Materials Reports		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE/CONTENTS/MAINTENANCE: The contractor shall implement NASA's policy for controlling risk and enhance reliability by controlling the EEE Parts used in flight and critical ground support equipment. To carry out this policy, the contractor shall accomplish the following:

a. Select parts and packaging technology based on their intended use considering, but not limited to, performance, environmental, criticality, and lifetime requirements. To the greatest extent possible, part selection shall be made from previously qualified parts that are identified in the WEB-Based NASA Parts Selection List (NPSL) without compromising the design.

b. Enhance equipment and system reliability by utilizing documented derating criteria of the parts parameters in the design applications.

c. Utilize the results of surveys/audits as a means to determine capability and qualification of suppliers/sources. When using third party survey result, the survey process used by third-party auditors/surveyors (including those performed by other Government agencies or commercial third-party auditors) and the survey results must be reviewed prior to their use to determine that the process and results meets minimum NASA requirements. The contractor shall document in a Parts Control Plan the features discussed below as a minimum. The plan shall demonstrate that the contractor has the technical expertise, documentation system and defined management roles and responsibilities that will assure adequate implementation of the Plan.

1. Parts Selection: The Parts Control Plan shall describe a concurrent engineering process, integrated with hardware design, in which parts are selected for use in hardware on the basis of suitability for the intended application. The plan shall identify parts that are considered standard and how other (nonstandard) parts will be evaluated and controlled. As a cost-control initiative and without overly limiting the designer's ability to select emerging technologies, the plan will address how the system will limit the number of different part types and the number of nonstandard parts used in hardware design.

2. Controlling specifications: Parts shall be controlled by specifications which delineate as a minimum:

- a. Complete identification of the part.
- b. Physical, environmental, and performance specifications.
- c. Reliability requirements, including inspections and tests for qualification, acceptance, and lot sampling.
- d. Special handling, packaging, and storage requirements.
- e. Documentation, data retention, and submittal requirements.

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3. Part Qualification:

a. Parts shall be qualified to the requirements of the controlling specification. Part qualification must demonstrate that the part meets its ratings, that it is suitable for the application, and that the manufacturer is using materials, processes, design, and quality controls that will produce a consistent, reliable, high quality device.

b. Where adequate qualification data are not available, the plan shall describe the process of qualification testing to demonstrate that the part meets its ratings and that it is suitable for the application.

c. Parts shall be requalified in the event of manufacturer process changes, or when a new lot of qualified parts is procured and it cannot be documented that the parts manufacturer has not changed the materials, processes, equipment, or facility used to manufacture the part.

d. The plan shall address how the contractor will document and maintain the documentation to support the "qualified status" of parts and the respective suppliers.

4. Design Configuration Acceptability and Control: The plan must address how the selected parts for a design are reviewed for suitability for the application and environment, how the parts quality and reliability will meet the operational performance requirements, and if the parts are being used within the specific device ratings (including the NASA derating policy). The selection process, technical acceptability of devices, and application documentation and review results shall be available to NASA to support hardware design reviews, certification, acceptance reviews, problem resolutions, and ground and flight operations. Key elements are as-designed-parts lists, application stress analyses (including radiation effects), and nonstandard parts acceptability assessments.

5. Parts Procurement: The plan must address how the contractor will select, qualify, control, and monitor parts manufacturers. The procurement must address the contractor's source inspections, receiving inspection (including destructive physical analysis), and stocking and handling procedures prior to and during assembly. These procedures must address how the contractor will avoid the procurement and any subsequent installation of parts or "lots" of parts subject to conditions identified in GIDEP and NASA ALERT's. This section of the plan must ensure that the selection and use of the parts will not have an "obsolescence" issue.

6. Radiation Effects: The Parts Control Plan must include the following requirements:

a. It must be shown by analysis or test that Single Event Upset (SEU) or total dose radiation effects will not cause Electrical, Electronic, or Electromechanical (EEE) parts to fail or malfunction in such a manner as to cause a safety hazard or loss of a mission. b. EEE parts that are used to control a hazard, or as part of a subsystem that controls a hazard must be immune to the SEU and total dose radiation environment to which they will be exposed. This requirement can be waived in the event that a radiation hard, or purely mechanical (for example, a fuse, circuit breaker, mechanical thermostat, or pressure relief valve) device is used as a backup hazard control.

7. Commercial Off-The-Shelf (COTS) hardware: The plan shall address the use of COTS hardware for which insufficient parts information is available. In these cases, parts used in COTS hardware may be qualified by environmental and accelerated life testing of a complete COTS assembly.

8. Documentation: The plan must define the contractor's electronic (preferred) or paper documentation system, data supporting milestone and design reviews, and NASA's access to the parts electronic data base and files.

APPLICABLE DOCUMENTS:

NPD 8730.2 NASA PARTS POLICY
NSTS 5300.4(1D-1) (For Space Shuttle Program equipment)
SSP 30312 (For Space Station Program equipment)

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENT DESCRIPTION (DRD)
(Based on JSC -STD-123)

DISTRIBUTION:

The contractors Parts Control Plan will be provided to the SR&QA EEE Parts Assurance Activity as a minimum.

INITIAL SUBMITTAL:

The plan shall be submitted 60 days after award of first DO that requires electronics and prior to parts selections, procurements and utilization.

SUBMITTAL FREQUENCY:

As required by Maintenance and to obtain approval prior to changes.

FORMAT:

Electronic format submittal is preferred. The plan is to be an official controlled document.

MAINTENANCE: As required to remain current.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Certification Data Package	SEPT 2004	44	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To provide objective evidence to NASA that the delivered item meets requirements. The certification data package, when approved, is the NASA certification.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
EA-WI-023 "Project Management of GFE Flight Projects", EA-WI-025 "		See DRDs identified in item 8 below	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The Certification Data Package contains all data needed to determine that the item meets design and safety requirements.

CONTENTS:

- a. Hard and soft-copy GCAR (JSC form 1296) (See <http://wwwsrqa.jsc.nasa.gov/gcars/> for additional information and instructions)
- b. Verification and Validation plan with Verification Matrix
- c. Completed CARD (DRD 45) with completed verification Matrix (For EVA projects only)
- d. Verification and Validation Report (includes the verification matrix mapped to verification data) DRD 48
 - 1) Qualification Report DRD 25
 - 2) Engineering Analysis Reports: Stress, thermal, EEE Parts Stress/De-rating, structural, off-gassing, flammability, toxicological, others specific to the product.
 - 3) Qualification Test Reports
 - 4) Manufacturer's Data used for a verification of hazard control
 - 5) Materials Certification
 - 6) Fracture Control Report and Materials Usage Agreement
 - 7) Certification Compliance Matrix, 8080.1 Compliance matrix, and 50021 Compliance matrix
 - 8) Acceptance Report for Qualification Unit or first flight unit
 - 9) List of Approved Operational Controls
 - 10) Structural Integrity Verification Plan
 - 11) Verification Tracking Log (VTL)
 - 12) Inspections reports
 - 13) Demonstrations reports
- e. Risk Assessment Executive Summary Report (RAESR) (FMEA and hazard analysis) DRD 39
- f. Waivers, deviations and NCRs
- g. Discrepancy Reports and Problem Closure Reports Relevant to Certification
- h. Limited Life Items List DRD 32
- i. Engineering Drawings DRD 16

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j. Current Project Technical Requirements Specification or Original PTRS with All Approved Changes that affect the content of the PTRS DRD 3

k. Assessment of Criticality (JF1380)

l. Software / Firmware Version Description Document (VDD) [see EA-WI-025]

FORMAT: The format of the items in this list is defined by the forms that can be found in EA-WI-023, Table 7.5.3-1 or the associated DRD.

MAINTENANCE: The Certification Data Package is maintained until complete. In some cases initial flight operations may begin prior to finishing qualification and verification.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Certification and Acceptance Requirements Document (CARD)	SEPT 2004	45	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To establish the joint JSC and hardware provider agreed upon requirements to be used for acceptance and certification of flight hardware		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
JSC 22626 EVA Generic Design Requirements Document			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The CARD is a two part document. Part one addresses hardware and, if applicable, installed software definition, verification requirements, and acceptance and certification environmental requirements. These verification requirements apply to both the design certification and the acceptance testing of flight hardware. The CARD combines the end item specification and certification plan documents into one document. Part two is the associated Requirements Verification Matrix. The CARD is submitted for approval in the Critical Design Review time frame. Once the CARD is approved, it shall be placed under configuration control. The Requirements Verification Matrix is then used to verify and document the hardware compliance to the established requirements. A copy of the Requirements Verification Matrix, with the column "Verification Documentation" listing the appropriate documentation (e.g. test document number, analysis document number, technical memo number, etc.), shall be completed and submitted along with the supporting documentation as part of the GCAR/Certification Package.

FORMAT: The CARD format shall be as defined in the contents below.

CONTENTS:

Part One:

- a. Foreword. This includes, but is not limited to, the company or organization preparing the CARD, for whom the CARD is prepared (e.g. NASA Johnson Space Center), the contract number, project sub-task order number, and any other pertinent information.
- b. Abstract. Define the high level scope of the CARD, as it relates to testing, analyses, inspections, etc
- c. Table of Contents
- d. Tables. List of tables (e.g. Requirements Verification Matrix) and the associated page numbers
- e. Figures. List of figures and the associated page number
- f. Acronyms. List the applicable acronyms and their explanation
- g. Introduction. Discuss the purpose of the CARD and a description of the hardware. Include specific part numbers and dash numbers for the hardware being covered by the CARD. If available, include a line drawing of the hardware. All operational constraints for use of the hardware will be listed and explained in this section.
- h. Applicable Documents. List the documents which apply to the hardware (e.g. program level documents, interface control documents, Safety and Mission Assurance documents, etc.).
- i. Requirements. List the functional and performance requirements, both general and unique, for the hardware. Also, list any exceptions to existing requirements.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

j. Verification.

1) Certification Approach. Give a brief explanation of the approach to be used for certification. This shall include, but is not limited to: The Certification Rationale, describing the certification methods (e.g. assessment, analysis, test, similarity). The Certification Plan, describing the sequence of test activity, use of the Verification Matrix, the use of test procedures, the documenting of test failures and non-compliance's, etc.

2) Acceptance Approach. Give a brief explanation of the approach to be used for acceptance. This shall include, but is not limited to: The requirement for acceptance testing of parts, components, assemblies, receiving tests, etc. The requirement for Pre-Installation Acceptance (PIA) testing, Pre-Delivery Acceptance (PDA) testing, and the requirement for Environmental Testing.

Part Two:

This section is the Requirements Verification Matrix, in table format.
This matrix shall list, but is not limited to, the following information:

- a) Name and part number of the hardware
- b) The requirements
- c) Exceptions to the requirements
- d) The verification method (e.g. assessment, analysis, test, or similarity)
- e) The test procedure codes (e.g. FC-Fit Check, LT-Load Test, PDA, PIA, TT-Thermal Test, etc.)
- f) A comment block for special comments or explanations

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Wage/Salary and Fringe Benefit Data	SEPT 2004	46	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
The Wage/Salary and Fringe Benefit Data will be used by the NASA Contracting Officer and the Contract Labor Relations Office to provide the necessary data for submittal of Standard Form (SF) 98, Notice of Intention to Make a Service Contract and Response to Notice, to the Department of Labor, and to assist in the monitoring of Service Contract Act compliance.		<input type="checkbox"/> Technical <input checked="" type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
	FAR 52.222-41		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: The Wage/Salary and Fringe Benefit Data must be submitted by the Contractor, and any subcontractors which are subject to the provisions of the Service Contract Act, to the Contracting Federal Agency. In accordance with FAR regulations 22.1007 and 22.1008, the Contracting Officer is required to submit a SF 98 to the Department of Labor, Wage and Hour Division.

APPLICABLE DOCUMENTS: None

CONTENTS: The Wage/Salary and Fringe Benefit Data should contain the data included in the enclosed DRD forms, titled "Wage/Salary Rate Information", "Fringe Benefit for Service Employees", and "Fringe Benefits per Collective Bargaining Agreement". The Wage/Salary Rate Information shall contain a listing of all exempt and nonexempt labor classifications working on the contract. Separate forms should be utilized for classifications working in different geographic areas and for each subcontractor. Wage determination numbers, appropriation labor organization names, and subcontractor names, must be reflected. All nonexempt labor classifications must be matched to wage determination classes or to Collective Bargaining Agreement (CBA) classifications for represented classes. Annotate exempt or nonexempt and union or nonunion. The current hourly rates should reflect the actual lowest and highest paid employees, along with a computed average rate. State the number of employees working in each category. Separate Fringe Benefit forms should be completed for nonrepresented classifications and for each separate CBA. A separate form must be completed for the prime and each subcontractor. Three copies of each Collective Bargaining Agreement are required, if applicable.

FORMAT: The Wage/Salary and Fringe Benefit Data should be in a format substantially the same as enclosed with this DRD (Forms 2, 3, and 3A).

MAINTENANCE: Changes shall be incorporated as required by change page or complete reissue.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

Form 2 Page 1 of 1

WORK SHEET FOR SF-98 DATA
WAGE RATE INFORMATION

CONTRACTORS LABOR	WAGE DETERMINATION	EXEMPT OF	UNION OR	CURRENT HOURLY	MYE NO OF
<u>CLASSIFICATION</u>	<u>CLASSIFICATION</u>	<u>NONEXEMPT</u>	<u>NONUNION</u>	<u>RATE</u>	<u>EMPLOYEES</u>
Illustration of required data:					
Project Manager	Not Required	E	N	\$40.00	1
Supervisor	Not Required	E	N	\$32.00	1
Electrical Engineer	Not Required	E	N	\$26.50 - 30.00	3
Engineering Tech, Jr	Engineering Tech, I	N	N	\$14.00 - 17.00	12
Electrical Technician	Electronics Tech Maint II	N	U	\$19.02 - \$21.50	4
Secretary	Secretary I	N	N	\$14.52 - \$15.50	2
File Clerk	General Clerk II	N	N	\$9.86	1
Clerical Data Entry	Word Processor I	N	N	\$11.45 - \$12.90	3

Submit data in the above illustrated format for all labor classifications used, or planned to be used, on this contract.
 All contractor labor classifications must be matched to wage determination classes listed in CBA's represented classes or classes shown in WD 94-2516 for nonrepresented classes.

CONTRACTORS LABOR	WAGE DETERMINATION	EXEMPT OF	UNION OR	CURRENT HOURLY	MYE NO OF
<u>CLASSIFICATION</u>	<u>CLASSIFICATION</u>	<u>NONEXEMPT</u>	<u>NONUNION</u>	<u>RATE</u>	<u>EMPLOYEES</u>

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

FORM 3
Page 1 of 2

FRINGE BENEFITS PER COLLECTIVE BARGAINING AGREEMENT

For period from _____ to _____

Contractor:

Contract Number:

Number of employees in bargaining unit _____

Total number of employees on contract _____

1. Shift Differential: (Describe any pay over and above base rates for 2nd, 3rd, weekend, or other shifts.)

2. Health and Welfare Items and Other Fringe Items: (Indicate whether or not coverage is provided to employees and state current average hourly cost per employee covered by Collective Bargaining Agreement.)

Item	Coverage Provided (Yes or No)	Average Hourly Cost
a. Life Insurance		
b. Accidental Death		
c. Disability		
d. Medical and Hospital		
e. Dental		
f. Retirement Plan		
g. Savings/Thrift Plan		
h. Sick Leave		
i. Tuition		
j. Other (Describe)		

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

FORM 3
Page 2 of 2

3. Paid Absences:

	Service Requirement	Days per Year
a. Vacation		
b. Holiday		
c. Sick Leave		
d. Jury Leave		
e. Funeral Leave		
f. Military Leave		
g. Other (Describe)		

4. Severance Pay: (Briefly describe terms and amounts.)

5. Other Fringe Benefits: (Describe any other fringe benefits not included above, and show average hourly cost.)

6. Premium Pay: (Discuss all premium pay provisions not previously shown on this form.)

Signature of Company Representative

Date

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

FORM 3A
Page 1 of 1

FRINGE BENEFITS FOR SERVICE EMPLOYEES

For Period from _____ to _____

Contractor: _____

Number of nonexempt employees on contract: _____

Total number of employees on contract: _____

1. **Health and Welfare Items and Other Fringe Items:**
 (Indicate whether or not coverage is provided to employees and state current average hourly cost per service employee.)

<u>Item</u>	<u>Coverage Provided</u>	<u>Average Hourly Cost</u>
a. Life Insurance		
b. Accidental Death		
c. Disability		
d. Medical & Hospital		
e. Dental		
f. Retirement Plan		
g. Savings/Thrift Plan		
h. Sick Leave		
i. Tuition Reimbursement		
j. Other (Describe)		

2. **Paid Absences**

	<u>Service Requirement</u>	<u>Days per Year</u>
a. Vacation		
b. Holidays		
c. Sick Leave		
d. Jury Leave		
e. Funeral Leave		
f. Military Leave		
g. Other (Describe)		

 Signature of Company Representative

 Date

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
GFE Acceptance Test Procedures	SEPT 2004	47	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To define all procedures and success criteria for testing of all flight hardware and the qualification unit in order to verify that each unit meets the expected engineering performance.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
Task Performance Sheet (TPS), NT-CWI-001 http://www4.jsc.nasa.gov/eaprojects/EA-ISO9000/NT-CWI-001.doc		Verification and Validation Plan, DRD 12 Certification and Acceptance Requirements Document DRD 45 End Item Specification, DRD 10 Flight Hardware Software Requirements Specification, DRD 13 Acceptance Data Package, DRD 27	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: To document the detailed procedures used to test GFE flight products in order to assure that engineering processes and assumptions used are adequate for acceptance of each flight unit.

CONTENTS:

The procedures shall contain the following:

- Identification of the specific End Item being tested
- Detail description of the test objective
- Description of all relevant test equipment and facility used
- Full set of procedures
- Criteria for passing or failing the test
- Specification of the tolerances on all operational parameters with go, no-go criteria
- Initial Settings for all Controls, Power Supply Voltages, etc.
- Safety hardware that is mandatory to be verified operational prior to testing, with reference to procedures used.

FORMAT: A Test Preparation Sheet format shall be used to document the detailed instructions needed to perform the procedure. Acceptance test procedures generated at the contractor's facility shall be delivered as part of the Acceptance Data Package for that unit.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Flight GFE Verification and Validation Report	SEPT 2004	48	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
Provides the Verification Matrix from the V&V Plan with reference to the information that supports that the requirements have been met. Documents the detailed assessments from testing, analysis, demonstration and inspection that serve as the supporting record.		<input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
6. References (Optional)		7. Interrelationships (e.g., with other DRDs) (Optional)	
EA-WI-023 Project Management of GFE Flight Projects		Flight GFE Verification and Validation Plan, DRD 12 Qualification Report, DRD 25 Acceptance Data Package, DRD 27	
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE: This report consists of all the Verification and Validation (V&V) documentation performed to confirm that the GFE (including GFE payloads) comply with their specifications, function properly in the complete integrated environment with other actual flight hardware or payload products, and are ready for use in flight.

CONTENT: EA-WI-023 contains a definition of the objectives of the V&V Plan and gives the detailed content for the NASA System Level V&V Plan. The contractor shall perform all or a part of the verification activities for qualification and acceptance. For Flight GFE (including payloads) that are not full systems, the contractor shall provide V&V reports for verification activities associated with the portion of products assigned. The configuration of the products at the time that the verification activity is performed shall be recorded in the report associated with each activity.

FORMAT: Configuration of the GFE is documented using Engineering Drawings (DRD 16), software code (DRD 22) and Flight Software Design Documents (DRD 15). Engineering Analysis uses the format is defined in DRD 26. The V&V Report shall contain the Qualification Report (DRD 25) and Acceptance Data Package (DRD 27).

MAINTENANCE: The initial report is provided at qualification or 1st flight unit completion and requires NASA approval. At CDR a fully developed V&V Plan is submitted and requires NASA approval. The V&V reports may be submitted in the period between CDR and the complete submittal at the Systems Acceptance Review and into the period of operations if additional environment qualification is still required.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
Space Shuttle GFE Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL) [FMEA_1]	SEPT 2004	49	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
To identify to program management the risk associated with design, use, and failure of systems.		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
See "Reference Documents" under item 8 below.			
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

Reference Documents:

NHB 5300.4 (1D-2), "Safety, Reliability, Maintainability and Quality Provisions for the Space Shuttle Program"

SCOPE: The FMEA and CIL are applicable to all Government-furnished equipment classified as flight hardware.

FORMAT: Electronic delivery or through data keyed directly into the NASA application. (JSC will identify the available application.) The format of the FMEA and CIL shall be in accordance with NSTS 22206 "Instructions for Preparation of Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)". A suggested format is provided, with the numbers in parentheses corresponding to the data elements in NSTS 22206, table 3.0 for FMEAs and table 4.0 for CILs. Other formats are acceptable provided all FMEA data elements are included.

CONTENTS: The hardware provider shall provide FMEAs and CILs for project and program management.

An FMEA shall be performed on every system, subsystem, assembly, or item to identify failure modes and the effects thereof for support of additional design action, safety analysis, hardware/software interface analysis, test planning, mission planning, preparation of mandatory inspection points, fault detection and isolation, maintainability analysis and planning, maintenance planning, and logistics planning.

The FMEA shall be conducted and prepared in accordance with NSTS 22206. The FMEA may be sufficed by a properly completed criticality worksheet alone if the system, subsystem, assembly, or item under analysis is noncritical.

The CIL is used to identify critical items which require special risk assessments to support the activities supported by the FMEA and waivers to program requirements. The CIL shall be conducted and prepared in accordance with NSTS 22206.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

FAILURE MODE EFFECTS ANALYSIS/CRITICAL ITEMS LIST

FMEA NUMBER:	ORIGINATOR	PROJECT:
PART NAME:	LRUPART NUMBER:	QUANTITY:
PART NUMBER:	LRU/ORU PART NAME:	SYSTEM:
LSC CONTROL NO:	DRAWING/REF DESIGNATOR:	SUBSYSTEM:
ZONE/LOCATION:	EFFECTIVITY/AFFECT STAGE:	

CRITICALITY:

CRITICAL ITEM?

CRITICALITY CATEGORY _____

REDUNDANCY SCREEN:

ORBITER/SPACE STATION

- A -
 - B -
 - C -
 - D -
-

FUNCTION:

FAILURE MODE CODE:

FAILURE MODE:

CAUSE:.

FAILURE DETECTION:

REMAINING PATHS:

EFFECT/ MISSION PHASE:

_____ **CORRECTIVE ACTION:**

-FAILURE EFFECTS-

END ITEM/LRU/ORU/ASSEMBLY:

SUBSYSTEM/NEXT ASSEMBLY/INTERFACE:

SYSTEM/END ITEM/MISSION:

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

CREW/VEHICLE :

FAILURE MODE EFFECTS ANALYSIS/CRITICAL ITEMS LIST

FMEA NUMBER:	ORIGINATOR	PROJECT:
PART NAME:	LRUPART NUMBER:	QUANTITY:
PART NUMBER:	LRU/ORU PART NAME:	SYSTEM:
LSC CONTROL NO:	DRAWING/REF DESIGNATOR:	SUBSYSTEM:
ZONE/LOCATION:	EFFECTIVITY/AFFECT STAGE:	

HAZARD INFORMATION:

HAZARD: YES__ **NO**__

HAZARD ORGANIZATION CODE:

HAZARD NUMBER:

TIME TO EFFECT:
TIME TO DETECT:
TIME TO CORRECT:
FAILURE DETECTION/FLIGHT:

REMARKS:

-RATIONALE FOR ACCEPTABILITY-

- (A) DESIGN:
- (B) TEST:
- (C) INSPECTION:
- (D) FAILURE HISTORY:
- (E) OPERATIONAL USE:
- (F) MAINTAINABILITY:

PREPARED BY:	REVISION:
DATE:	WAIVER NUMBER

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

Reviewed By:

Original Signed by Janice Nesbitt 2/10/04
 Chief, Date
 Cost Accounting, Reports, and Property Branch
 Financial Management Division

Concurred By:

Original Signed by John Beal 2/6/04
 Chief Financial Officer Date

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
NASA Contractor Financial Management Reporting	SEPT 2004	51	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
Report monthly financial status of contract activity.		<input type="checkbox"/>	Technical
		<input checked="" type="checkbox"/>	Administrative
		<input type="checkbox"/>	SR&QA
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

The NASA Form 533 (NF533) reports provide data necessary for the following:

1. Projecting costs and hours to ensure that dollar and labor resources realistically support project and program schedules.
2. Evaluating contractors' actual cost and fee data in relation to negotiated contract value, estimated costs, and budget forecast data.
3. Planning, monitoring, and controlling project and program resources.
4. Accruing cost in NASA's accounting system, providing program and functional management information, and resulting in liabilities reflected on the financial statements.

Cost is a financial measurement of resources used in accomplishing a specified purpose, such as performing a service, carrying out an activity, acquiring an asset, or completing a unit of work or project. NASA Contractor Financial Management Reporting, NASA Procedures and Guidelines (NPG) 9501.2D, or its most current revision, identifies the cost reporting requirements for a contract.

NASA is required by law to maintain accrual accounting, which requires cost to be reported in the period in which benefits are received, without regard to time of payment. Examples of accrual accounting for common cost elements reported on the NF533 as follows:

Cost Element

Labor

Reported to NASA as hours are incurred.

Equipment & Materials
 (commercial off the shelf)

Generally reported to NASA when received and accepted by the contractor.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

Cost Element

Manufactured Equipment

Defined as any equipment that is produced to specific requirements that make it useless to anyone else without rework. Cost should be reported to NASA as the equipment is being manufactured. The straight-line method for estimating accrued costs or the use of supplemental information obtained from the vendor are acceptable methods used to calculate the cost accrual amount.

Leases

Reported to NASA using a proration over the life of the lease.

Travel

Reported to NASA as costs are incurred.

Subcontracts

Actual and estimated costs reported by prime contractors shall include subcontractors' incurred costs for the same accounting period. Where subcontract costs are material, they should be separately identified on NF533 reports. The prime contractor shall include in the total cost of each subdivision of work the accrued cost (including fee, if any) of related subcontractor effort. Subcontractors should, therefore, be required to report cost to the prime contractor, using the accrual method of accounting. If the G&A and fee reported by a subcontractor are at the total subcontractor level, these costs must be allocated to specific subdivisions of work. Data submitted by the subcontractor should be structured similar to the prime contractor's NF533 to enable the prime contractor to properly report to NASA. For Firm Fixed Price subcontracts with a contract value greater than \$500,000, the prime contractor is required to document the methodology used to generate the sub-contractor costs reported and provide this information to the Contracting Officer and Center Deputy Chief Financial Officer (Finance).

Unfilled Orders

Reported as the difference between the cumulative cost incurred to date and amounts obligated to suppliers and subcontractors.

Fee

Should be accrued as earned using a consistent and auditable method to determine the amount. For example: an acceptable method would be to use historical data to determine the amount to accrue each month. Fee should be reported on the NF533 following the "Total Cost" line. Award fee must be reported by the following categories: Base Fee, Fee Earned, Interim Fee, Provisional Fee, Potential Additional Fee, Interim Fee, Provisional Fee, Potential Additional Fee, and Total Fee. If any of the above fee categories do not pertain, they should not be included in the NF533.

Prompt Payment Discounts

Cumulative cost reported to NASA should be the full incurred cost. The prompt payment discount amount taken should be reported as a separate line item on the NF533 below the cumulative cost amounts for the contract.

The NF533 reports are the official cost documents used at NASA for cost type, price redetermination, and fixed price incentive contracts. The data contained in the reports must be auditable using Generally Accepted Accounting Principles. Supplemental cost reports submitted in addition to the NF533 must be reconcilable to the NF 533.

The due dates for the NF533M and NF533Q reports are outlined in Chapter 3 of NPG 9501.2D. The following is a summary of the NF533 due date requirements.

<u>NF533 Report</u>	<u>Due Date</u>
<i>NF533M</i>	Due not later than 10 working days following the close of the contractor's monthly accounting period.
<i>NF533Q</i>	Due not later than the 15th day of the month preceding the quarter being reported.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

The due dates reflect the date the NF533 reports are received by personnel on the distribution list, not the date the reports are generated or mailed by the contractor. It is critical that the NF533 reports are submitted in a timely manner to ensure adequate time for NASA to analyze and record the cost into the NASA accounting system.

Uncompensated overtime hours worked should be reported on NF533 reports as a separate line item or in the footnotes.

For contracts which have multiple schedules, a summary NF533 is required to provide a cumulative from inception cost for the contract, regardless of schedule.

An initial NF533 report is required in the NF533Q format to be used as a baseline for the life of the contract. The initial (baseline) NF533Q report shall be submitted by the contractor within 30 days after authorization to proceed has been granted. The initial report shall reflect the original contract value detailed by negotiated reporting categories and shall be the original contract baseline plan. In addition to the initial (baseline) report, monthly NF533 reporting shall begin no later than 30 days after the incurrence of cost.

Column 7b (planned cost incurred/hours worked for the month) and 7d (cumulative planned cost incurred/ hours worked) of the NF533M represent the negotiated baseline plan for the contract. There may not be a relationship between the estimates provided in columns 8 of the NF533M to columns 7b and 7d. Columns 7b and 7d represent the legally binding contract negotiated baseline plan plus all authorized changes.

Short and long-term cost estimates, which include all data entered in columns 8 and 9a on the NF533M and NF533Q reports, shall be based on the most current and reliable information available.

Prior period cost adjustments should be reported in column 7a and 7c of NF533M and column 7a of the NF533Q with a footnote discussing the reasons for and amounts of the adjustments.

Monthly NF533 reporting is no longer required once the contract is physically complete, provided the final cost report includes actual cost only (no estimates or forecasts). The contractor must continue to submit monthly NF533 reports as long as estimates for the following period are included. If the final cost of a contract changes after the submission of the "final" contractor cost report, the contractor must submit a revised NF533 report in the month the cost change is recognized.

Variance Reports

The contractor shall provide a written narrative of variance analysis when variances exceed +/- 5% including a narrative form of corrective actions and schedules for such variances.

Format

The contractor shall deliver all reports electronically in a compatible format with the Engineering Directorate's Design Data Management System (DDMS).

Electronic NF533 Requirement

In addition to submitting the NF533M or NF533Q in a hardcopy format, the contractor, upon request, shall submit the NF533 electronically by the same due date as the hardcopy. The data shall be submitted via email using the Government prescribed flat file format (see attached Agency Defined File Format for an example of the layout details) and shall include the following header information from the hardcopy.

<u>Data Element</u>	<u>Description</u>
Contract Number	NASA assigned contract number
Modification Number	Latest definitive Modification Number
Accrual Date	Date the data was generated for
Report Period End Date	Period ending date of the NF533
Operating Days	Number of operating days for the current NF533
Date Received/Submitted	Date the report is submitted
CCR Format	Monthly (NF533M) or Quarterly (NF533Q)

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

Cost Unit of Measure	Unit of measure used to report cost on the report NF533
HR/WYE Unit of Measure	Unit of measure used to report Hours/Work Year Equivalents (WYEs) on the NF533 report
Authorized Contractor Representative	Name of Contractor Approving Officer
Authorized Contractor Representative Date Signed	Date the NF533 is approved and signed by the authorized Contractor Representative
Monthly Grand Total Cost Incurred (7a)	Grand Total Actual Monthly cost for the prior month (column 7a on the NF533)
Monthly Grand Total HR/WYE (7a)	Grand Total Actual monthly hours/WYEs for the prior month (column 7a on the NF533)
Monthly Grand Total Cost Planned (7b)	Prior month planned cost (column 7b on the NF533)
Grand Total Cost Incurred ITD (7c)	Grand total contract cost from Inception to Date (ITD) (column 7c on the NF533)
Grand Total Planned Cost (7d)	Grand total planned contract cost (column 7d on the NF533)
Grand Total Estimated Cost (8a)	Grand total current month cost estimate (column 8a on the NF533)
Grand Total Estimated HR/WYE (8a)	Grand total current month HR/WYE estimate (column 8a on the NF533)
Grand Total Next Month Estimated Cost (8b)	Grand total next month cost estimate (column 8b on the NF533)
Grand Total Balance of Contract (8c)	Contract Balance for the remaining estimate to complete
Grand Total Contractor Estimate (9a)	Contractor estimate to complete entire scope of contract
Grand Total Contract value (9b)	Contractor distribution of contract value by the reporting categories
Grand Total Unfilled Orders Outstanding (10)	Unfilled order outstanding at the end of the reporting period

The flat file will also contain detail information for each Reporting Category (RC). A Reporting Category correlates to a task order, delivery order, or Work Breakdown Structure (WBS) and is the level at which cost is reported. Each RC can have Sub-Reporting Category line items (detailed cost elements) that add up to a RC. The Contractor is required to coordinate with the NASA Resource Analyst assigned to the contract in order to establish and maintain the Reporting Categories the contractor shall use to comply with this data requirement. The chart below describes the data elements to be included in this section of the flat file (see attached Agency Defined File Format for specific layout details).

<u>Data Element Name</u>	<u>Description</u>
Reporting Category (RC)	Task, Delivery Order, Work Breakdown Structure
Cost Incurred for Month (7a)	Prior month actual cost incurred for each RC (column 7a on NF533)
HR/WYE Incurred for Month (7a)	Prior month actual HR/WYE incurred for each RC (column 7a on NF533)
Contract prior month planned cost (7b)	Planned cost for prior month for each RC (column 7b on NF533)
Contract ITD cost (7c)	Contract ITD cost for each RC (column 7c on NF533)
Contract planned ITD cost (7d)	Contract planned ITD cost for each RC (column 7d on NF533)
Current month estimated cost (8a)	Cost estimate for the current month for each RC (column 8a on NF533)
Current month estimated HR/WYE (8a)	HR/WYE estimate for the current month for each RC (column 8a on NF533)
Next month estimated cost (8b)	Estimated cost for next month for each RC (column 8b on NF533)
Balance of Contract	Balance of contract for the remaining estimate to complete for each RC (column 8c on NF533)
Contractor Estimate	Contractor estimate for the total estimate to complete entire scope of contract for each RC (column 9a on NF533)
Contract Value	Contract value based upon contract modifications for each RC (column 9c on NF533)
Unfilled orders outstanding	Unfilled orders outstanding at the end of the reporting period for each RC (column 10 on NF533)
Reporting Category level	Used by NASA's accounting system to determine the RC level
Reporting Category Identifier	Identifies if the RC is a actual Reporting Category or a Sub-Reporting Category

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

The flat file shall be saved as a text file with no extension (do not include .txt after the file name) and named in strict accordance with the specific format described in the attached Agency Defined File Format document.

ATTACHMENTS:

Attachment 1: Contract Summary Report/533M & Individual DO Report

Attachment 2: Quarterly 533Q Report/Baseline Report

Attachment 3: Flat File Format

NASA Monthly Contractor Financial Management Report

Form Approved OMB No. 2700-0003

2. REPORT FOR MONTH ENDING & # OF WORK DAYS

TO:

FROM:

3. CONTRACT VALUE

a. COST \$	b. FEE \$
---------------	--------------

1. DESCRIPTION OF CONTRACT

a. TYPE

b. CONTRACT NO. & LATEST DEFINITIZED MOD NO.

c. SCOPE OF WORK

d. AUTH. CONTR. REP.
(Signature)

DATE

4. FUND LIMITATION: \$

5. BILLING

a. INVOICE AMTS. BILLED \$	b. TOTAL PMTS. REC'D \$
-------------------------------	----------------------------

6. REPORTING CATEGORY

7. COST INCURRED/HOURS WORKED

8. ESTIMATED COST/HOURS TO COMPLETE

9. ESTIMATED FINAL COST/HOURS

DURING MONTH		CUM TO DATE		DETAIL		BALANCE OF CONTRACT	COST/HOURS		10. UNFILED ORDERS OUTSTANDING
ACTUAL a.	PLANNED b.	ACTUAL c.	PLANNED d.	Curr Mth Est a.	Next Mth Est b.		CONTRACTOR EAC a.	CONTRACT VALUE b.	

IDIQ

Direct Labor Hours

Direct Labor Cost

Total direct labor cost

Subcontractor Direct Labor Cost

Subcontractor Direct Labor Cost

Total subcontractor cost

Travel Cost

Material Cost

Freight Cost

Subcontractor Cost

Other Direct Cost

Total non-labor resources

G&A

Cost of Money

Total Costs

Fixed Fee

Total Cost and Fee

Prime FTEs - Onsite

Prime FTEs - Offsite

Subcontractor FTEs - Onsite

Subcontractor FTEs - Offsite

Cost per FTE

TOTAL FIRM FIXED PRICE

TOTAL CONTRACT PRICE

Termination Liability

TO:	FROM:	3. CONTRACT VALUE	
		a. COST; \$	b. FEE: \$
1. DESCRIPTION OF CONTRACT	a. TYPE	4. FUND LIMITATION: \$	
	c. SCOPE OF WORK	b. CONTRACT NO. & LATEST DEFINITIZED MOD NO.	5. BILLING
	d. AUTH. CONTR. REP. (Signature)	DATE	a. INVOICE AMTS. BILLED \$
			b. TOTAL PMTS. REC'D \$

6. REPORTING CATEGORY	7. COST INCURRED/ HOURS WORKED			8. ESTIMATED COST/HOURS TO COMPLETE										9. ESTIMATED FINAL COST/HOURS		10. ESTI-MATED COM- PLETION DATE	11. UN- FILLED ORDERS OUT- STAND	
	CUMU- LATIVE ACTUAL THROUGH PRIOR MONTH	CUR- RENT MONTH ESTI- MATE	CUMU- LATIVE ESTI- MATE TO DATE	MONTH	MONTH	MONTH	QUARTER	QUARTER	QUARTER	BALANCE OF FY-	NEXT FY-	BALANCE OF CONTRACT	TOTAL TO COM- PLETE	CONTRACTOR ESTIMATE	CONTRACT VALUE			
																		a.
IDIQ																		
Direct Labor Hours																		
Direct Labor Cost																		
Total direct labor cost																		
Subcontractor Direct Labor Cost																		
Subcontractor Direct Labor Cost																		
Total subcontractor cost																		
Travel Cost																		
Material Cost																		
Freight Cost																		
Subcontractor Cost																		
Other Direct Cost																		
Total non-labor resources																		
G&A																		
Cost of Money																		
Total Costs																		
Fixed Fee																		
Total Cost and Fee																		
Prime FTEs - Onsite																		
Prime FTEs - Offsite																		
Subcontractor FTEs - Onsite																		
Subcontractor FTEs - Offsite																		
Cost per FTE																		
TOTAL FIRM FIXED PRICE																		
TOTAL CONTRACT PRICE																		
Termination Liability																		

File names must be provided in a specific format. Each file name will begin with the SAP 2 Character center abbreviation listed below. The contract number and date will be included in the file name as well. Below is a sample file name.

MACFPS001_NAS00-0001_yyyy_mm_dd

SAP 2 Charter Center Abbreviations

Headquarters	HQ	Dryden	DR
Marshall	MA	Goddard	GO
Ames	AM	Stennis	ST
Glenn	GL	Johnson	JO
Langley	LA	Kennedy	KE

Example File Format

Header (Non-Repeating Segment)

CCR Extension Data Element	Description	Contractor Initial Data Mapping	NF 533 Required/Optional	OTHER CCR Required/Optional	Field Name	St Pos	EndPos	Len	Formt
HEADER:									
Record Type	Used by eGate to determine record type	'HD' for Header	Required	Required	RECORD_TYPE	1	2	2	CHAR
Contract Number	Contract Number (1b)	Header field—submitted with CONTRACTOR data or defaulted by interface or extension	Required	Required	CONTRACT_NUMBER	3	12	10	CHAR
	Latest definitive Modification Number(CR8197)				MOD_NUMBER	13	18	6	CHAR
Accrual Date	Date the data was generated for. Used by SAP as part of Oracle table key	Accrual Date. MM01YYYY, where MM is the Accrual Month and YYYY is the fiscal year	Required	Required	ACCRUAL_DATE	19	26	8	DATE MM01YYYY

Report Period End Date	Report Period End Date is a date(2)	Header field—submitted with CONTRACTOR data or defaulted by interface or extension	Required	Required	REP_END_DATE	27	34	8	DATE
Operating Days	Operating days(2).	Header field—submitted with CONTRACTOR data	Required	Optional unless Required by contract	OPER_DAYS	35	40	6	NUMERIC
Date Received	Date Received (1d)	System Date upon which the cost data is loaded into the CCR Extension	Required	Required	DATE_REC	41	48	8	DATE
CCR Format	'M' for Monthly and 'Q' for Quarterly (SIR2047)	Submitted with CONTRACTOR data	Required	Required	CCR_FORMAT	49	49	1	CHAR
Cost Unit of Measure	Cost Unit of Measure (SIR2047)	Submitted with CONTRACTOR data	Required	Required	COST_UOM	50	51	2	CHAR
HR/WYE Unit of Measure	Hour/Work-Year-Equivalent Unit of Measure (SIR2047)	Submitted with CONTRACTOR data	Required	Required	HR_WYE_UOM	52	53	2	CHAR
	Authorized Contractor Representative – Name of Contractor Approving Officer (CR 8197)				AUTH_SIGNATURE	54	78	25	CHAR
	Authorized Contractor Representative Date Signed – Date CCR is approved/signed by authorized contractor representative(CR 8197)				AUTH_SIGNATURE_DATE	79	86	8	DATE MMDDYYYY
ATTACHMENT 3- FLAT FILE FORMAT PAGE <u>2</u> OF <u>9</u>									

Grand Total Cost Incurred Month (7a)	The Grand Total Contract Prior Month Actual Dollars Column 7a reports actual costs for the prior month.	Submitted with CONTRACTOR data	Required.	Optional. Only required if lower detailed line item data is submitted in monthly batch file.	GT_COST_INCUR_MONTH	87	99	13	CURRENCY(2)
Grand Total HR/WYE (7a)	The Grand Total Contract Prior Month Actual Hours Column 7a reports actual HR or WYE for the prior month.	Submitted with CONTRACTOR data	Required if detailed line item data is submitted in monthly batch file.	Required if detailed line item data is submitted in monthly batch file.	GT_HRWYE_PRIOR_MONTH	100	109	10	NUMERIC(1)
	The Grand Total Contract Prior Month Planned Dollars Column (7b) reports planned costs for the prior month. (CR8197)				GT_COST_PLANNED_MONTH	110	122	13	CURRENCY (2)
Grand Total Cost Incurred ITD (7c)	The Grand Total Contract Cost Dollars Column 7c which represents Contract Cost Inception to Date	Submitted with CONTRACTOR data	Required. Does not require detailed line item data if provided from Cost Incurred Month (7a)	Required if detailed line item data is provided for this column	GT_ITD_COST	123	135	13	CURRENCY (2)
	Grand Total Contract Planned Cost Dollars Column (7d) which represents Planned Contract Cost Inception to Date(CR 8197)				GT_COST_PLANNED_ITD	136	148	13	CURRENCY (2)
Grand Total Estimated Cost (8a)	The Grand Total Contract Estimated Cost for first upcoming month, or Current Month Estimate for cost.	Submitted with CONTRACTOR data	Required	Required if detailed line item data is provided for this column	GT_EST_COST	149	161	13	CURRENCY (2)
ATTACHMENT 3- FLAT FILE FORMAT PAGE 3 OF 9									

Grand Total HRWYE (8a)	The Grand Total Contract Estimated Hours for first upcoming month, or Current Month Estimate for HRWYE.	Submitted with CONTRACTOR data	Required if detailed line item data is provided for this column	Required if detailed line item data is provided for this column	GT_HRWYE_FIRST_MONTH	162	171	10	NUMERIC (1)
Grand Total Next Month Estimated Cost (8b)	The Grand Total Contract Estimated Cost for second upcoming month or Next Month Estimate for cost.	Submitted with CONTRACTOR data	Required if detailed line item data is provided for this column	Required if detailed line item data is provided for this column	GT_NEXT_MONTH_EST	172	184	13	CURRENCY (2)
	Grand Total Balance of Contract for the remaining estimate to complete (CR 8197)				GT_BALANCE_CONTRACT	185	197	13	CURRENCY (2)
	Grand Total Contractor Estimate for the total estimate to complete entire scope of contract (CR 8197)				GT_BALANCE_CONTRACTOR_ESTIMATE	198	210	13	CURRENCY (2)
	Grand Total Contract Value based upon Contract Modifications (CR 8197)				GT_CONTRACT_VALUE	211	223	13	CURRENCY (2)
	Grand Total Unfilled Orders Outstanding at end of reporting period (CR 8197)				ST_UNFILLED_ORDERS	224	236	13	CURRENCY (2)

Example File Format

Detail (Repeating Segment)

CCR Extension Data Element	Description	Contractor Initial Data Mapping	NF 533 Required/ Optional	OTHER CCR Required/ Optional	Field Name	St Pos	End Pos	Len	Format
CCR DETAIL LINE ITEMS:									
Record Type	'DM' for Monthly column 7a Detail; 'DQ' for ITD Column 7c Detail	"RD" for Detail	Required	Required	RECORD_TYPE	1	2	2	CHAR
Reporting Category	Reporting Category (6)	Line item field— submitted with CONTRACTOR data	Required	Required	SERV_ORD_CAT	3	26	24	CHAR
Cost Incurred Month (7a)	Prior Month incurred costs (ACTUALS) for given category.	Line item field— submitted with CONTRACTOR data	Required if detailed line item data is not provided from Cost Incurred Month (7c)	Determined by contract requirement- data from Column 7a, 7c or 8a	COST_INCUR_MONTH	27	39	13	CURRENCY (2)
HR/WYE Incurred Month (7a)	Prior month incurred hours worked [Actuals] for given category..	Line item field— submitted with CONTRACTOR data	Optional unless Required by contract for WYE calculation	Optional unless Required by contract for WYE calculation	HRWYE_INCUR_MONTH	40	49	10	NUMERIC (1)
	Contract Prior Month Planned Dollars Column (7b) reports planned costs for the prior month (CR 8197)				COST_PLANNED_MONTH	50	62	13	CURRENCY (2)
	Contract Cost Dollars Column (7c) which represents Contract Cost Inception to Date (CR 8197)				CUR_COST_INCUR_ITD	63	75	13	CURRENCY (2)
	Contract Planned Cost Dollars Column (7d) which represents Planned Contract Cost Inception to Date (CR 8197)				COST_PLANNED_ITD	76	88	13	CURRENCY (2)
Current Month Estimated Cost (8a)	Estimated costs for first upcoming month for given category.	Line item field— submitted with CONTRACTOR data	Required.	Determined by contract requirement- data from Column 7a, 7c or 8a	CUR_MONTH_EC	89	101	13	CURRENCY (2)

HR/WYE Current Month Estimate (8a)	Estimated hours for first upcoming month for given category. Will only be needed if labor hours are required to be submitted electronically per contract.	Line item field— submitted with CONTRACTOR data	Optional unless Required by contract for WYE calculation	Optional unless Required by contract for WYE calculation	HRWYE_CUR_MONTH_EST	102	111	10	NUMERIC (1)
Next Month Estimated Cost (8b)	Estimated costs for second upcoming month for given category.	Line item field— submitted with CONTRACTOR data	Required unless not part of Contract scope	Required unless not part of Contract scope	NEXT_MONTH_EC	112	124	13	CURRENCY (2)
	Balance of Contract for the remaining estimate to complete (8c) (CR 8197)				BALANCE_CONTRACT	125	137	13	CURRENCY (2)
	Contractor Estimate for the total estimate to complete entire scope of contract (9a) (CR 8197)				CONTRACTOR_ESTIMATE	138	150	13	CURRENCY (2)
	Contract Value based upon Contract Modifications (CR 8197)				CONTRACT_VALUE	151	163	13	CURRENCY (2)
	Unfilled Orders Outstanding at end of reporting period (CR 8197)				UNFILLED_ORDERS	164	176	13	CURRENCY (2)
	Used by SAP to determine Reporting Category Level (1.1.2.2.1) (CR 8197)				REPORTING_LEVEL	177	206	30	CHAR
	Fill in an "X" if record is a Reporting Category. Otherwise, leave blank for Sub-Reporting Category Line Items and Element of Cost detail records. This field is used by SAP to determine if the record is a Reporting Category. (CR 8197)				REPORTING_CAT_INDICATOR	207	207	1	CHAR

Example File Format

Sub-Reporting Category Line Items – Repeating Segment

Field Name	Start Pos	End Pos	Length	Format	Variable Repetition (?;*,+,n-n)	Description
SUB_RECORD_TYPE	1	2	2	CHAR		'SM' for Monthly column 7a Detail; 'SQ' for ITD column Detail
SUB_REP_CAT	3	26	24	CHAR		Reporting Category
SUB_COST_INCUR_MONTH	27	39	13	CURRENCY (2)		Prior month incurred costs (Actuals) for given category.
SUB_HRWYE_INCUR_MONTH	40	49	10	NUMERIC (1)		Prior month incurred hours worked (Actuals) for given category.
SUB_COST_PLANNED_MONTH	50	62	13	CURRENCY (2)		Contract Prior Month Planned Dollars Column (7b) reports planned costs for the prior month.
SUB_CUR_COST_INCUR_ITD	63	75	13	CURRENCY (2)		Contract Cost Dollars Column (7c) which represents Contract Cost Inception to Date.
SUB_COST_PLANNED_ITD	76	88	13	CURRENCY (2)		Contract Planned Cost Dollars Column (7d) which represents Planned Contract Cost Inception to Date.
SUB_CUR_MONTH_EC	89	101	13	CURRENCY (2)		Estimated costs for first upcoming month for given category (8a).
SUB_HRWYE_CUR_MONTH_EST	102	111	10	NUMERIC (1)		Estimated hours for first upcoming month for given category. Will only be needed if labor hours are required to be submitted electronically per contract (8a).
SUB_NEXT_MONTH_EC	112	124	13	CURRENCY (2)		Estimated costs for second upcoming month for given category (8b).
SUB_BALANCE_CONTRACT	125	137	13	CURRENCY (2)		Balance of Contract for the remaining estimate to complete (8c).
SUB_CONTRACTOR_ESTIMATE	138	150	13	CURRENCY (2)		Contractor Estimate for the total estimate to complete entire scope of contract (9a).
SUB_CONTRACT_VALUE	151	163	13	CURRENCY (2)		Contract Value based upon Contract Modifications (9b).
SUB_UNFILLED_ORDERS	164	176	13	CURRENCY (2)		Unfilled Orders Outstanding at end of reporting period.
REPORTING_LEVEL	177	206	30	CHAR		Used by SAP to determine Reporting Category Level (1.1.2.2.1) (CR 8197).
REPORTING_CAT_INDICATOR	207	207	1	CHAR		Fill in an "X" if record is a Reporting Category. Otherwise, leave Blank for Sub-Reporting Category Line Items and Element of Cost detail records. This field is used by SAP to determine if the record is a Reporting Category. (CR 8197)

Example File Format

533 Agency FILE RECORD LAYOUT (Element of Cost Detail – Repeating Segment (CR8197))

Field Name	Start Pos	End Pos	Length	Format	Variable Repetition (?,*+,n-n)	Description
RECORD_TYPE	1	2	2	CHAR		'EM' for Monthly column 7a Detail; 'EQ' for ITD column Detail
EOC_REP_CAT	3	26	24	CHAR		Reporting Category
EOC_COST_INCUR_MONTH	27	39	13	CURRENCY (2)		Prior month incurred costs (Actuals) for given category.
EOC_HRWYE_INCUR_MONTH	40	49	10	NUMERIC (1)		Prior month incurred hours worked (Actuals) for given category.
EOC_COST_PLANNED_MONTH	50	62	13	CURRENCY (2)		Contract Prior Month Planned Dollars Column (7b) reports planned costs for the prior month.
EOC_CUR_COST_INCUR_ITD	63	75	13	CURRENCY (2)		Contract Cost Dollars Column (7c) which represents Contract Cost Inception to Date.
EOC_COST_PLANNED_ITD	76	88	13	CURRENCY (2)		Contract Planned Cost Dollars Column (7d) which represents Planned Contract Cost Inception to Date.
EOC_CUR_MONTH_EC	89	101	13	CURRENCY (2)		Estimated costs for first upcoming month for given category (8a).
EOC_HRWYE_CUR_MONTH_EST	102	111	10	NUMERIC (1)		Estimated hours for first upcoming month for given category. Will only be needed if labor hours are required to be submitted electronically per contract (8a).
EOC_NEXT_MONTH_EC	112	124	13	CURRENCY (2)		Estimated costs for second upcoming month for given category (8b).
EOC_BALANCE_CONTRACT	125	137	13	CURRENCY (2)		Balance of Contract for the remaining estimate to complete (8c).
EOC_CONTRACTOR_ESTIMATE	138	150	13	CURRENCY (2)		Contractor Estimate for the total estimate to complete entire scope of contract (9a).
EOC_CONTRACT_VALUE	151	163	13	CURRENCY (2)		Contract Value based upon Contract Modifications (9b).
EOC_UNFILLED_ORDERS	164	176	13	CURRENCY (2)		Unfilled Orders Outstanding at end of reporting period.
REPORTING_LEVEL	177	206	30	CHAR		Used by SAP to determine Reporting Category Level (1.1.2.2.1) (CR 8197).
REPORTING_CAT_INDICATOR	207	207	1	CHAR		Fill in an "X" if record is a Reporting Category. Otherwise, leave Blank for Sub-Reporting Category Line Items and Element of Cost detail records. This field is used by SAP to determine if the record is a Reporting Category. (CR 8197)

Example File Format

Trailer (provides the number of header & detail records sent from the contractor/vendor/center in order to verify the receipt of complete data after transmission)

CCR Extension Data Element	Description	Contractor Initial Data Mapping	NF 533 Required/Optional	OTHER CCR Required/Optional	Field Name	Start Pos	End Pos	Length	Format
TRAILER:									
Record Type	Used by eGate to determine record type	"TL" for Trailer	Required	Required	RECORD_TYPE	1	2	2	CHAR
Record Count	Count of the number of Detail records sent to process (Detail Only)	Trailer field submitted with CONTRACTOR data	Required	Required	RECORD_COUNT	3	9	7	NUMERIC
	Value of spaces				FILLER	10	207	198	CHAR

JSC DATA REQUIREMENT LIST (DRL)/DATA REQUIREMENT DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title Government Property Management Plan	2. Date of current version SEPT 2004	3a. DRL Line 52	3b. RFP/Contract No. NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data) To describe the method of administering Government personal property.		5. DRD Category: (check one) <input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional) Clause 52.245-5	7. Interrelationships (e.g., with other DRDs) (Optional)		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

SCOPE:

The Government Property Management plan defines the contractor's use, maintenance, repair, protection, and preservation of Government personal property. It shall describe the contractor's approach to receiving, handling, stocking, maintaining, protecting, and issuing Government property. The Plan should include interaction and Departmental/Office responsibilities. The delegated Property Administrator will request detailed procedures after contract start.

APPLICABLE DOCUMENTS:

Federal Acquisition Regulation (FAR) Part 45 NASA FAR Supplement (NFS) Part 1845

CONTENTS: This plan shall reference those policies and procedures, which constitute the contractor's Property Management Manual and shall include at a minimum the following categories:

- | | | |
|---|----------------------|------------------------------|
| Property Management | Acquisition | Receiving |
| Identification | Records | Movement |
| Storage | Physical Inventories | Reports |
| Consumption | Utilization | Maintenance |
| Subcontractor | Control Disposition | Contractor Closeout |
| Reconcile Contractor Records with Financial Records | | Center-Unique Considerations |

FORMAT:

Contractor format is acceptable; electronic format and availability as required by Contracting Officer's letter.

MAINTENANCE:

Changes shall be incorporated by change pages or complete reissue.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
 (Based on JSC -STD-123)

1. DRD Title	2. Date of current version	3a. DRL Line	3b. RFP/Contract No.
System Safety Plan	10/02 (replaced 4/99 version)	53	NNJ04HH99B
4. Use (Define need for, intended use of, and/or anticipated results of data)		5. DRD Category: (check one)	
Establishes system safety tasks and activities to identify, evaluate, and eliminate or control hazards associated with space flight hardware and related operations.		<input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA	
6. References (Optional)	7. Interrelationships (e.g., with other DRDs) (Optional)		
See Block 8	See Block 8		
8. Preparation Information: The contractor shall prepare the deliverable as follows:			

Applicable references for this DRD are as follows:

- NPG 8715.3, "Safety Manual"
- JPG 1700.1, as revised, "JSC Safety and Health Handbook."
- MIL-STD-882, as revised, "System Safety Program for Systems and Associated Subsystems and Equipment, General Requirements for"
- NSTS 5300.4, 1D-2, as revised, "Safety, Reliability, Maintainability, and Quality Provisions for the Space Shuttle Program." (Note: also used by the Space Station program.)
- JSC 17773, as revised, "Instruction for Preparation of Hazard Analyses for JSC Ground Operations."
- NSTS 1700.7, as revised, "Safety Policy and Requirements for Payloads Using the Space Transportation System."
- 45 SPW HB S-100/KHB 1700.7, "Space Transportation System Payload Ground Safety Handbook."
- NSTS 22254, as revised, "Methodology for Conduct of Space Shuttle Program Hazard Analyses."
- JESA 30000, Section 9, as revised, "Product Assurance Requirements."
- SSP 30309, as revised, "Safety Analysis and Risk Assessment Requirements Document."

NOTE: Detailed System Safety requirements differ according to different flight programs. The elements of a System Safety Program Plan as outlined below are generic; refer to the appropriate applicable references listed above for specific program requirements.

System Safety Program Plans are to be tailored for individual safety engineering projects as integral parts of a formal, disciplined system safety program plan implemented by the contractor. System Safety Program Plan Requirements:

1. Source Documents. The initial issue of the documents cited herein (including those of any applicable amendments and revisions) shall be as reflected in the contract schedule.
2. General. The System Safety Program Plan shall be documented in narrative format and shall:
 - 2.a Describe the scope of the project for which the safety engineering activity is to be tailored.
 - 2.b Describe any interrelationships to other contract requirements, tasks and functional elements including appropriate cross references to minimize duplication.
 - 2.c List the contractor and NASA documents which will be applied either as directives or as guidance in the conduct of the SSPP and related system safety tasks.
 - 2.d Identify the system safety engineering requirements, tasks, and responsibilities on an item-by-item basis in accordance with the schedule.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

3. Content.

3.1 System Safety Engineering Organization. The SSPP shall describe:

3.1.a The system safety organization or function within the organization of the contract including charts to show the organizational and functional relationships and lines of communication.

3.1.b The responsibility, authority, and accountability of system safety personnel and other contractor organizational elements (including subcontractors) involved in the system safety effort. Identify each organizational unit responsible for executing each task. Identify the authority in regard to resolution of all identified hazards. Include the title, address, and telephone number of the System Safety Program Manager.

3.1.c The staffing of the system safety organization for the duration of the project including manpower loading and qualifications of assigned key personnel.

3.1.d The procedures by which the contractor will integrate and coordinate the system safety efforts. Include methods of dissemination of system safety requirements to action organizations and subcontractors; coordination of subcontractors' system safety programs; integration of hazard analyses; management and engineering reviews; program status reporting; and the identities and charters of any system safety groups.

3.1.e. The process through which contractor management decisions will be made to include notification and subsequent actions for the following: critical and catastrophic hazards; corrective actions taken; mishaps or malfunctions; waivers to safety requirements; and program deviations.

3.1.f. The interfaces between the system safety organization and all other applicable disciplines such as Engineering, Occupational Safety and Health, Reliability, Quality Assurance, Medical Support, etc., at all levels of the project (NASA, contractor, and subcontractor.)

3.2 System Safety Project Milestones. The SSPP shall:

3.2.a Identify safety milestones required to accomplish evaluations of the effectiveness of the system safety effort at critical safety checkpoints (such as design reviews, self-evaluations, operational readiness reviews, audits, etc.)

3.2.b Provide a contract schedule of safety tasks showing start and completion dates, reports, reviews, and manloading, in relationship to other contract milestones.

3.2.c To preclude duplication, identify integrated system activities (i.e., design analyses, test, demonstrations, etc.) applicable to the system safety program but specified within other engineering tasks. Include as part of this section the estimated system safety manpower loading required to accomplish these integrated tasks.

3.3 System Safety Requirements. The SSPP shall:

3.3.a Describe or reference the methods that will be used to identify and apply hazard control requirements and criteria for the design and operation of equipment, software, and facilities, and for procedures covering all phases of acquisition specified in the schedule. List the safety standards and system specifications which are the sources of safety requirements with which the contractor either is required to comply or intends to adopt as a requirement.

3.3.b Describe the risk assessment procedures including the hazard severity categories, hazard probability (or frequency) levels, the precedence to be followed in satisfying safety requirements. State any qualitative or quantitative measures of system safety which the contractor is required to meet, including a description of the acceptable risk levels. Include system safety definitions which are in addition to those in JSC documents or are unique to the project covered by the SSPP.

3.3.c Describe the management controls that shall be used to ensure compliance or justify waivers and deviations with general design and operational safety criteria and the closed loop procedures to ensure hazard resolution and control.

JSC DATA REQUIREMENTS LIST (DRL)/DATA REQUIREMENTS DESCRIPTION (DRD)
(Based on JSC -STD-123)

3.4 Hazard Analyses. The SSPP shall describe:

3.4.a The analysis techniques and format that will be used in qualitative and quantitative analysis to identify hazards, their causes and effects, and recommended corrective actions.

3.4.b The depth to which each analysis technique will be used within the system, operation, or scenario being analyzed. This description will include identification of hazards associated with the system, subsystem, components, personnel, support equipment, government furnished equipment, facilities, and their interrelationships in the logistics support, training, maintenance, transportability, operational environments, and phase out or disposal.

3.4.c The integration of subcontractor hazard analyses and techniques within the overall project including contractor hazard analyses.

3.4.d The techniques to be used to establish a single closed loop tracking system.

3.5 System Safety Data. The SSPP shall:

3.5.a Describe the approach for researching, disseminating, and analyzing pertinent historical hazard or mishap data.

3.5.b Identify deliverable data and the level of approval required for customer acceptance. Attach a copy of the appropriate sheets from the data requirements list (DRL) of the schedule.

3.5.c Identify safety related non-deliverable data and describe the procedures for accessibility by NASA and the retention of data.

3.6. Safety Verification and Audits. The plan shall describe:

3.6.a The verification and audit requirements and procedures for ensuring that the objectives and requirements of the system safety program have been adequately demonstrated and implemented.

3.6.b The procedures for ensuring feedback of safety-pertinent information for management and engineering review and analysis.

3.6.c The review procedures established by the contractor's system safety organization to ensure safe conduct of hazardous tests with particular emphasis on those involving human test subjects.

3.7 Training. Describe techniques and procedures to be used by the contractor to ensure that the objectives and requirements of the system safety program are implemented in training for engineers, test subjects, technicians, operators, and support (including maintenance) personnel.

Authority. NFS 18-52.223-70, 18-52.223-73, 18-52.223-73 (Alt 1); JPI 52.223-92

Attachment J-2

ACRONYM LIST

ATTACHMENT J-2**ACRONYM LIST**

A/As	ALERTS/Advisories
ADP	Acceptance Data Package
AIT	Analysis and Integration Team
ALERT	Acute Lance Emergency Reliability Tip
AO	Atomic Oxygen
ATCS	Active Thermal Control Systems
ATP	Acceptance Test Procedures
BOE	Basis of Estimate
BRDF	Bi-directional Reflectance Distribution Function
CAD	Computer Aided Design
CAGE	Contractor and Government Entity
CARD	Certification and Acceptance Document
CBA	Collective Bargaining Agreement
CBL	Commercial Bill of Lading
CBI	Confidential Business Information
CCR	Central Contractor Registration
CDP	Certification Data Package
CDR	Critical Design Review
CEA	Center Export Administrator
CHeCS	Crew Health and Conditioning Systems
CIL	Critical Items List
CO	Contracting Officer
COTR	Contracting Officer's Technical Representative
COTS	Commercial off the Shelf
CPFF	Cost Plus Fixed Fee
CRAVE	Crew, Robotics, and Vehicle Equipment
DCAA	Defense Contract Audit Agency
DDMS	Design Data Management System
DDTM&E	Design, Development, Testing, Manufacturing and Evaluation
DID	Data Item Description
DO	Delivery Order
DOD	Department of Defense
DOL	Department of Labor
DR	Discrepancy Reporting
DRD	Data Requirements Descriptions
DRL	Data Requirements List
ECCN	Export Classification Control Number
ECD	Estimated Completion Date
ECLSS	Environmental Control and Life Support

A-Crew, Robotics, and Vehicle Equipment (CRAVE)-Unrestricted

EDCC	Engineering Drawing Control Center
EDCP	Engineering Design Change Proposal
EEE	Electronic, Electrical and Electromechanical
EIS	End Item Specification
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EST	Export Services Team
EVA	Extravehicular Activity
EVL	Expendable Launch Vehicle
EVR	Extravehicular Robotics
FAR	Federal Acquisition Regulation
FCA	Functional Configuration Audit
FCE	Flight Crew Equipment
FDIR	Failure Detection, Isolation, and Recovery
FEA	Finite Element Analysis
FFP	Firm Fixed Price
FLT	Flight
FMEA	Failure Modes and Effects Analysis
FMS	Financial Management System
FSE	Flight Support Equipment
GBL	Government Bill of Lading
GCAR	Government Certification and Approval Request
GFE	Government Furnished Equipment
GFS	Government Furnished Software
GFY	Government Fiscal Year
GIDEP	Government Industry Data Exchange Program
GSE	Ground Support Equipment
GSI	Government Source Inspection
GSRP	Ground Safety Review Panel
HBCU	Historically Black College or University
HR	Hazard Report
HUBZone	Historically Underutilized Business Zone
ICD	Interface Control Document
IDIQ	Indefinite Delivery Indefinite Quantity
IPC	Information Planning Council
IPO	Industrial Property Officer
IRD	Interface Requirement Document
ISS	International Space Station
IT	Information Technology
ITS	Information Technology System
IVA	Intravehicular Activity
JPG	JSC Procedures and Guidelines

A-Crew, Robotics, and Vehicle Equipment (CRAVE)-Unrestricted

JSC	Lyndon B. Johnson Space Center
KSC	Kennedy Space Center
LRU	Line Replacement Unit
MSFC	Marshall Space Flight Center
MTBF	Mean Time Between Failures
NAC	National Agency Check
NCR	Nonconformance Report
NESS	NF 1018 Electronic Submission System
NFNMS	Foreign National Management System
NFS	NASA FAR Supplement
NPSL	NASA Parts Selection List
NPG	NASA Procedures and Guidelines
ORU	Orbital Replacement Unit
OSE	Orbital Support Equipment
OTS	Off the Shelf
PCA	Physical Configuration Audit
PDA	Pre-Delivery Acceptance
PDR	Preliminary Design Review
PIA	Pre-Installation Acceptance
PKI	Public Key Infrastructure
PPE	Personal Protection Equipment
PRACA	Problem Reporting and Corrective Action
PRVD	Flight Hardware Project Requirements and Verification Document
PTRS	Project Technical Requirements Specification
QE	Quality Engineer
QMS	Quality Management System
RAESR	Risk Assessment Executive Summary Report
R&M	Reliability and Maintainability
RFP	Request for Proposal
RFR	Request for Request
RIDS	Review Item Discrepancies
S&MA	Safety and Mission Assurance
SAR	System Acceptance Review
SAR	Safety Analysis Report
SAFER	Simplified Aid for EVA Rescue
SDB	Small Disadvantaged Business
SDD	Software Design Document

A-Crew, Robotics, and Vehicle Equipment (CRAVE)-Unrestricted

SDVOSB	Service Disabled Veteran Owned Small Business
SE	Sustaining Engineering
SEMO	Supply and Equipment Management Office
SEU	Single Event Upset
SMART	S&MA Review Team
SOW	Statement of Work
SQA	Software Quality Assurance
SR&MA	Safety Reliability and Mission Assurance
SR&QA	Safety Reliability and Quality Assurance
SRR	System Requirements Review
SRS	Software Requirements Specification
SSP	Space Shuttle Program
SSPP	System Safety Program Plan
SSRP	System Safety Review Panel
STE	Special Test Equipment
TBD	To Be Determined
TMR	Technical Manager Representative
V&V	Verification and Validation
V&VD	Verification and Validation Document
VDD	Version Description Document
VOSB	Veteran Owned Small Business
VTL	Verification Tracking Log
VUV	Vacuum Ultra Violet
WBS	Work Breakdown Structure
WOSB	Women Owned Small Business
WSTF	White Sands Test Facility

Attachment J-3

DOL WAGE DETERMINATIONS

January 1996

NOTICE OF INTENTION TO MAKE A SERVICE CONTRACT AND RESPONSE TO NOTICE

1. NOTICE NO.

U.S. DEPARTMENT OF LABOR
EMPLOYMENT STANDARDS
ADMINISTRATION

(See Instructions on Reverse)

NASA

MAIL TO:

**Administrator
Wage and Hour Division
U.S. Department of Labor
Washington, DC 20210**

2. Estimated solicitation date (use numerals)

Month	Day	Year

3. Estimated date bids or proposals to be opened or negotiations begun (use numerals)

Month	Day	Year

4. Date contract performance to begin (use numerals)
Extension

Month	Day	Year
01	01	07

5. PLACE(S) OF PERFORMANCE

Harris County, TX
Pima County, AZ

6. SERVICES TO BE PERFORMED (describe)

IV: Crew Robotics and Vehicle Equipment Support Services
Period of Performance 01-01-07 to 12-31-07

7. INFORMATION ABOUT PERFORMANCE

- A. Services now performed by a contractor
 B. Services now performed by Federal employees
 C. Services not presently being performed

8. IF BOX A IN ITEM 7 IS MARKED, COMPLETE ITEM 8 AS APPLICABLE

- a. Name and address of incumbent contractor
 Oceaneering Space Systems
 16665 Space Center Blvd.
 Houston, TX 77058-2268
- b. Number(s) of any wage determination(s) in incumbent's contract
 94-2515, 94-2025

c. Name(s) of union(s) if services are being performed under collective bargaining agreement(s). **Important:** Attach copies of current applicable collective bargaining agreements

None

RESPONSE TO NOTICE
(by Department of Labor)

- A. The attached wage determination(s) listed below apply to procurement.
 WD 2005-2515, Rev 2
 WD 2005-2025, Rev 2
- B. As of this date, no wage determination applicable to the specified locality and classes of employees is in effect.
- C. From information supplied, the Service Contract Act does not apply (see attached explanation).
- D. Notice returned for additional information (see attached explanation)

9. OFFICIAL SUBMITTING NOTICE

SIGNED: 	DATE 02/14/07
TYPE OR PRINT NAME Connie R. Pritchard Contract Labor Relations Officer	TELEPHONE NO. 281-483-4121

10. TYPE OR PRINT NAME AND TITLE OF PERSON TO WHOM RESPONSE IS TO BE SENT AND NAME AND ADDRESS OF DEPARTMENT OR AGENCY, BUREAU, DIVISION, ETC.

NASA Johnson Space Center
Connie R. Pritchard, Mail Code BA2
2101 NASA Parkway
Houston, TX 77058

Signed: _____
(U.S. Department of Labor)

(Date)

REGISTER OF WAGE DETERMINATIONS UNDER
THE SERVICE CONTRACT ACT

U.S. DEPARTMENT OF LABOR
EMPLOYMENT
STANDARDS ADMINISTRATION
WAGE AND HOUR DIVISION
WASHINGTON D.C. 20210

By direction of the Secretary of Labor

William W. Gross
Director

Division of
Wage Determinations

Wage Determination No.: 2005-2515
Revision No.: 2
Date of Last Revision: 12/06/2006

State: Texas

Area: Texas Counties of Austin, Brazoria, Chambers, Colorado, Fort Bend, Galveston,
Grimes, Harris, Houston, Jackson, Lavaca, Liberty, Madison, Matagorda, Montgomery,
San Jacinto, Trinity, Walker, Waller, Washington, Wharton

****Fringe Benefits Required Follow the Occupational Listing****

OCCUPATION CODE - TITLE

MINIMUM WAGE RATE

01000 - Administrative Support and Clerical Occupations

01011 - Accounting Clerk I	12.52
01012 - Accounting Clerk II	14.06
01013 - Accounting Clerk III	15.73
01020 - Administrative Assistant	22.76
01040 - Court Reporter	18.01
01051 - Data Entry Operator I	11.36
01052 - Data Entry Operator II	14.32
01060 - Dispatcher, Motor Vehicle	15.40
01070 - Document Preparation Clerk	12.98
01090 - Duplicating Machine Operator	12.98
01111 - General Clerk I	10.80
01112 - General Clerk II	12.97
01113 - General Clerk III	14.88
01120 - Housing Referral Assistant	20.55
01141 - Messenger Courier	10.86
01191 - Order Clerk I	13.36
01192 - Order Clerk II	15.24
01261 - Personnel Assistant (Employment) I	13.79
01262 - Personnel Assistant (Employment) II	16.50
01263 - Personnel Assistant (Employment) III	17.63
01270 - Production Control Clerk	18.50
01280 - Receptionist	10.93
01290 - Rental Clerk	14.34
01300 - Scheduler, Maintenance	15.92
01311 - Secretary I	15.92
01312 - Secretary II	17.73

01313 - Secretary III	20.55
01320 - Service Order Dispatcher	14.63
01410 - Supply Technician	22.76
01420 - Survey Worker	15.53
01531 - Travel Clerk I	12.30
01532 - Travel Clerk II	13.36
01533 - Travel Clerk III	14.18
01611 - Word Processor I	11.45
01612 - Word Processor II	14.09
01613 - Word Processor III	16.27

05000 - Automotive Service Occupations

05005 - Automobile Body Repairer, Fiberglass	24.80
05010 - Automotive Electrician	22.66
05040 - Automotive Glass Installer	21.68
05070 - Automotive Worker	20.91
05110 - Mobile Equipment Servicer	19.27
05130 - Motor Equipment Metal Mechanic	24.53
05160 - Motor Equipment Metal Worker	20.91
05190 - Motor Vehicle Mechanic	24.53
05220 - Motor Vehicle Mechanic Helper	18.48
05250 - Motor Vehicle Upholstery Worker	19.84
05280 - Motor Vehicle Wrecker	20.91
05310 - Painter, Automotive	22.66
05340 - Radiator Repair Specialist	22.88
05370 - Tire Repairer	14.40
05400 - Transmission Repair Specialist	25.17

07000 - Food Preparation and Service Occupations

07010 - Baker	10.04
07041 - Cook I	9.17
07042 - Cook II	9.89
07070 - Dishwasher	8.11
07130 - Food Service Worker	8.41
07210 - Meat Cutter	12.36
07260 - Waiter/Waitress	7.97

09000 - Furniture Maintenance and Repair Occupations

09010 - Electrostatic Spray Painter	16.65
09040 - Furniture Handler	11.74
09080 - Furniture Refinisher	16.09
09090 - Furniture Refinisher Helper	13.74
09110 - Furniture Repairer, Minor	15.29
09130 - Upholsterer	16.65

11000 - General Services and Support Occupations

11030 - Cleaner, Vehicles	9.12
11060 - Elevator Operator	7.71
11090 - Gardener	13.35
11122 - Housekeeping Aide	7.71
11150 - Janitor	8.17

11210 - Laborer, Grounds Maintenance	10.63
11240 - Maid or Houseman	7.27
11260 - Pruner	8.17
11270 - Tractor Operator	12.47
11330 - Trail Maintenance Worker	10.63
11360 - Window Cleaner	8.92

12000 - Health Occupations

12010 - Ambulance Driver	12.93
12011 - Breath Alcohol Technician	14.22
12012 - Certified Occupational Therapist Assistant	19.58
12015 - Certified Physical Therapist Assistant	20.24
12020 - Dental Assistant	14.22
12025 - Dental Hygienist	31.09
12030 - EKG Technician	23.12
12035 - Electroneurodiagnostic Technologist	23.12
12040 - Emergency Medical Technician	14.22
12071 - Licensed Practical Nurse I	15.57
12072 - Licensed Practical Nurse II	17.47
12073 - Licensed Practical Nurse III	18.81
12100 - Medical Assistant	12.40
12130 - Medical Laboratory Technician	13.94
12160 - Medical Record Clerk	13.21
12190 - Medical Record Technician	16.02
12195 - Medical Transcriptionist	14.44
12210 - Nuclear Medicine Technologist	28.64
12221 - Nursing Assistant I	7.08
12222 - Nursing Assistant II	9.82
12223 - Nursing Assistant III	10.62
12224 - Nursing Assistant IV	12.40
12235 - Optical Dispenser	15.26
12236 - Optical Technician	13.64
12250 - Pharmacy Technician	14.41
12280 - Phlebotomist	13.30
12305 - Radiologic Technologist	22.89
12311 - Registered Nurse I	24.51
12312 - Registered Nurse II	30.20
12313 - Registered Nurse II, Specialist	32.08
12314 - Registered Nurse III	37.96
12315 - Registered Nurse III, Anesthetist	39.12
12316 - Registered Nurse IV	43.48
12317 - Scheduler (Drug and Alcohol Testing)	18.90

13000 - Information and Arts Occupations

13011 - Exhibits Specialist I	19.30
13012 - Exhibits Specialist II	24.74
13013 - Exhibits Specialist III	28.94
13041 - Illustrator I	17.60
13042 - Illustrator II	22.56
13043 - Illustrator III	26.40
13047 - Librarian	23.29

13050 - Library Aide/Clerk	9.87
13054 - Library Information Technology Systems Administrator	20.94
13058 - Library Technician	13.25
13061 - Media Specialist I	14.80
13062 - Media Specialist II	16.56
13063 - Media Specialist III	18.46
13071 - Photographer I	13.93
13072 - Photographer II	17.60
13073 - Photographer III	22.56
13074 - Photographer IV	26.40
13075 - Photographer V	30.06
13110 - Video Teleconference Technician	13.83

14000 - Information Technology Occupations

14041 - Computer Operator I	14.80
14042 - Computer Operator II	16.62
14043 - Computer Operator III	18.46
14044 - Computer Operator IV	22.60
14045 - Computer Operator V	23.90
14071 - Computer Programmer I (1)	21.12
14072 - Computer Programmer II (1)	26.16
14073 - Computer Programmer III (1)	27.62
14074 - Computer Programmer IV (1)	27.62
14101 - Computer Systems Analyst I (1)	27.62
14102 - Computer Systems Analyst II (1)	27.62
14103 - Computer Systems Analyst III (1)	27.62
14150 - Peripheral Equipment Operator	14.80
14160 - Personal Computer Support Technician	22.60

15000 - Instructional Occupations

15010 - Aircrew Training Devices Instructor (Non-Rated)	27.12
15020 - Aircrew Training Devices Instructor (Rated)	32.81
15030 - Air Crew Training Devices Instructor (Pilot)	35.70
15050 - Computer Based Training Specialist / Instructor	25.70
15060 - Educational Technologist	28.73
15070 - Flight Instructor (Pilot)	35.70
15080 - Graphic Artist	23.11
15090 - Technical Instructor	20.19
15095 - Technical Instructor/Course Developer	24.70
15110 - Test Proctor	17.73
15120 - Tutor	17.73

16000 - Laundry, Dry-Cleaning, Pressing And Related Occupations

16010 - Assembler	8.49
16030 - Counter Attendant	8.49
16040 - Dry Cleaner	9.00
16070 - Finisher, Flatwork, Machine	8.49
16090 - Presser, Hand	8.49
16110 - Presser, Machine, Drycleaning	8.49
16130 - Presser, Machine, Shirts	8.49
16160 - Presser, Machine, Wearing Apparel, Laundry	8.49

16190 - Sewing Machine Operator	11.55
16220 - Tailor	12.42
16250 - Washer, Machine	9.32
19000 - Machine Tool Operation and Repair Occupations	
19010 - Machine-Tool Operator (Tool Room)	16.65
19040 - Tool and Die Maker	19.20
21000 - Materials Handling and Packing Occupations	
21020 - Forklift Operator	12.84
21030 - Material Coordinator	18.50
21040 - Material Expediter	18.50
21050 - Material Handling Laborer	12.26
21071 - Order Filler	10.55
21080 - Production Line Worker (Food Processing)	12.84
21110 - Shipping Packer	12.49
21130 - Shipping/Receiving Clerk	12.49
21140 - Store Worker I	9.57
21150 - Stock Clerk	13.57
21210 - Tools and Parts Attendant	13.58
21410 - Warehouse Specialist	12.84
23000 - Mechanics and Maintenance and Repair Occupations	
23010 - Aerospace Structural Welder	26.66
23021 - Aircraft Mechanic I	25.39
23022 - Aircraft Mechanic II	26.66
23023 - Aircraft Mechanic III	27.99
23040 - Aircraft Mechanic Helper	19.88
23050 - Aircraft, Painter	20.15
23060 - Aircraft Servicer	22.11
23080 - Aircraft Worker	23.30
23110 - Appliance Mechanic	16.65
23120 - Bicycle Repairer	13.91
23125 - Cable Splicer	22.30
23130 - Carpenter, Maintenance	18.58
23140 - Carpet Layer	15.92
23160 - Electrician, Maintenance	26.51
23181 - Electronics Technician Maintenance I	17.50
23182 - Electronics Technician Maintenance II	21.33
23183 - Electronics Technician Maintenance III	24.17
23260 - Fabric Worker	15.00
23290 - Fire Alarm System Mechanic	17.43
23310 - Fire Extinguisher Repairer	14.40
23311 - Fuel Distribution System Mechanic	19.17
23312 - Fuel Distribution System Operator	16.33
23370 - General Maintenance Worker	15.46
23380 - Ground Support Equipment Mechanic	25.39
23381 - Ground Support Equipment Servicer	22.11
23382 - Ground Support Equipment Worker	23.30
23391 - Gunsmith I	13.67
23392 - Gunsmith II	15.79

23393 - Gunsmith III	17.67
23410 - Heating, Ventilation and Air-Conditioning Mechanic	20.06
23411 - Heating, Ventilation and Air Conditioning Mechanic (Research Facility)	20.93
23430 - Heavy Equipment Mechanic	17.43
23440 - Heavy Equipment Operator	17.43
23460 - Instrument Mechanic	17.67
23465 - Laboratory/Shelter Mechanic	16.81
23470 - Laborer	10.62
23510 - Locksmith	16.65
23530 - Machinery Maintenance Mechanic	20.08
23550 - Machinist, Maintenance	20.16
23580 - Maintenance Trades Helper	13.58
23591 - Metrology Technician I	17.67
23592 - Metrology Technician II	18.44
23593 - Metrology Technician III	19.22
23640 - Millwright	20.25
23710 - Office Appliance Repairer	16.65
23760 - Painter, Maintenance	16.65
23790 - Pipefitter, Maintenance	19.33
23810 - Plumber, Maintenance	18.87
23820 - Pneudraulic Systems Mechanic	17.67
23850 - Rigger	17.67
23870 - Scale Mechanic	15.92
23890 - Sheet-Metal Worker, Maintenance	17.43
23910 - Small Engine Mechanic	15.92
23931 - Telecommunications Mechanic I	21.33
23932 - Telecommunications Mechanic II	22.28
23950 - Telephone Lineman	21.09
23960 - Welder, Combination, Maintenance	17.43
23965 - Well Driller	17.67
23970 - Woodcraft Worker	17.67
23980 - Woodworker	11.30
24000 - Personal Needs Occupations	
24570 - Child Care Attendant	9.68
24580 - Child Care Center Clerk	12.06
24610 - Chore Aide	6.36
24620 - Family Readiness and Support Services Coordinator	11.05
24630 - Homemaker	15.41
25000 - Plant and System Operations Occupations	
25010 - Boiler Tender	21.14
25040 - Sewage Plant Operator	17.00
25070 - Stationary Engineer	21.14
25190 - Ventilation Equipment Tender	14.33
25210 - Water Treatment Plant Operator	16.65
27000 - Protective Service Occupations	
27004 - Alarm Monitor	14.82
27007 - Baggage Inspector	10.14

27008 - Corrections Officer	18.04
27010 - Court Security Officer	18.04
27030 - Detection Dog Handler	17.90
27040 - Detention Officer	18.04
27070 - Firefighter	17.90
27101 - Guard I	10.14
27102 - Guard II	17.90
27131 - Police Officer I	23.33
27132 - Police Officer II	25.99

28000 - Recreation Occupations

28041 - Carnival Equipment Operator	10.69
28042 - Carnival Equipment Repairer	11.24
28043 - Carnival Equipment Worker	8.25
28210 - Gate Attendant/Gate Tender	13.64
28310 - Lifeguard	12.15
28350 - Park Attendant (Aide)	15.26
28510 - Recreation Aide/Health Facility Attendant	11.13
28515 - Recreation Specialist	16.21
28630 - Sports Official	12.15
28690 - Swimming Pool Operator	14.41

29000 - Stevedoring/Longshoremen Occupational Services

29010 - Blocker and Bracer	16.16
29020 - Hatch Tender	16.16
29030 - Line Handler	16.16
29041 - Stevedore I	15.12
29042 - Stevedore II	17.29

30000 - Technical Occupations

30010 - Air Traffic Control Specialist, Center (HFO) (2)	36.37
30011 - Air Traffic Control Specialist, Station (HFO) (2)	25.08
30012 - Air Traffic Control Specialist, Terminal (HFO) (2)	27.62
30021 - Archeological Technician I	19.34
30022 - Archeological Technician II	23.15
30023 - Archeological Technician III	28.63
30030 - Cartographic Technician	28.67
30040 - Civil Engineering Technician	27.30
30061 - Drafter/CAD Operator I	19.18
30062 - Drafter/CAD Operator II	23.15
30063 - Drafter/CAD Operator III	25.80
30064 - Drafter/CAD Operator IV	29.47
30081 - Engineering Technician I	16.59
30082 - Engineering Technician II	20.41
30083 - Engineering Technician III	22.83
30084 - Engineering Technician IV	28.28
30085 - Engineering Technician V	36.15
30086 - Engineering Technician VI	41.85
30090 - Environmental Technician	27.24
30210 - Laboratory Technician	21.72
30240 - Mathematical Technician	28.67

30361 - Paralegal/Legal Assistant I	17.80
30362 - Paralegal/Legal Assistant II	21.38
30363 - Paralegal/Legal Assistant III	26.62
30364 - Paralegal/Legal Assistant IV	29.59
30390 - Photo-Optics Technician	28.67
30461 - Technical Writer I	18.90
30462 - Technical Writer II	23.12
30463 - Technical Writer III	26.42
30491 - Unexploded Ordnance (UXO) Technician I	23.12
30492 - Unexploded Ordnance (UXO) Technician II	27.97
30493 - Unexploded Ordnance (UXO) Technician III	34.42
30494 - Unexploded (UXO) Safety Escort	23.12
30495 - Unexploded (UXO) Sweep Personnel	23.12
30620 - Weather Observer, Combined Upper Air or Surface Programs (3)	19.79
30621 - Weather Observer, Senior (3)	23.99

31000 - Transportation/Mobile Equipment Operation Occupations

31020 - Bus Aide	10.16
31030 - Bus Driver	15.48
31043 - Driver Courier	11.91
31260 - Parking and Lot Attendant	8.34
31290 - Shuttle Bus Driver	12.98
31310 - Taxi Driver	9.54
31361 - Truckdriver, Light	12.98
31362 - Truckdriver, Medium	15.34
31363 - Truckdriver, Heavy	16.39
31364 - Truckdriver, Tractor-Trailer	16.39

99000 - Miscellaneous Occupations

99030 - Cashier	9.10
99050 - Desk Clerk	10.65
99095 - Embalmer	21.55
99251 - Laboratory Animal Caretaker I	9.03
99252 - Laboratory Animal Caretaker II	10.11
99310 - Mortician	24.04
99410 - Pest Controller	13.78
99510 - Photofinishing Worker	10.43
99710 - Recycling Laborer	11.24
99711 - Recycling Specialist	13.71
99730 - Refuse Collector	10.03
99810 - Sales Clerk	11.41
99820 - School Crossing Guard	8.29
99830 - Survey Party Chief	20.96
99831 - Surveying Aide	14.35
99832 - Surveying Technician	18.13
99840 - Vending Machine Attendant	10.91
99841 - Vending Machine Repairer	13.10
99842 - Vending Machine Repairer Helper	11.19

ALL OCCUPATIONS LISTED ABOVE RECEIVE THE FOLLOWING BENEFITS:

HEALTH & WELFARE: \$3.01 per hour or \$120.40 per week or \$521.73 per month

VACATION: 2 weeks paid vacation after 1 year of service with a contractor or successor; 3 weeks after 5 years, and 4 weeks after 15 years. Length of service includes the whole span of continuous service with the present contractor or successor, wherever employed, and with the predecessor contractors in the performance of similar work at the same Federal facility. (Reg. 29 CFR 4.173)

HOLIDAYS: A minimum of ten paid holidays per year, New Year's Day, Martin Luther King Jr's Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day, and Christmas Day. (A contractor may substitute for any of the named holidays another day off with pay in accordance with a plan communicated to the employees involved.) (See 29 CFR 4174)

THE OCCUPATIONS WHICH HAVE PARENTHESES AFTER THEM RECEIVE THE FOLLOWING BENEFITS (as numbered):

1) Does not apply to employees employed in a bona fide executive, administrative, or professional capacity as defined and delineated in 29 CFR 541. (See CFR 4.156)

2) **APPLICABLE TO AIR TRAFFIC CONTROLLERS ONLY - NIGHT DIFFERENTIAL:** An employee is entitled to pay for all work performed between the hours of 6:00 P.M. and 6:00 A.M. at the rate of basic pay plus a night pay differential amounting to 10 percent of the rate of basic pay.

3) **WEATHER OBSERVERS - NIGHT PAY & SUNDAY PAY:** If you work at night as part of a regular tour of duty, you will earn a night differential and receive an additional 10% of basic pay for any hours worked between 6pm and 6am. If you are a full-time employed (40 hours a week) and Sunday is part of your regularly scheduled workweek, you are paid at your rate of basic pay plus a Sunday premium of 25% of your basic rate for each hour of Sunday work which is not overtime (i.e. occasional work on Sunday outside the normal tour of duty is considered overtime work).

HAZARDOUS PAY DIFFERENTIAL: An 8 percent differential is applicable to employees employed in a position that represents a high degree of hazard when working with or in close proximity to ordnance, explosives, and incendiary materials. This includes work such as screening, blending, dying, mixing, and pressing of sensitive ordnance, explosives, and pyrotechnic compositions such as lead azide, black powder and photoflash powder. All dry-house activities involving propellants or explosives. Demilitarization, modification, renovation, demolition, and maintenance operations on sensitive ordnance, explosives and incendiary materials. All operations involving regrading and cleaning of artillery ranges.

A 4 percent differential is applicable to employees employed in a position that represents a low degree of hazard when working with, or in close proximity to ordnance, (or employees possibly

adjacent to) explosives and incendiary materials which involves potential injury such as laceration of hands, face, or arms of the employee engaged in the operation, irritation of the skin, minor burns and the like; minimal damage to immediate or adjacent work area or equipment being used. All operations involving, unloading, storage, and hauling of ordnance, explosive, and incendiary ordnance material other than small arms ammunition. These differentials are only applicable to work that has been specifically designated by the agency for ordnance, explosives, and incendiary material differential pay.

**** UNIFORM ALLOWANCE ****

If employees are required to wear uniforms in the performance of this contract (either by the terms of the Government contract, by the employer, by the state or local law, etc.), the cost of furnishing such uniforms and maintaining (by laundering or dry cleaning) such uniforms is an expense that may not be borne by an employee where such cost reduces the hourly rate below that required by the wage determination. The Department of Labor will accept payment in accordance with the following standards as compliance:

The contractor or subcontractor is required to furnish all employees with an adequate number of uniforms without cost or to reimburse employees for the actual cost of the uniforms. In addition, where uniform cleaning and maintenance is made the responsibility of the employee, all contractors and subcontractors subject to this wage determination shall (in the absence of a bona fide collective bargaining agreement providing for a different amount, or the furnishing of contrary affirmative proof as to the actual cost), reimburse all employees for such cleaning and maintenance at a rate of \$3.35 per week (or \$.67 cents per day). However, in those instances where the uniforms furnished are made of "wash and wear" materials, may be routinely washed and dried with other personal garments, and do not require any special treatment such as dry cleaning, daily washing, or commercial laundering in order to meet the cleanliness or appearance standards set by the terms of the Government contract, by the contractor, by law, or by the nature of the work, there is no requirement that employees be reimbursed for uniform maintenance costs.

The duties of employees under job titles listed are those described in the "Service Contract Act Directory of Occupations," Fifth Edition, April 2006, unless otherwise indicated. Copies of the Directory are available on the Internet. A links to the Directory may be found on the WHD home page at <<http://www.dol.gov/esa/whd/>> or through the Wage Determinations On-Line (WDOL) Web site at <<http://wdol.gov/>>.

REQUEST FOR AUTHORIZATION OF ADDITIONAL CLASSIFICATION AND WAGE RATE {Standard Form 1444 (SF 1444)}

Conformance Process:

The contracting officer shall require that any class of service employee which is not listed herein and which is to be employed under the contract (i.e., the work to be performed is not performed by any classification listed in the wage determination), be classified by the contractor so as to provide a reasonable relationship (i.e., appropriate level of skill comparison) between such unlisted classifications and the classifications listed in the wage determination. Such conformed classes of employees shall be paid the monetary wages and furnished the fringe benefits as are determined. Such conforming process shall be initiated by the contractor prior to the performance of contract work by such unlisted class(es) of employees. The conformed classification, wage rate, and/or fringe benefits shall be retroactive to the commencement date of the contract. {See Section 4.6 (C)(vi)}

When multiple wage determinations are included in a contract, a separate SF 1444 should be prepared for each wage determination to which a class(es) is to be conformed.

The process for preparing a conformance request is as follows:

- 1) When preparing the bid, the contractor identifies the need for a conformed occupation(s) and computes a proposed rate(s).
- 2) After contract award, the contractor prepares a written report listing in order proposed classification title(s), a Federal grade equivalency (FGE) for each proposed classification(s), job description(s), and rationale for proposed wage rate(s), including information regarding the agreement or disagreement of the authorized representative of the employees involved, or where there is no authorized representative, the employees themselves. This report should be submitted to the contracting officer no later than 30 days after such unlisted class(es) of employees performs any contract work.
- 3) The contracting officer reviews the proposed action and promptly submits a report of the action, together with the agency's recommendations and pertinent information including the position of the contractor and the employees, to the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, for review. (See section 4.6(b)(2) of Regulations 29 CFR Part 4).
- 4) Within 30 days of receipt, the Wage and Hour Division approves, modifies, or disapproves the action via transmittal to the agency contracting officer, or notifies the contracting officer that additional time will be required to process the request.
- 5) The contracting officer transmits the Wage and Hour decision to the contractor.
- 6) The contractor informs the affected employees.

Information required by the Regulations must be submitted on SF 1444 or bond paper.

When preparing a conformance request, the "Service Contract Act Directory of Occupations" (the Directory) should be used to compare job definitions to insure that duties requested are not performed by a classification already listed in the wage determination. Remember, it is not the job title, but the required tasks that determine whether a class is included in an established wage determination. Conformances may not be used to artificially split, combine, or subdivide classifications listed in the wage determination.

REGISTER OF WAGE DETERMINATIONS UNDER
THE SERVICE CONTRACT ACT

U.S. DEPARTMENT OF LABOR
EMPLOYMENT
STANDARDS ADMINISTRATION
WAGE AND HOUR DIVISION
WASHINGTON D.C. 20210

By direction of the Secretary of Labor

William W. Gross Division of
Director Wage Determinations

Wage Determination No.: 2005-2025
Revision No.: 2
Date of Revision: 11/06/2006

State: Arizona

Area: Arizona Counties of Cochise, Graham, Greenlee, Pima, Santa Cruz

****Fringe Benefits Required Follow the Occupational Listing****

OCCUPATION CODE - TITLE	MINIMUM WAGE RATE
01000 - Administrative Support and Clerical Occupations	
01011 - Accounting Clerk I	11.02
01012 - Accounting Clerk II	12.97
01013 - Accounting Clerk III	14.07
01020 - Administrative Assistant	19.02
01040 - Court Reporter	14.42
01051 - Data Entry Operator I	10.20
01052 - Data Entry Operator II	11.77
01060 - Dispatcher, Motor Vehicle	15.11
01070 - Document Preparation Clerk	10.27
01090 - Duplicating Machine Operator	10.27
01111 - General Clerk I	10.33
01112 - General Clerk II	11.72
01113 - General Clerk III	14.91
01120 - Housing Referral Assistant	16.52
01141 - Messenger Courier	10.31
01191 - Order Clerk I	10.91
01192 - Order Clerk II	12.42
01261 - Personnel Assistant (Employment) I	12.73
01262 - Personnel Assistant (Employment) II	14.24
01263 - Personnel Assistant (Employment) III	16.26
01270 - Production Control Clerk	17.31
01280 - Receptionist	10.22
01290 - Rental Clerk	11.87
01300 - Scheduler, Maintenance	12.39
01311 - Secretary I	12.39
01312 - Secretary II	13.73
01313 - Secretary III	16.52
01320 - Service Order Dispatcher	13.23
01410 - Supply Technician	19.02

01420 - Survey Worker	11.95
01531 - Travel Clerk I	10.67
01532 - Travel Clerk II	11.18
01533 - Travel Clerk III	11.74
01611 - Word Processor I	12.16
01612 - Word Processor II	15.10
01613 - Word Processor III	16.92
05000 - Automotive Service Occupations	
05005 - Automobile Body Repairer, Fiberglass	20.32
05010 - Automotive Electrician	17.99
05040 - Automotive Glass Installer	16.25
05070 - Automotive Worker	16.25
05110 - Mobile Equipment Servicer	14.51
05130 - Motor Equipment Metal Mechanic	17.99
05160 - Motor Equipment Metal Worker	16.25
05190 - Motor Vehicle Mechanic	17.99
05220 - Motor Vehicle Mechanic Helper	13.50
05250 - Motor Vehicle Upholstery Worker	15.40
05280 - Motor Vehicle Wrecker	16.25
05310 - Painter, Automotive	17.12
05340 - Radiator Repair Specialist	16.25
05370 - Tire Repairer	13.08
05400 - Transmission Repair Specialist	17.99
07000 - Food Preparation and Service Occupations	
07010 - Baker	11.28
07041 - Cook I	10.07
07042 - Cook II	12.92
07070 - Dishwasher	6.69
07130 - Food Service Worker	8.27
07210 - Meat Cutter	16.56
07260 - Waiter/Waitress	6.86
09000 - Furniture Maintenance and Repair Occupations	
09010 - Electrostatic Spray Painter	15.98
09040 - Furniture Handler	10.70
09080 - Furniture Refinisher	15.98
09090 - Furniture Refinisher Helper	12.60
09110 - Furniture Repairer, Minor	14.37
09130 - Upholsterer	15.98
11000 - General Services and Support Occupations	
11030 - Cleaner, Vehicles	8.47
11060 - Elevator Operator	8.47
11090 - Gardener	12.35
11122 - Housekeeping Aide	8.82
11150 - Janitor	9.03
11210 - Laborer, Grounds Maintenance	9.77
11240 - Maid or Houseman	7.96
11260 - Pruner	8.96

11270 - Tractor Operator	11.27
11330 - Trail Maintenance Worker	9.77
11360 - Window Cleaner	9.90

12000 - Health Occupations

12010 - Ambulance Driver	14.54
12011 - Breath Alcohol Technician	16.79
12012 - Certified Occupational Therapist Assistant	18.91
12015 - Certified Physical Therapist Assistant	15.23
12020 - Dental Assistant	13.44
12025 - Dental Hygienist	31.12
12030 - EKG Technician	21.27
12035 - Electroneurodiagnostic Technologist	21.27
12040 - Emergency Medical Technician	14.54
12071 - Licensed Practical Nurse I	15.02
12072 - Licensed Practical Nurse II	16.79
12073 - Licensed Practical Nurse III	17.75
12100 - Medical Assistant	12.27
12130 - Medical Laboratory Technician	13.20
12160 - Medical Record Clerk	10.75
12190 - Medical Record Technician	13.54
12195 - Medical Transcriptionist	14.51
12210 - Nuclear Medicine Technologist	29.98
12221 - Nursing Assistant I	9.09
12222 - Nursing Assistant II	10.21
12223 - Nursing Assistant III	11.15
12224 - Nursing Assistant IV	12.61
12235 - Optical Dispenser	12.04
12236 - Optical Technician	15.36
12250 - Pharmacy Technician	12.19
12280 - Phlebotomist	13.46
12305 - Radiologic Technologist	20.76
12311 - Registered Nurse I	20.47
12312 - Registered Nurse II	25.06
12313 - Registered Nurse II, Specialist	25.06
12314 - Registered Nurse III	30.32
12315 - Registered Nurse III, Anesthetist	30.32
12316 - Registered Nurse IV	36.30
12317 - Scheduler (Drug and Alcohol Testing)	19.73

13000 - Information and Arts Occupations

13011 - Exhibits Specialist I	15.36
13012 - Exhibits Specialist II	16.60
13013 - Exhibits Specialist III	20.31
13041 - Illustrator I	16.84
13042 - Illustrator II	19.48
13043 - Illustrator III	23.83
13047 - Librarian	21.57
13050 - Library Aide/Clerk	11.87
13054 - Library Information Technology Systems Administrator	19.48
13058 - Library Technician	17.94

13061 - Media Specialist I	14.01
13062 - Media Specialist II	15.67
13063 - Media Specialist III	17.47
13071 - Photographer I	12.76
13072 - Photographer II	16.37
13073 - Photographer III	17.69
13074 - Photographer IV	21.64
13075 - Photographer V	26.17
13110 - Video Teleconference Technician	14.17
14000 - Information Technology Occupations	
14041 - Computer Operator I	11.21
14042 - Computer Operator II	15.16
14043 - Computer Operator III	16.96
14044 - Computer Operator IV	18.85
14045 - Computer Operator V	20.87
14071 - Computer Programmer I (1)	17.65
14072 - Computer Programmer II (1)	21.70
14073 - Computer Programmer III (1)	25.18
14074 - Computer Programmer IV (1)	27.62
14101 - Computer Systems Analyst I (1)	23.19
14102 - Computer Systems Analyst II (1)	27.62
14103 - Computer Systems Analyst III (1)	27.62
14150 - Peripheral Equipment Operator	12.89
14160 - Personal Computer Support Technician	18.85
15000 - Instructional Occupations	
15010 - Aircrew Training Devices Instructor (Non-Rated)	21.82
15020 - Aircrew Training Devices Instructor (Rated)	26.40
15030 - Air Crew Training Devices Instructor (Pilot)	29.04
15050 - Computer Based Training Specialist / Instructor	22.76
15060 - Educational Technologist	17.51
15070 - Flight Instructor (Pilot)	29.04
15080 - Graphic Artist	17.88
15090 - Technical Instructor	15.79
15095 - Technical Instructor/Course Developer	19.31
15110 - Test Proctor	13.11
15120 - Tutor	13.11
16000 - Laundry, Dry-Cleaning, Pressing And Related Occupations	
16010 - Assembler	7.65
16030 - Counter Attendant	7.65
16040 - Dry Cleaner	9.08
16070 - Finisher, Flatwork, Machine	7.65
16090 - Presser, Hand	7.65
16110 - Presser, Machine, Drycleaning	7.65
16130 - Presser, Machine, Shirts	7.65
16160 - Presser, Machine, Wearing Apparel, Laundry	7.65
16190 - Sewing Machine Operator	9.57
16220 - Tailor	10.74
16250 - Washer, Machine	8.10

19000 - Machine Tool Operation and Repair Occupations

19010 - Machine-Tool Operator (Tool Room)	15.98
19040 - Tool and Die Maker	19.23

21000 - Materials Handling And Packing Occupations

21020 - Forklift Operator	13.35
21030 - Material Coordinator	17.55
21040 - Material Expediter	17.55
21050 - Material Handling Laborer	9.48
21071 - Order Filler	10.69
21080 - Production Line Worker (Food Processing)	13.35
21110 - Shipping Packer	11.57
21130 - Shipping/Receiving Clerk	11.57
21140 - Store Worker I	11.32
21150 - Stock Clerk	14.69
21210 - Tools and Parts Attendant	13.35
21410 - Warehouse Specialist	13.35

23000 - Mechanics and Maintenance and Repair Occupations

23010 - Aerospace Structural Welder	22.14
23021 - Aircraft Mechanic I	21.09
23022 - Aircraft Mechanic II	22.14
23023 - Aircraft Mechanic III	23.25
23040 - Aircraft Mechanic Helper	15.82
23050 - Aircraft, Painter	20.84
23060 - Aircraft Servicer	18.05
23080 - Aircraft Worker	19.06
23110 - Appliance Mechanic	17.58
23120 - Bicycle Repairer	13.08
23125 - Cable Splicer	25.70
23130 - Carpenter, Maintenance	15.98
23140 - Carpet Layer	15.17
23160 - Electrician, Maintenance	16.79
23181 - Electronics Technician Maintenance I	17.54
23182 - Electronics Technician Maintenance II	21.73
23183 - Electronics Technician Maintenance III	22.83
23260 - Fabric Worker	14.74
23290 - Fire Alarm System Mechanic	17.19
23310 - Fire Extinguisher Repairer	13.82
23311 - Fuel Distribution System Mechanic	19.28
23312 - Fuel Distribution System Operator	15.54
23370 - General Maintenance Worker	15.17
23380 - Ground Support Equipment Mechanic	21.09
23381 - Ground Support Equipment Servicer	18.05
23382 - Ground Support Equipment Worker	19.06
23391 - Gunsmith I	13.79
23392 - Gunsmith II	15.53
23393 - Gunsmith III	17.19
23410 - Heating, Ventilation and Air-Conditioning Mechanic	17.03
23411 - Heating, Ventilation and Air Conditioning Mechanic (Research Facility)	17.82

23430 - Heavy Equipment Mechanic	18.53
23440 - Heavy Equipment Operator	17.07
23460 - Instrument Mechanic	17.19
23465 - Laboratory/Shelter Mechanic	16.37
23470 - Laborer	9.48
23510 - Locksmith	15.98
23530 - Machinery Maintenance Mechanic	18.75
23550 - Machinist, Maintenance	16.79
23580 - Maintenance Trades Helper	12.60
23591 - Metrology Technician I	17.19
23592 - Metrology Technician II	17.99
23593 - Metrology Technician III	18.83
23640 - Millwright	17.19
23710 - Office Appliance Repairer	16.41
23760 - Painter, Maintenance	15.98
23790 - Pipefitter, Maintenance	17.71
23810 - Plumber, Maintenance	17.24
23820 - Pneudraulic Systems Mechanic	17.19
23850 - Rigger	17.19
23870 - Scale Mechanic	15.53
23890 - Sheet-Metal Worker, Maintenance	16.79
23910 - Small Engine Mechanic	15.17
23931 - Telecommunications Mechanic I	18.67
23932 - Telecommunications Mechanic II	22.51
23950 - Telephone Lineman	18.67
23960 - Welder, Combination, Maintenance	16.79
23965 - Well Driller	18.59
23970 - Woodcraft Worker	17.19
23980 - Woodworker	13.75
24000 - Personal Needs Occupations	
24570 - Child Care Attendant	7.82
24580 - Child Care Center Clerk	9.92
24610 - Chore Aide	10.96
24620 - Family Readiness and Support Services Coordinator	12.63
24630 - Homemaker	12.24
25000 - Plant and System Operations Occupations	
25010 - Boiler Tender	22.35
25040 - Sewage Plant Operator	20.41
25070 - Stationary Engineer	22.35
25190 - Ventilation Equipment Tender	15.64
25210 - Water Treatment Plant Operator	20.41
27000 - Protective Service Occupations	
27004 - Alarm Monitor	13.20
27007 - Baggage Inspector	9.24
27008 - Corrections Officer	19.12
27010 - Court Security Officer	19.14
27030 - Detection Dog Handler	12.20
27040 - Detention Officer	19.12

27070 - Firefighter	18.02
27101 - Guard I	9.24
27102 - Guard II	12.20
27131 - Police Officer I	22.32
27132 - Police Officer II	24.81
28000 - Recreation Occupations	
28041 - Carnival Equipment Operator	8.95
28042 - Carnival Equipment Repairer	9.61
28043 - Carnival Equipment Worker	7.77
28210 - Gate Attendant/Gate Tender	12.14
28310 - Lifeguard	10.33
28350 - Park Attendant (Aide)	12.82
28510 - Recreation Aide/Health Facility Attendant	9.91
28515 - Recreation Specialist	9.91
28630 - Sports Official	10.33
28690 - Swimming Pool Operator	14.37
29000 - Stevedoring/Longshoremen Occupational Services	
29010 - Blocker and Bracer	16.78
29020 - Hatch Tender	16.78
29030 - Line Handler	16.78
29041 - Stevedore I	13.81
29042 - Stevedore II	17.66
30000 - Technical Occupations	
30010 - Air Traffic Control Specialist, Center (HFO) (2)	32.50
30011 - Air Traffic Control Specialist, Station (HFO) (2)	22.33
30012 - Air Traffic Control Specialist, Terminal (HFO) (2)	24.59
30021 - Archeological Technician I	14.33
30022 - Archeological Technician II	16.02
30023 - Archeological Technician III	19.84
30030 - Cartographic Technician	21.48
30040 - Civil Engineering Technician	20.89
30061 - Drafter/CAD Operator I	14.95
30062 - Drafter/CAD Operator II	17.43
30063 - Drafter/CAD Operator III	19.32
30064 - Drafter/CAD Operator IV	23.77
30081 - Engineering Technician I	14.53
30082 - Engineering Technician II	15.73
30083 - Engineering Technician III	18.25
30084 - Engineering Technician IV	20.61
30085 - Engineering Technician V	25.23
30086 - Engineering Technician VI	30.52
30090 - Environmental Technician	18.02
30210 - Laboratory Technician	15.18
30240 - Mathematical Technician	20.71
30361 - Paralegal/Legal Assistant I	18.53
30362 - Paralegal/Legal Assistant II	22.07
30363 - Paralegal/Legal Assistant III	23.25
30364 - Paralegal/Legal Assistant IV	26.71

30390 - Photo-Optics Technician	20.17
30461 - Technical Writer I	19.40
30462 - Technical Writer II	23.72
30463 - Technical Writer III	27.36
30491 - Unexploded Ordnance (UXO) Technician I	20.58
30492 - Unexploded Ordnance (UXO) Technician II	24.90
30493 - Unexploded Ordnance (UXO) Technician III	29.85
30494 - Unexploded (UXO) Safety Escort	20.58
30495 - Unexploded (UXO) Sweep Personnel	20.58
30620 - Weather Observer, Combined Upper Air or Surface Programs (3)	16.19
30621 - Weather Observer, Senior (3)	18.00
31000 - Transportation/Mobile Equipment Operation Occupations	
31020 - Bus Aide	9.00
31030 - Bus Driver	11.91
31043 - Driver Courier	12.59
31260 - Parking and Lot Attendant	12.00
31290 - Shuttle Bus Driver	13.46
31310 - Taxi Driver	10.45
31361 - Truckdriver, Light	13.46
31362 - Truckdriver, Medium	16.22
31363 - Truckdriver, Heavy	16.60
31364 - Truckdriver, Tractor-Trailer	16.60
99000 - Miscellaneous Occupations	
99030 - Cashier	9.35
99050 - Desk Clerk	8.37
99095 - Embalmer	20.58
99251 - Laboratory Animal Caretaker I	10.25
99252 - Laboratory Animal Caretaker II	10.96
99310 - Mortician	20.58
99410 - Pest Controller	12.49
99510 - Photofinishing Worker	10.82
99710 - Recycling Laborer	9.48
99711 - Recycling Specialist	11.05
99730 - Refuse Collector	8.70
99810 - Sales Clerk	10.33
99820 - School Crossing Guard	7.07
99830 - Survey Party Chief	18.26
99831 - Surveying Aide	10.33
99832 - Surveying Technician	12.82
99840 - Vending Machine Attendant	10.84
99841 - Vending Machine Repairer	12.97
99842 - Vending Machine Repairer Helper	10.84

ALL OCCUPATIONS LISTED ABOVE RECEIVE THE FOLLOWING BENEFITS:

HEALTH & WELFARE: \$3.01 per hour or \$120.40 per week or \$521.73 per month

VACATION: 2 weeks paid vacation after 1 year of service with a contractor or successor; 3 weeks after 5 years, and 4 weeks after 15 years. Length of service includes the whole span of continuous service with the present contractor or successor, wherever employed, and with the predecessor contractors in the performance of similar work at the same Federal facility. (Reg. 29 CFR 4.173)

HOLIDAYS: A minimum of ten paid holidays per year, New Year's Day, Martin Luther King Jr's Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day, and Christmas Day. (A contractor may substitute for any of the named holidays another day off with pay in accordance with a plan communicated to the employees involved.) (See 29 CFR 4174)

THE OCCUPATIONS WHICH HAVE PARENTHESES AFTER THEM RECEIVE THE FOLLOWING BENEFITS (as numbered):

- 1) Does not apply to employees employed in a bona fide executive, administrative, or professional capacity as defined and delineated in 29 CFR 541. (See CFR 4.156)
- 2) **APPLICABLE TO AIR TRAFFIC CONTROLLERS ONLY - NIGHT DIFFERENTIAL:** An employee is entitled to pay for all work performed between the hours of 6:00 P.M. and 6:00 A.M. at the rate of basic pay plus a night pay differential amounting to 10 percent of the rate of basic pay.
- 3) **WEATHER OBSERVERS - NIGHT PAY & SUNDAY PAY:** If you work at night as part of a regular tour of duty, you will earn a night differential and receive an additional 10% of basic pay for any hours worked between 6pm and 6am. If you are a full-time employed (40 hours a week) and Sunday is part of your regularly scheduled workweek, you are paid at your rate of basic pay plus a Sunday premium of 25% of your basic rate for each hour of Sunday work which is not overtime (i.e. occasional work on Sunday outside the normal tour of duty is considered overtime work).

HAZARDOUS PAY DIFFERENTIAL: An 8 percent differential is applicable to employees employed in a position that represents a high degree of hazard when working with or in close proximity to ordnance, explosives, and incendiary materials. This includes work such as screening, blending, dying, mixing, and pressing of sensitive ordnance, explosives, and pyrotechnic compositions such as lead azide, black powder and photoflash powder. All dry-house activities involving propellants or explosives. Demilitarization, modification, renovation, demolition, and maintenance operations on sensitive ordnance, explosives and incendiary materials. All operations involving regrading and cleaning of artillery ranges.

A 4 percent differential is applicable to employees employed in a position that represents a low degree of hazard when working with, or in close proximity to ordnance, (or employees possibly adjacent to) explosives and incendiary materials which involves potential injury such as laceration of hands, face, or arms of the employee engaged in the operation, irritation of the skin, minor burns and the like; minimal damage to immediate or adjacent work area or equipment being used. All operations involving, unloading, storage, and hauling of ordnance, explosive, and incendiary ordnance material other than small arms ammunition. These differentials are only

applicable to work that has been specifically designated by the agency for ordnance, explosives, and incendiary material differential pay.

**** UNIFORM ALLOWANCE ****

If employees are required to wear uniforms in the performance of this contract (either by the terms of the Government contract, by the employer, by the state or local law, etc.), the cost of furnishing such uniforms and maintaining (by laundering or dry cleaning) such uniforms is an expense that may not be borne by an employee where such cost reduces the hourly rate below that required by the wage determination. The Department of Labor will accept payment in accordance with the following standards as compliance:

The contractor or subcontractor is required to furnish all employees with an adequate number of uniforms without cost or to reimburse employees for the actual cost of the uniforms. In addition, where uniform cleaning and maintenance is made the responsibility of the employee, all contractors and subcontractors subject to this wage determination shall (in the absence of a bona fide collective bargaining agreement providing for a different amount, or the furnishing of contrary affirmative proof as to the actual cost), reimburse all employees for such cleaning and maintenance at a rate of \$3.35 per week (or \$.67 cents per day). However, in those instances where the uniforms furnished are made of "wash and wear" materials, may be routinely washed and dried with other personal garments, and do not require any special treatment such as dry cleaning, daily washing, or commercial laundering in order to meet the cleanliness or appearance standards set by the terms of the Government contract, by the contractor, by law, or by the nature of the work, there is no requirement that employees be reimbursed for uniform maintenance costs.

The duties of employees under job titles listed are those described in the "Service Contract Act Directory of Occupations," Fifth Edition, April 2006, unless otherwise indicated. Copies of the Directory are available on the Internet. A links to the Directory may be found on the WHD home page at <<http://www.dol.gov/esa/whd/>> or through the Wage Determinations On-Line (WDOL) Web site at <<http://wdol.gov/>>.

REQUEST FOR AUTHORIZATION OF ADDITIONAL CLASSIFICATION AND WAGE RATE {Standard Form 1444 (SF 1444)}

Conformance Process:

The contracting officer shall require that any class of service employee which is not listed herein and which is to be employed under the contract (i.e., the work to be performed is not performed by any classification listed in the wage determination), be classified by the contractor so as to provide a reasonable relationship (i.e., appropriate level of skill comparison) between such unlisted classifications and the classifications listed in the wage determination. Such conformed classes of employees shall be paid the monetary wages and furnished the fringe benefits as are determined. Such conforming process shall be initiated by the contractor prior to the performance of contract work by such unlisted class(es) of employees. The conformed classification, wage rate, and/or fringe benefits shall be retroactive to the commencement date of the contract. {See Section 4.6 (C)(vi)} When multiple wage determinations are included in a contract, a separate SF 1444 should be prepared for each wage determination to which a class(es) is to be conformed.

The process for preparing a conformance request is as follows:

- 1) When preparing the bid, the contractor identifies the need for a conformed occupation) and computes a proposed rate).
- 2) After contract award, the contractor prepares a written report listing in order proposed classification title), a Federal grade equivalency (FGE) for each proposed classification), job description), and rationale for proposed wage rate), including information regarding the agreement or disagreement of the authorized representative of the employees involved, or where there is no authorized representative, the employees themselves. This report should be submitted to the contracting officer no later than 30 days after such unlisted class(es) of employees performs any contract work.
- 3) The contracting officer reviews the proposed action and promptly submits a report of the action, together with the agency's recommendations and pertinent information including the position of the contractor and the employees, to the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, for review. (See section 4.6(b)(2) of Regulations 29 CFR Part 4).
- 4) Within 30 days of receipt, the Wage and Hour Division approves, modifies, or disapproves the action via transmittal to the agency contracting officer, or notifies the contracting officer that additional time will be required to process the request.
- 5) The contracting officer transmits the Wage and Hour decision to the contractor.
- 6) The contractor informs the affected employees.

Information required by the Regulations must be submitted on SF 1444 or bond paper.

When preparing a conformance request, the "Service Contract Act Directory of Occupations" (the Directory) should be used to compare job definitions to insure that duties requested are not performed by a classification already listed in the wage determination. Remember, it is not the job title, but the required tasks that determine whether a class is included in an established wage determination. Conformances may not be used to artificially split, combine, or subdivide classifications listed in the wage determination.

Attachment J-4

IT SECURITY PLAN

The contractor shall submit Plan as directed in the applicable DRD

Attachment J-6

Table 1 Installation Accountable Property and Services

The Crew and Thermal Systems Division's (CTSD) Systems Test Branch (STB) at the Johnson Space Center (JSC) provides an extensive array of testing services and capabilities for NASA and external customers. Significant test capabilities include:

- human-rated space environment chamber facilities wherein space suited crewmembers train and test in space-simulated environments
- human-rated and unmanned testing of equipment containing hazardous materials such as anhydrous ammonia
- a diverse array of small environmental test chambers
- specialized NASA program testing facilities such as the Space Station Airlock Test Article chamber complex

It is anticipated that the contractor may have temporary access to, be temporary furnished with, or temporary use, the types of facilities and or equipment described above in the performance of this contract only if it is determined to be in the best interest of the Government. Additional information pertaining to the above facilities and equipment can be found at:

<http://ctsdtests.jsc.nasa.gov/>

Other facilities to be provided include the JSC Calibration Laboratory. In accordance with clause G.3, JSC 52.204-92, all local area contractors are required to use the laboratory. This includes any need for calibration as related to any other testing that may be conducted on or near site.

ADMINISTRATIVE PROVISIONS RELATING TO INSTALLATION-ACCOUNTABLE GOVERNMENT PROPERTY AND SERVICES

(a) Requests for specific support to be furnished by the Government pursuant to the "Installation-Accountable Government Property" clause and the "List of Installation-Accountable Government Property and Services" clause shall be made by the contractor to the Contracting Officer as part of the delivery ordering procedures (see Clause F.5 – Ordering Procedures), the completion of forms, needed to obtain support, shall be accomplished by the contractor.

(b) If the contractor requests property or services which are not available or cannot be made available from the Government to meet the contractor's schedule needs, the requesting document will be canceled and returned to the contractor. The contractor will thereafter be responsible for acquiring the needed items or services.

(c) If the contractor initiates a transfer of accountability (DD Form 1149) from the contractor to the Government, the contractor shall continue to account for the property in question until contractor receives notification that the form has been signed by the JSC

Supply and Equipment Management Officer (SEMO) or his/her authorized representative. If the contractor does not receive such notice in a reasonable time, contractor will make inquiry through the Property Administrator as to the status of the transfer.

**Attachment J-6
Table 2 Government Furnished Property/Facilities**

Although it is not the intent of the Government to provide property to contractors, it is recognized that since it is not known all the work to be required under this contract throughout the period of performance, property may be provided if it is in the best interest of the Government. In accordance with clause 1852.245-76, List of Government-Furnished Property (GFP), the following property will be provided if so included on the Delivery Order:

A. List of Property the Contractor Shall Replace

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
-------------	-----------------	-------------------------	---------------------------------	---

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

B. List of Property the Government Will Replace

Item	Quantity	Acquisition Cost	Use of Property Location	Date to be Furnished to the Contractor
-------------	-----------------	-------------------------	---------------------------------	---

[Insert a description of the item(s), quantity, acquisition cost, and date the property will be furnished to the Contractor] - List of Property will be added as requirements are further identified and the determination to provide property is determined to be in the best interest of the Government.

Attachment J-7

GOVERNMENT PROPERTY PLAN

The contractor will submit Plan as part of their proposal.

Document No. 31100-70001
Release Date: _____
Revision Date: _____



16665 Space Center Boulevard
Houston, Texas 77058

GOVERNMENT PROPERTY MANAGEMENT PLAN
FOR
CREW, ROBOTICS AND VEHICLE EQUIPMENT
DRD 52

Prepared by:

Bob Goldstein, Manufacturing Manager

Approved by:

Dave Wallace, General Manager, Military and Thermal Systems

This proposal includes data that shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed in whole or in part for any purpose other than to evaluate this proposal. If, however, a contract is awarded to this offer or as a result of or in connection with the submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit the Government's right to use information contained in this data if it is obtained from another source without restriction. The data subject to this restriction are contained in all sheets.

Change Log					
Rev. Ltr. Change No.	Justification and Description of Change	Affected Pages	Effectivity (Serial No.)	Release Date	Change Approval (Initial & Date)
IR	Initial Release	All	All		N/A

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Preface

This document, the Crew, Robotics, and Vehicle Equipment Inventory Management Plan, was prepared for the NASA Johnson Space Center by Oceanering Space System (OSS) and is submitted in accordance with the Data Requirements Description (DRD 52).

Definitions and Acronyms

Definitions

Government Property - includes all property owned or leased to the Government or acquired by the Government under the terms of a contract. This includes both Government-Furnished Property and Contractor-Acquired Property as defined below:

Government Furnished Property (GFP) - is normally considered property already in the possession of, or acquired directly by the Government and made available to the Contractor.

Contractor Acquired Property (CAP) - property procured or otherwise provided by the Contractor for the performance of a contract, title to which is vested in the Government.

Government material - is property which may be incorporated into or attached to an end item to be delivered under a contract, or which may be consumed in the performance of a contract. It includes, but is not limited to, raw and processed materials, parts, components, and small tools and supplies.

Centrally Reportable Equipment (CRE) - plant equipment, special test equipment (including components), special tooling, and non-flight space property (including ground support equipment) that a) is generally commercially available and used as a separate item or component of a system, b) has an acquisition cost of \$1000 or more, c) and is identifiable by a manufacturer and model number.

Controlled Document Package (CDP)- The official documentation (Drawings, FIMRS, NCR's, etc) issued by CDM that is required to manufacture the product.

Logistics - The Logistics Department consists of Shipping/Receiving, Certified/Bonded Stores, and the Tool Crib.

Acronyms

CAP	Contract Acquired Property
C/DM	Configuration/Data Management
CDP	Controlled Document Package
CERT	Certification
CRE	Centrally Reportable Equipment
DR	Discrepancy Report
FIMR	Fabrication Inspection Materials Record
GFP	Government Furnished Property
GSA	Government Services Administration
IATA	International Air Transport Association
JSC	Johnson Space Center
NASA	National Aeronautics and Space Administration
NBL	Neutral Buoyancy Lab
NEMS	NASA Equipment Management System
NCR	Nonconformance Report
OSS	Oceaneering Space Systems
P/N	Part Number
PO	Purchase Order
PRO	Carrier Bill Number
SR	Service Request
QA	Quality Assurance
QOP	Quality Operating Procedure
TPS	Test Preparation Sheet

1.0 Introduction

1.1 Purpose

This plan establishes the requirements, methods, and instructions for receiving, disposing, storing, moving inventory, acquiring, reporting, controlling and recording of GFE, and CAP property for which Oceanering Space Systems (OSS) is accountable.

1.2 Applicability and Scope

This plan is applicable to all OSS personnel, including subcontractors who provide support to OSS for the Crew, Robotics, and Vehicle Equipment DRD 52. It defines maintenance, repair, protection, and preservation of Government property, and describes the OSS receiving, handling, stocking, and issuance of Government property.

1.3 Responsibility

OSS inventory management is a part of our Manufacturing Service Group and is responsible for all Government-Furnished Equipment (GFE), Government-Furnished Material (GFM), and Contractor-Acquired Property (CAP) used on this contract, both durable and expendable supplies.

The OSS Manufacturing Manager will be the designated OSS Property Administrator and has overall responsibility for the implementation of this procedure. The Manufacturing Manager reports to the General Manager and dotted line to each of the OSS Program Managers. The Property Administrator has the organizational authority and independence to ensure that the Inventory Management System Plan is vigorously implemented. This person is the focal point of oversight, control, audit, and customer liaison for all Government Property related activities on the program, including subcontractors, vendors, and suppliers.

The Manufacturing Manager has overall responsibility for the implementation of this procedure.

The Receiving Technician is responsible for the receipt and verification of all incoming shipments.

Quality Receiving Inspectors are responsible for the inspection of all items with quality requirements in accordance with PA/PRC/007, Receiving Inspection.

Stores personnel will be responsible for the operation of a limited access storage area. Stores personnel will also be responsible for ensuring that all doors which provide access to the Certified/Bonded Stores areas are secured by security locks. (Access to the Certified/Bonded Stores areas will be allowed only with the consent and presence of Stores Personnel).

The Logistics Lead, along with the Stores personnel, have responsibility for retaining the Certified/Bonded Stores security keys.

The Driver is responsible for all pickup and deliveries of all materials and documentation.

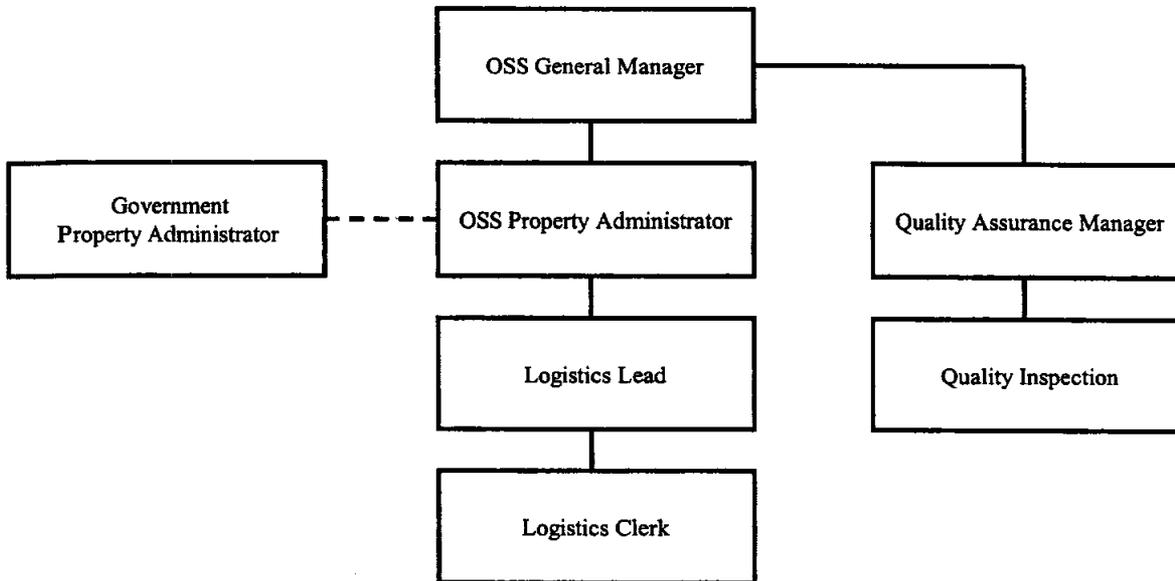


Figure 3.1-1: Organization Chart

2.0 Reference Documents

MFG/PRC/001	Control of OSS Property and Customer Contract Property, and Customer Supplied Products
MFG/PRC/013	Shipping Orders
MOP-09-22	Handling, Storing, Using, and Controlling Hazardous Chemicals
MOP-09-23	The Management and Disposal of Toxic and Hazardous Chemical and Waste Materials
PA/PRC/002	GFI/CFI Procedure or Inspection and Maintenance
PA/PRC/007	Receiving Inspection
PRCH/PRC/001	Purchasing Procedure

Forms

Form 409	Purchase Requisition Form
Form 405	Purchase Order Form
Form D809	Stores Transfer/Requisition Form
Form H884	Shipping Order Form
JSC Form 1710	Multi-item Warehouse Supply Requisition
NASA Form 1256	Inventory Adjustment Voucher
NASA Form 1018	Report of Government Owned/Contractor Held Property
NASA Form 1368	NASA Critical Item Label
Form DD1419	DOD Industrial Plant Equipment Requisition
Form DD1149	Requisition and Invoice/Shipping Document
Form DD1348	DOD Single Line Item Requisition System Document

Form DD250	Material Inspection and Receiving Report
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-794	Procedures for Packaging and Packing of Parts and Equipment
MIL-STD-130	Packing of Parts and Equipment
MIL-P-116	Packaging Methods of Preservation
NHB 6000.1	Requirements for Packaging, Handling and Transportation for Aeronautical and Space Systems, Equipment and Associated Components
JSC 18983	Preservation and Packaging Manual
CFR Title 49	Transportation of Hazardous Materials
IATA	International Air Transport Association
JSC 26549	JSC Manual for the Control of Program Stock
NFSD 97-0	NASA FAR Supplement Document, Section 1845.71
NFSD 97-0	NASA FAR Supplement Document, Section 1846.672

3.0 Process and Procedures

OSS will use existing, proven, policies, procedures, instructions, practice and controls, update and implement, to ensure that OSS achieves all Government Property control requirements.

3.1 Receipt and Identification

Upon receipt of GFP/CAP equipment, pertinent information will be recorded on a computer database, according to contract, for internal records.

Government Furnished Equipment, product, and/or material and Contractor Acquired Property is checked against the shipping document. The accompanying document(s) is/are dated and stamped.

A visual inspection is performed for damage. When damage is noted, the Customer is notified immediately.

Incoming products that require quality inspection are released to Receiving Inspection for processing in accordance with PA/PRC/002.

A Property Tag will be affixed to each item of Government Property when required. This property will be entered in a computerized database for historical records.

A copy of the required document will be made and forwarded to the appropriate Subcontract Administration Management.

3.2 Maintenance and Calibration of Government Supplied Property

Inspection and test equipment are inspected and calibrated as necessary to ensure continued accuracy. Records are maintained and audited per PA/PRC/016.

3.3 NASA Equipment Management System (NEMS) (If Applicable)

For items considered to be \$1000 or more, a Form DD1419 must be submitted to the appropriate Screening Office before new items of Centrally Reportable Equipment are procured. The NEMS will be used to screen agency property assets to avoid purchase of equipment already within NASA resources.

If the item(s) are not available within NASA resources, a Form DD1419 is returned certifying non-availability by the Property Administrator. A Purchase Request will be generated to procure item(s) per approved purchasing procedures.

3.4 Utilization of Government Property

Government property will not be used on any contract other than that for which it was requisitioned without prior approval from the Contracting Officer.

3.5 Excess Government Property

All government property assigned to OSS will be screened annually to ensure that a need for the property still exists. The screening will be performed at the time that the annual inventory is conducted. Screening documentation will be kept on file for audit verification.

When government property has been determined to be excess to the needs of a contract, the property will be processed in accordance with instructions provided by the Contract/ Subcontract Administrator for the appropriate contract.

3.6 Inventory

All government property and materials will be inventoried annually or as instructed. The annual inventory schedule determination will be made by the Division Property Administrator and the Government Property Custodian.

Inventories will be conducted by the Logistics Lead who also serves as the Government Property Custodian.

Inventory consists of sighting, tagging or marking, describing, recording and reporting the property concerned.

Equipment inventories will be conducted in accordance with the following guidelines:

- All equipment will be counted and recorded on an inventory count sheet.
- Inventory count sheets will be given to the checker who will verify the count against the records.
- If a discrepancy exists between the inventory count and the records, a recount will be performed.
- Lost, stolen, or damaged government property shall be reported by telephone to the Contract/Subcontract Administrator of the appropriate contract as soon as the property is discovered missing or damaged. A written report will follow within 30 days.
- Material inventories will be conducted in accordance with steps outlined in section 3.9.

- All inventory adjustments will be recorded on an Inventory Adjustment Voucher (NASA Form 1256).

Results of the inventory must be submitted to the appropriate Contract/Subcontract Administrator within 30 days after completion of the inventory. This will include:

- A listing which identifies all discrepancies disclosed by the inventory, and
- A signed statement that a physical inventory of government property was completed on a given date and that the official property records were found to be in agreement with the inventory, except for discrepancies reported.

3.7 Report of Government Property

OSS will submit NASA Form 1018, "Report of Government Owned/Contractor Held Property", when contractually required, to the Contract/Subcontract Administrator.

This report will be prepared in accordance with NASA FAR Supplement Document (NFSD 97-0), Section 1845.71.

3.8 Shipping Government Property

If the shipment is to a government installation or to a JSC Contractor, the shipping clerk will prepare a Form DD1149 or DD250 unless otherwise specified by the contract. The appropriate contract voucher number will be assigned by C/DM. The Form DD1149 or DD250 must be signed and approved by the appropriate person, i.e., Contract Office, Technical Monitor, Property Administrator.

3.8.1 Distribution of Form DD1149 Shipping Document

- Original will be retained in C/DM.
- Two copies will accompany the shipment.
- One copy will be sent to Accounting with the bill of lading.
- One copy will be sent to the Program Manager.
- Distribution of any other copies will be as contract requires.

3.8.2 Material Inspection and Receiving Report (Form DD250)

A Form DD 250 will be used to deliver and ship all NASA JSC hardware deliverables (contract deliverables). The Form DD250 will be generated by Logistics. QA determines and notifies Logistics when a DD250 is to be generated for Flight (Class I or II) hardware. Production Control notifies Logistics when a DD250 is to be generated for Class III, Trainer, Mock-up, or Prototype (any non-flight) hardware.

The Form DD250 will be filled out according to the NASA FAR Supplement Document (NFSD 97-0), section 1846.672, and the following additional information:

- The line item dollar value that is to be included on the form is an estimated value supplied to Logistics from Engineering and/or Production Control, and an "E" (for estimated) should be listed in the appropriate blank/column.
- The DD250 number, or shipment number, should be comprised of a three "Alpha", four "numeric" code (i.e.- SSD0001) in ascending numeric order for each contract. A Log with the next available number is generated and kept by C/DM.
- Quality Assurance will indicate by letter, or on the ADP or C of C, or in block 23 of the DD250, that the hardware delivered meets contract deliverable requirements.
- If hardware is being delivered on site (JSC), and on all first time deliveries, they must go through JSC Building #421. Building #421 personnel must receive and sign for hardware in section 22 of the DD250 Form.
- Quality Assurance is to provide advance notification to NASA QA of the pending delivery of the hardware for planning purposes.

When the Form DD250 document is used, distribution will be as follows:

- Original form will accompany the hardware.
- One copy will be retained in the shipping files (located in Logistics).
- One copy will be sent to C/DM.
- One copy will be sent to the NASA Quality Assurance Representative.
- One copy will be sent to the appropriate hardware Program Manager.
- A copy of all DD250's must be provided to Contracts (page E2 from the Contract tells the distribution of the customer (NASA) side). Contracts will generate the shipper for fixed price hardware items based on the DD250's and the determined need to be paid. If shippers are prepared for partial payment, this will be determined by Contracts and the Program Manager for that project. Otherwise, one shipper will be prepared after the Program Manager closes the project.

3.9 Packing NASA Hardware

For shipments of NASA hardware, Class I, Class II, and Class III items, the Shipping Clerk will ensure that NASA Form 1368 "NASA Critical Item Label" is prominently displayed on the top and each side of the shipping container. This label will alert personnel to the criticality of the item to the NASA effort. The container shall be lined with a minimum of 2 inches of sheet foam, or designed in a manner to ensure no damage occurs during shipment.

Each shipping container will be marked in accordance with MIL-STD-130 and MIL-STD- 129, when applicable.

Coordination will be made with Quality Assurance for each shipment to ensure that all quality and packaging requirements have been met. Quality Inspection will be in accordance with applicable quality operating procedures.

3.10 GSA Supplies (Applies only if a budget is available)

GSA supplies will be requisitioned through the appropriate Subcontract Administrator.

The Logistics Group is responsible for ordering, receiving and maintaining records of all GSA supplies.

Supplies will be requisitioned using the following forms:

- DD1348 - GSA Requisition Form (Single line item) (work stoppage)
- JSC1710 - Single or Multi-item Warehouse Supply Requisition

Upon receipt of a verbal request for supplies, the appropriate requisition will be prepared. Required approval will be obtained, then the requisition will be processed.

When processing "work stoppage" requisitions the total cost shall be entered in remarks column.

The Logistics Group will make copies of all requisitions and will retain in a document register.

3.10.1 Procedure for Receipt of Items

The Logistics Group, upon receipt of items from GSA stock will:

- Sign (not just initial) and date the two receiving copies of DD Form 1348-1. (The delivery person will take one copy back with them).
- Circle the quantity shown as delivered in block Q of the second copy of the receiving form and retain for the Logistics Group files.
- Enter in the receiving part of the document register the date of receipt, quantity received, unit cost, and total cost.

The requester will date and sign the back of the receiving copy.

When order is complete, the receipt form is filed by Julian date in the Logistics Group "closed" file.

3.11 Bonded Stores

Items can only be issued and received in Bonded Stores using the following forms:

- Form DD250
- Form 290
- Form 528
- Form 1027
- Form 1149
- DR
- NCR
- TPS

Data Entry/Receipt and issue of Bonded Stores Items:

Upon receipt and issue of items to be placed in Bond, Quality Assurance will be notified and required for verification of the following:

- Paperwork matches hardware
- Serial Number
- Lot Number
- Part Number
- Unit Cost
- Quantity
- Class
- Item Description
- Expiration Date

Once QA determines all documents and hardware are correct, QA will stamp the paperwork and 911 tag when issued or received.

Stores personnel will then update database to reflect status of all hardware moved.

3.12 Disposition of Closed Contract Materials

3.12.1 General

When a contract is to be closed, the Program Manager will request the Logistics Lead to provide a closing inventory list. Once the list is generated, all inventory on that contract is on hold pending disposition as described in the following paragraphs. The Logistics Lead will provide the closing inventory list to the Program Manager and the Contracts Administrator.

Inventory transfers on fixed price contracts should be completed within 60 days of contract close. Government or customer furnished equipment must be transferred as described in section 3.14. Transfers must follow all contractual requirements.

3.12.2 Cost Plus or Time and Material Contracts

For cost plus or time and material contracts, the Contracts department will send the list, along with any required contractual forms, to the Customer Contracting Officer to request direction for disposition of the contract material. The Logistics Lead will ensure the inventory is segregated and placed on hold until direction is received. Government or customer furnished equipment must be dispositioned as described in section 3.14 and all associated contractual requirements.

3.12.3 Fixed Price Contracts

For fixed price contracts, the Program Manager or designee will determine the disposition for all remaining inventory. The following dispositions are possible for each item of inventory:

- Transfer to another active job
- Transfer to an inventory account (common or program area)
- Downgrade and transfer to uncontrolled storage

- Dispose or scrap

The Program Manager and Contracts Manager must approve all dispositions and transfers. In addition, the Manufacturing Manager must approve all transfers to an inventory account. A VP or General Manager must approve inventory transfers with over \$25,000 in total original value. When inventory is transferred from one manager's account to another manager's account, both managers must approve the transfer. In general, all transfers will be made at zero value. Whenever possible, transfers should be made to a common account to minimize transfer paperwork requirements when the parts/material are ultimately needed.

3.12.4 Handling of Items in Inventory Accounts

Items in stock in an inventory account must be reviewed, issued and tracked in the inventory control system as shown in sections 3.4 - 3.8, and will be inventoried as described in section 3.9. As part of the annual inventory, stock will be screened for usage history and condition. Parts and materials that have degraded or have not been utilized for 2 or more years should be evaluated for downgrade, scrap or disposal. Downgrade, scrap, or disposal of these items is at the discretion of the inventory account manager or general manager.

Attachment J-9

RELIABILITY AND MAINTAINABILITY PLAN

The contractor will submit Plan as part of their proposal.

Document No. 31100-70003

Release Date: _____

Revision Date: _____



16665 Space Center Boulevard
Houston, Texas 77058

RELIABILITY AND MAINTAINABILITY PLAN

FOR

CREW ROBOTICS AND VEHICLE EQUIPMENT

DRD 37

Prepared by:

Samantha Reaves, Safety Engineer

Approved by:

Lisa Porter, Product Assurance Manager

This proposal includes data that shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed in whole or in part for any purpose other than to evaluate this proposal. If, however, a contract is awarded to this offeror as a result of or in connection with the submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit the Government's right to use information contained in this data if it is obtained from another source without restriction. The data subject to this restriction are contained in all sheets.

Change Log					
Rev. Ltr. Change No.	Justification and Description of Change	Affected Pages	Effectivity (Serial No.)	Release Date	Change Approval (Initial & Date)
IR	Initial Release	All	All		N/A

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Abbreviations and Acronyms

CCB	Configuration Control Board
CDR	Critical Design Review
CIL	Critical Items Lists
DRD	Data Requirements Description
EEE	Electrical, Electronic, and Electromechanical
EIS	End Item Specification
EVA	Extravehicular Activity
FMEA	Failure Modes and Effects Analysis
GFE	Government Furnished Equipment
GIDEP	Government Industry Data Exchange Program
ILS	Integrated Logistics Support
LLIL	Limited Life Items List
LSA	Logistics Support Analysis
NASA	National Aeronautics and Space Administration
MMH/Y	Maintenance Manhours Per Year
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
ORU	Orbital Replacement Units
OSS	Oceanering Space Systems
PDFs	Probability Density Functions
PDR	Preliminary Design Review
PRACA	Problem Reporting and Corrective Action
RCM	Reliability Centered Maintenance
R&M	Reliability and Maintainability
SCDs	Source Control Drawings
SOW	Statement of Work
TTR	Time to Restore

1.0 Introduction

1.1 Approach

Oceanering Space Systems' Reliability and Maintainability approach is to 1) identify and eliminate by design all critical failures; 2) identify and control critical items and items subject to limited life; 3) minimize failure through test, verification, failure reporting, failure cause analysis and effective non-recurrence actions; and 4) minimize maintainability life cycle costs. This plan describes how the tasks will be executed, controlled, and reported. It complies with NSTS 5300.4 (1D-2) and is submitted in accordance with DRD 37.

1.2 Applicable Documents

The following documents are applicable to the extent specified herein:

NASA Documents

NSTS 5300.4 (1D-2)	“Safety, Reliability, Maintainability and Quality Provisions for the Shuttle Program”
NSTS 22206	“Instructions for Preparation of Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)”
SSP 30234	“Instructions for Preparation of Failure Modes and Effects Analysis and Critical Items List for International Space Station”
SSP 30312	“EEE and Mechanical Parts Management and Implementation”
JSC 61360	“JSC Engineering Directorate Certified Parts Approval Program (EDCPAP)”
SSP 41000	“System Specification for the International Space Station”
JSC 17057	“GFE Limited Cycle Time/Age Life Item Requirements”
JSC 28484	“Program Requirements Document for Johnson Space Center (JSC) Non-Critical Government Furnished Equipment (GFE)”
NPG 8735.1	“Procedure for Exchanging Parts, Materials, and Safety Problem Data Utilizing the Government Industry Data Exchange Program (GIDEP) and NASA Advisories”

2.0 Task Planning

2.1 Task Performance

Oceanering's approach to task performance is based on our experience working closely with NASA in managing reliability tasks, including FMEA, CIL, PRACA, and parts control. The Reliability organization plans, develops, and integrates reliability activities by providing specialized technical assistance, analyses, inspections, and data; and by conducting or participating in tests and demonstrations to verify design adequacy.

2.2 Task Interrelation with Other Related Tasks

Specific interfaces and the required data flow between organizations provide a structure that ensures that the Reliability program tasks are accomplished effectively. These interfaces are shown in Figure 2.2-1.

Reliability tasks within OSS are inter-related as follows:

- 1) Reliability Engineers (RE) participate in all design reviews and are cognizant of design evolution to ensure that reliability requirements and criteria are addressed,
- 2) RE obtain input from Logistics for maintenance crew-hour per year allocations and provides reliability data to ILS for determining correction maintenance frequency,
- 3) RE provide Systems Engineering and Design Engineering reliability inputs for Source control drawings and subcontractor Statement of Work (SOW),
- 4) RE supports Configuration Control Boards (CCBs) by providing reliability impacts of proposed changes, and
- 5) RE establishes operation constraints to insure product reliability is not degraded.

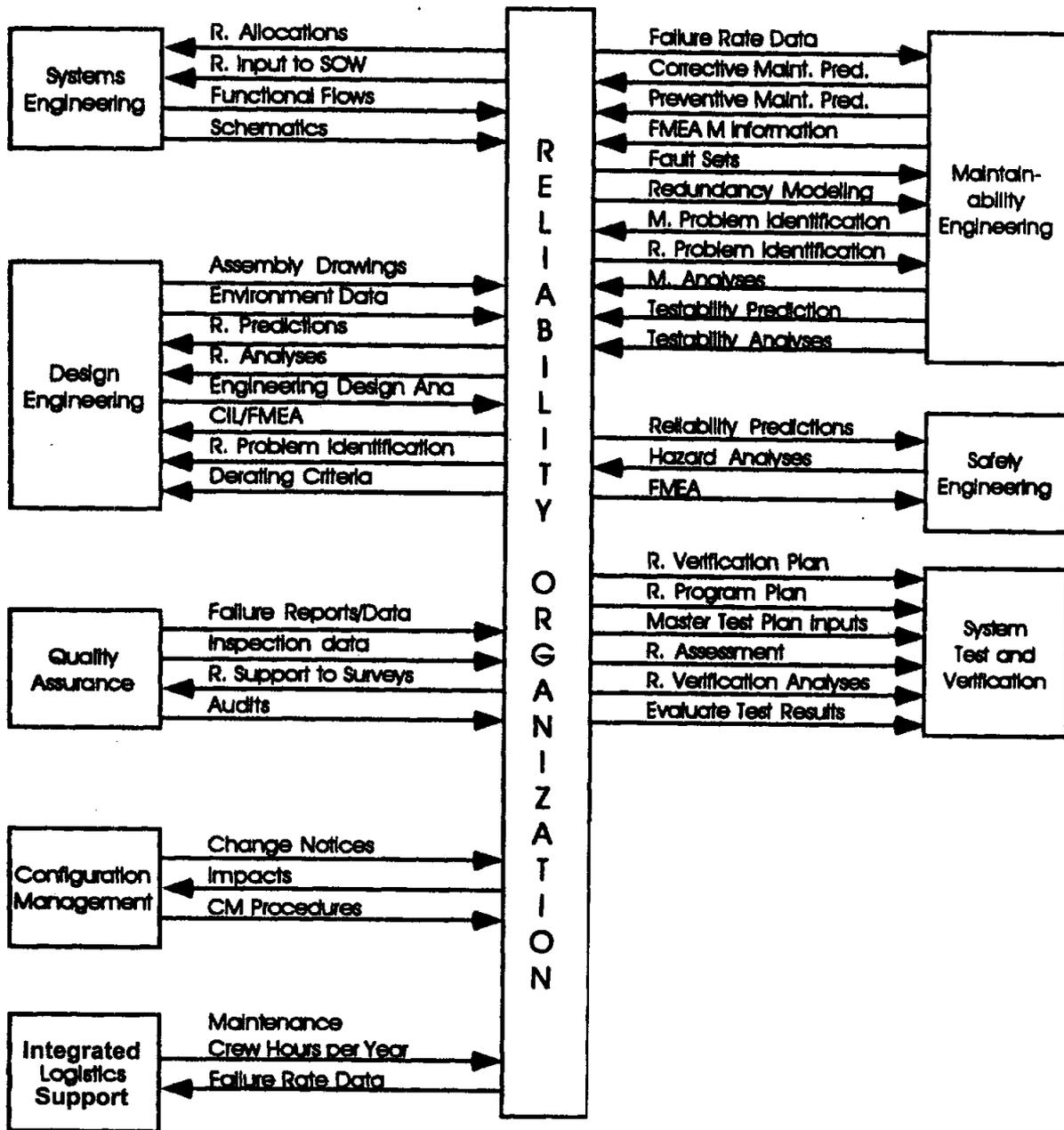


Figure 2.2-1: Reliability Interfaces

2.2.1 Systems Engineering

Reliability provides Systems Engineering with inputs to Source and Specification Control Drawings (SCDs), and subcontract SOWs. Systems Engineering establishes and implements the process that ensures that these inputs are properly reflected in program requirements documents. Reliability allocations and requirements are used to flow down quantitative requirements to our Subcontractors. Reliability engineers provide the bridge that ensures the interfaces between Systems, Integrated Logistics Support (ILS), Test and Quality Assurance are maintained and result in productive communication. The Reliability organization supports Systems Engineering in conducting trade studies where reliability is affected.

2.2.2 Design Engineering

All of the analyses that reliability engineers perform to satisfy the objectives of Section 2.4 are based on data required from the Design organizations. Therefore, this interface is critical and includes design organizations of subcontractors and suppliers. Design data required to perform FMEA/CIL, limited life analysis, and reliability predictions include functional flow diagrams, schematics, assembly drawings, testability logic matrices, and parts environmental and stress data.

2.2.3 Quality

QA engineering ensures that systems and components are manufactured, assembled and inspected per the design and requirements of the contract. Through the Reliability and System Safety team, QA is informed of any reliability/safety-related issues or concerns that are brought forward during safety reviews, so that any Quality-related issues are addressed.

2.2.4 Configuration Data Management

Proper configuration management of both engineering design documents and system safety documents ensures that hazard analyses are performed on the current configuration and that the system safety documents can be maintained and traced. All requirements, hardware, software, and procedural changes from the established baseline are evaluated for safety. Design engineers review and provide inputs to system safety information as part of the two-way communication process. Hazard analyses and hazard lists are updated, as required, to reflect hazards that have been introduced, eliminated, or modified as the result of a configuration change. CM releases and updates safety documentation as required by the Reliability and System Safety team. After safety documentation is formally approved and signed, the original documentation is submitted to CM for retention.

2.2.5 Integrated Logistics Support

Periodically, Logistics support is needed for maintainability, maintenance, and logistics planning. Reliability estimates and predictions are used in the Logistics Support Analysis (LSA). Maintenance, Crew Hours per Year and Failure Rate Data, are all incorporated in Logistics Planning as a means preparing and/or ensuring mission success is achieved.

2.2.6 Maintainability

From a pure discipline technology standpoint, maintainability is more closely aligned to reliability than any other discipline. Maintainability engineers utilize and provide support in the preparation of the FMEA and CIL.

These analyses are utilized in developing fault sets for establishing testability strategies and test point selection and optimization. Maintainability utilizes mean time between failure (MTBF) predictions and failure probability density functions (PDFs) in their analyses. Reliability redundancy models and criticality classifications are utilized in emergency maintenance analyses and fault detection and isolation probability estimates.

2.2.7 Safety

Manned flight safety is the most critical of design objectives. Reliability engineers interface with safety utilizing safety products such as hazard analyses, maximum allowable time to restore safety critical functions, and safety trade studies to minimize hazards in the maintenance environment. Safety supports reliability activities such as the tasks to identify maintenance induced hazards and emergency maintenance analyses required in the FMEA.

2.2.8 Systems Test and Verification

The reliability verification effort consists of validation by analysis, assessment, and demonstration. Interaction with the test organization is required to utilize targets of opportunity which will occur as various orbital replacement units (ORUs), subsystem and systems tests are conducted. Requirements for life testing, environmental stress screening, assessing failure, fault tolerance, redundancy management, and limited life testing will be supported by the Reliability Organization.

2.3 Task Product Identification

The products to be developed from the reliability and maintainability tasks are shown in Figure 2.3-1.

DRD No.	Description	Utilization
37	Reliability and Maintainability Plan	Provides planned methods for accomplishing reliability and maintainability tasks.
33, 49	Failure Modes and Effects Analysis (FMEA)	Initiates additional design action Input safety analysis Test planning Mission planning Selection of MIPs Fault detection and isolation Maintainability analysis Maintenance planning Logistics planning
33 49	Critical Items List	Identifies critical items for risk assessment Identifies waiver requirements Initiates additional design action Input to safety analyses Test planning Selection of MIPs Fault detection and isolation Maintainability studies Maintenance planning Logistics planning
40	Problem Reporting and Corrective Action	Provides corrective action recommendations Notifies other users of significant problems
32	Limited Life Items List	Provides for controlled replacement prior to failure
	Space Station Reliability and Maintainability Predictions Report	Provides quantitative reliability measures for evaluating against requirements Supports maintainability and logistics analyses
42	Government Industry Data Exchange Program and NASA Advisory Problem Data	Provides a controlled method of ALERT initiation, investigation, and response, as well as part obsolescence for new design.
43	EEE Parts Control Plan	Controls the selection, acquisition, traceability, testing, inspection, packaging, storage, and application for parts.
17	EEE Parts List and Analysis Report	Report to document the analysis used to verify that the selected electrical parts are not overstressed in worst case environments, operating conditions and duty cycles.

Figure 2.3-1: Products Developed from Reliability & Maintainability Tasks

2.4 Task Schedule

A typical schedule for reliability and maintainability task accomplishment, output product submittal and program reviews is shown in Figure 2.4-1.

DRD #	Program Milestones	PDR	CDR	A/R
37	Reliability Plan Initial update of approved plan	⇓		
33 or 49, as applicable	Failure Modes and Effects Analysis PDR Submittal CDR Submittal AR Submittal	▽	▽	▽
33 or 49, as applicable	Critical Items List PDR Submittal CDR Submittal AR Submittal	▽	▽	▽
40	Problem Report as required	▽		
32	Limited Life Items List CDR Submittal AR Submittal		▽	▽
17	EEE Parts List and Analysis Report	▽	▽	▽
43	Electrical, Electronic, and Electromechanical (EEE) Parts Control Plan	▽		▽

Figure 2.4-1: Reliability Task Program Schedule

2.5 Task Product Dissemination

Reliability activities are an integral part of the following functions:

- A. **Project:** Reliability Engineers review designs to ensure that reliability design requirements are met. They also monitor thermal and electronic derating.
- B. **Test Engineering:** Reliability Engineers support test requirements development. Tests are monitored by reliability to ensure that failures are correctly recorded.
- C. **Manufacturing:** Reliability Engineers provide insight into basic fabrication and manufacturing processes that can be planned and traded off during design to minimize degradation effects.
- D. **Quality Assurance:** FMEA is used to establish inspection criteria. Close coordination by reliability assures that the critical items are properly characterized and verified.

- E. Logistics: Reliability estimates and predictions are used in the Logistics Support Analysis (LSA) process.
- F. Contracts: Reliability participates in audits of suppliers and supplier hardware. Reliability works through the buyer of each subcontractor to ensure reliability requirements are met.
- G. Safety: FMEA/CIL data is coordinated with safety for use in hazard analysis.
- H. Maintainability: Reliability mean time between failure (MTBF) predictions and failure probability density functions (PDF) are used in the Maintainability Analysis process. Reliability's redundancy models and criticality classifications are utilized in emergency maintenance analyses and fault detection and isolation probability estimates. FMEA/CILs are utilized and supported by Maintainability engineers.

Tailored reliability requirements plus lessons learned are updated in design criteria and the reliability plans/procedures and are provided to the designers as reliability requirements. During the design evolution, Reliability Engineering determines which specific method will be applied to support or challenge the design approach. Subsequent changes to the approved designs will be similarly analyzed and the FMEA/CIL maintained current. The FMEA/CIL will be accomplished by Reliability Engineering. Other deliverable products, Limited Life Items List and Reliability Analysis are the responsibility of Reliability.

3.0 Management

Oceaneering's Reliability and Maintainability activities are planned and developed as an integral part of design, development, testing, evaluation and operational activities. Time-phased scheduling charges are developed for each reliability task. Progress is assessed by management and reported against each major milestone.

3.1 Organization

The reliability and maintainability (R&M) function at Oceaneering is the responsibility of the reliability engineer, reporting to the Product Assurance Manager.

The engineering manpower is distributed to match evolving program requirements and maintain an adequate span of control. Cross-discipline training of Safety, Reliability, Integrated Logistics, and Quality engineers provides flexibility and efficiency in task scheduling and accomplishment.

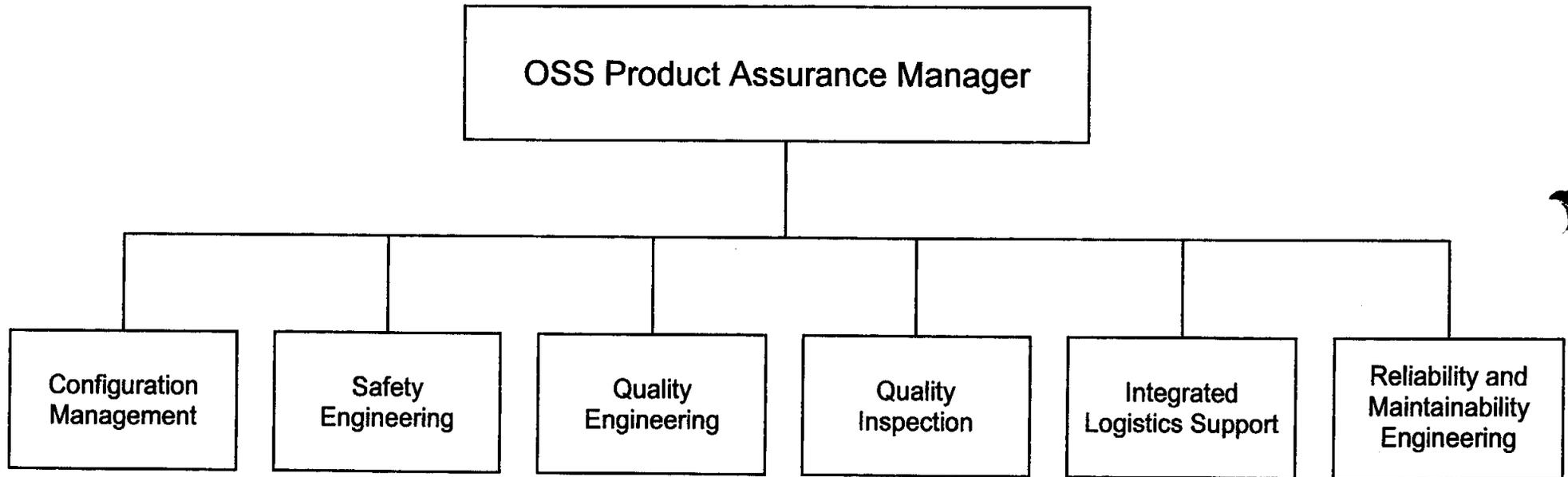


Figure 3.1-1: Reliability and Maintainability Reporting Responsibility

3.2 Reliability and Maintainability Audits

The R&M function is integrated into all design processes. R&M specialists work with Project Engineering to guide designers, suppliers, manufacturing, test and operation personnel responsible for including reliability and maintainability requirements in their initial designs and plans. Reliability and Maintainability supports internal design reviews at the system, subsystem, and component level; PDR, CDR, readiness reviews, and Program Reviews. Material addressed at these reviews includes:

- a) Quantitative and qualitative assessments of conformance to specified maintainability requirements;
- b) Status of solutions to outstanding maintainability problems and critical areas;
- c) Results of engineering design analyses with maintainability impact;
- d) Key trade studies resulting in Maintainability enhancements or trade-offs;
- e) Results of emergency maintenance analyses including proposed design changes for identified deficiencies;

3.3 Supplier Control

Reliability requirements for each procurement are determined by item complexity and criticality. Procured equipment which is identified as having high maintenance costs, is reliability significant, or contains critical or safety-critical items is subjected to special controls for reliability characteristics. Reliability prepares and publishes a list identifying these items and provides quantitative and qualitative reliability design requirements. These requirements are included or referenced in Source or Specification Control Drawings, Project Technical Requirement Document and SOWs. As the design matures, reliability/maintainability trades are conducted by the subcontractors to insure reliability goals and maintainability requirements are optimized to provide the best possible availability. Reliability engineers and the designers coordinate with each other to provide optimized designs; reliability engineers provide guidance and suggestions for meeting Reliability design metrics. Major supplier data required by the contract are included in OSS deliveries.

Reliability evaluates competitive proposals for reliability characteristics to assist in selection of the best qualified supplier. Checklists are used to evaluate characteristics such as Mean Time Between Failure (MTBF), mission reliability, redundancy, etc.

Supplier progress is monitored through periodic meetings, progress reports, design reviews, and test reports. Suppliers participate in Government Industry Data Exchange Program (GIDEP) in accordance with DRD 42 and NPG 8735.1, "Procedure for Exchanging Parts, Materials, and Safety Problem Data Utilizing the Government Industry Data Exchange Program (GIDEP) and NASA Advisories". Further, suppliers identified as providing equipment which is reliability or safety-significant are required to provide reliability data.

Reliability personnel interface with suppliers through written and verbal communications. The written communications include written reports required by the Program as well as other routine correspondence. Verbal communications include telephone conversations and face-to-face meetings. Reliability personnel meet with suppliers on a basis according to the needs of the program. Meetings are used to review progress; and to discuss designs, reliability block diagrams, reliability metrics, FMEA, CILs, Limited-Life Items, and other product assurance analyses to address questions and problems.

For proposed off-the-shelf hardware, R&M reviews include eliciting and evaluating historical data, and its applicability to the current intended usage. R&M's concurrence is required for procurement drawings, component specifications, and supplier statement of work.

3.4 Reliability and Maintainability of Government Furnished Equipment (GFE)

R&M engineers identify required documentation and advise NASA of any apparent deficiency or inconsistency in the R&M of GFE items in order that early corrective action can be taken.

4.0 Reliability and Maintainability Engineering

4.1 Reliability and Maintainability Design Criteria

Continuous informal review of design is accomplished in accordance with hardware design review procedures and instructions. Specific tasks to be accomplished are as follows:

- 1) Review procedures and instructions for compliance to contract requirements;
- 2) Review of designs/design documentation as they progress; preparation of reliability and maintainability checksheets or signing of documents for release to show compliance to contract reliability requirements and criteria;
- 3) Review of design changes for reliability and maintainability impact;
- 4) Reliability evaluations of design trade studies are utilized as an integral part of the trade-off process and selection decision. Reliability evaluations take into consideration the criticality category, FMEA, qualification/acceptance test status, parts and materials selection and application, redundancy, failure history, and overall effects on reliability as applicable. Results of the reliability evaluations are documented.
- 5) Review of parts, materials, processes, and test requirements specified in the design documentation with respect to manufacturing, reliability, qualification and acceptance testing throughout the manufacturing, assembly and test phases of hardware production.

4.2 Reliability and Maintainability Support of Design/Readiness Reviews

Reliability Engineering will participate in formal reviews. Reliability inputs and documentation for the formal reviews (FMEAs, CIL, and Limited Life Items Lists) will be provided as specified in the contract and or SOW. Supporting reliability documentation, consisting of the following items, (as applicable to the specific review), will be maintained for review.

- 1) Reliability review checklists, document review logs, or supplier design review minutes.
- 2) Documentation of each deviation from specified reliability requirements.
- 3) Circuit stress analysis, where applicable.
- 4) Reliability estimate(s) and redundancy analysis, where applicable.
- 5) Reliability criteria and requirements.
- 6) Problem resolution reports.
- 7) Reliability review meetings.

Reliability support of readiness reviews concentrates on the assurance that reliability criteria and requirements have been achieved. Primary inputs are:

- 1) Assessment of inherent reliability.
- 2) Assessment of closure of reliability issues, such as action items from acceptance data reviews and single points of failure.
- 3) Assessment of reliability verification through evaluation of equipment test history, failure reports, corrective action, and problem resolution reports.

4.3 Trade Studies

The R&M effort includes participation in trade studies. The Project Engineer, Project Manager, or Program Manager initiating the trade study ensures that reliability and maintainability inputs are included.

4.4 Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)

A FMEA and CIL are prepared in accordance with NSTS 22206 or SSP 30234, as applicable, and submitted in DRD 33 or 49.

The FMEA is a standard procedure that identifies the credible modes of failure within a system design and determines the effect of each failure on:

- a) the component
- b) the subsystem
- c) the success of the EVA mission
- d) the safety of the crew

The analysis also provides a description of system redundancies or degraded/alternate modes of operation available for mission continuation or crew safety after the initial failure. The method of detection and criticality of the hardware failure and function loss is included. Results are used

as inputs to the CIL, design trades, safety, maintenance requirements definition, maintainability, logistics support analyses, test planning, and test equipment design.

Flight hardware FMEAs are performed to levels consistent with the various stages of the design effort, beginning at the functional levels to determine to determine criticality of function loss. These results determine definition of system and subsystem redundancy requirements and redundancy management strategies. For criticalities identified as 1, 1R, 2 and 2R FMEAs are performed to the piece-part level.

The Critical Items List tabulates the critical failure modes in the FMEA and provides additional justification and rationale for retaining the current component designs. The critical failure modes as defined in NSTS 22206 are those single or double failures that cause loss of life/vehicle or loss of mission and also fail one or more redundancy screens, and single failures that result in loss of mission.

The rationale for acceptance includes the following information:

- a) Design features which minimize the probability of occurrence of the failure mode;
- b) Test to detect the failure mode
 - a. Acceptance tests
 - b. Certification tests
- c) Inspections during manufacturing to confirm that specific failure mode causes are not inadvertently manufactured into the hardware.
- d) Failure history of the hardware failure mode during flight, acceptance testing, certification testing, and field testing
- e) Ground turnaround inspections performed before flight
- f) Operating procedure, flight rules, and special training procedures required to retain system functions when the failure mode occurs.

The FMEA/CIL documents are working documents which are periodically updated to reflect design changes, system and/or operational modifications, and other changes.

4.5 Failure Rate Data

Failure rates in conjunction with duty cycles and sensitivity analysis are used to predict reliability parameters. Current component failure rate data for all hardware is compiled and maintained. This data is used in the accomplishment of reliability analysis, maintainability analysis, availability estimates, logistics support analyses, reliability trades, and other studies as appropriate.

Failure rate data is obtained from a variety of sources, the preferred source being historical data. Historical data is obtained from the Space Station Reliability and Maintainability Predictions Report, GIDEP, NASA documents, and other reports. Whenever possible, data obtained in the

space environment is used. When space experience is not available, data from other environments is used in conjunction with the appropriate environmental factor.

4.6 Limited Life Items

Each design is reviewed to determine any limitations which must be imposed on the operation of the equipment in its intended use. OSS will provide reports which estimate life expectancy for on-orbit maintenance items to support maintenance time predictions and preventative maintenance analysis. Parameters to be considered include:

- a) Shelf-life limitations
- b) Operational life limitations
- c) Scheduled maintenance, calibration, or replacement requirements
- d) Special packaging, handling, and transportation requirements

When identified, the item is listed on the Limited Life Items List and submitted in DRL 32. The list provides the following minimum information:

- a) Item name
- b) Part number
- c) Serial number
- d) Contractor and Government Entity (CAGE) code
- e) Life limiting parameter, material, or function (including analyses)
- f) Refurbishment limit
- g) Restrictions (handling, storage, special requirements)
- h) Justification

4.7 EEE Parts Control Program and EEE Parts List and Analysis Report

The R&M engineer participates in the EEE Parts Control Program detailed and submitted per DRD 43. The engineer also provides analysis information for all parts in the EEE Parts List, As-designed Parts List according to DRD 17, Electrical, Electronic, and Electromechanical Parts List and Analysis Report.

4.8 Problem Reporting System

Problem reports are prepared, reported, and closed out in accordance with established procedures. Reliability verifies that the criticality coding of problems agrees with the FMEA/CIL. Problem reports are also reviewed for any new component failure modes that should be included in the FMEA. Corrective action/recurrence control is verified by Reliability for design related problems by review of Engineering Changes and Material Review Board

(MRB) actions. The PRACA system is structured to retain, index, summarize, and categorize problem data to form the basis for trend analysis and feedback for design action.

Problems are identified and documented when they occur in any phase of the program. Problem reports are provided from the point of occurrence, whether at a vendor facility or at the operating facilities, including flight operations. Problem reports document any nonconformance, failure or unsatisfactory condition potentially affecting safety, reliability, or performance, or indicating a generic failure trend. This is initially documented on a discrepancy report, followed by an assessment using the criteria in JSC 28035 for reporting to the PRACA system. The NASA ALERT system is similarly utilized, including responding to ALERTs generated on other programs in accordance with DRD 42.

4.9 Maintainability Assurance

Maintainability allocations and design feature are cross-checked by independent reliability assessments. Reliability provides failure rate data for maintainability predictions and trades. Conversely, crew maintenance down time allocations are used to establish reliability goals. The MTBF prediction models complement the MTTR prediction and Logistics Support Analysis process. Actual demonstration is used to validate maintainability features and establish optimum availability.

4.9.1 Preventive Maintenance Requirements Analysis

A Preventive Maintenance Requirements Analysis is accomplished to identify required scheduled maintenance. Reliability Centered Maintenance (RCM) analyses techniques are selectively used and tailored to provide cost-effective analysis. The preventive maintenance analyses involve identifying preventive maintenance tasks and frequencies with the objective of preserving the inherent design reliability and safety of systems and equipment while minimizing maintenance costs. The analysis is weighted to reflect the maintainability objective of minimizing on-orbit and ground maintenance manpower requirements. This task is accomplished through the joint cooperation of Reliability, Maintainability, and Engineering. Maintainability has the primary responsibility for task completion and implementation.

4.9.2 Maintenance Degradation Analysis

Although it is one of the objectives of the Maintainability program not to degrade the inherent reliability of the end item through corrective and preventive maintenance procedures, it is unavoidable that for some assemblies, maintenance action imposes a certain amount of reliability degradation. Analyses are conducted to identify the maximum number of allowable maintenance actions for assemblies that are identified to experience accelerated wear-out tendencies as a result of maintenance.

4.10 Quantitative Maintainability Requirements and Groundrules

Quantitative Maintainability requirements are contained in the End Item Specification (EIS).

4.10.1 Maintenance Manhours Per Year (MMH/Y)

The quantitative requirement governing the maintainability design is the MMH/Y resource allocation provided in the End Item Specifications (EIS). These Maintainability allocations will be used as the baseline against which design alternatives are evaluated. Preventive maintenance analysis shall be conducted to determine an optimum preventive maintenance schedule that will minimize the amount of manpower required to sustain the required mission capability and will also minimize downtime.

4.10.2 Maximum Allowable Time to Restore (TTR) for Safety Critical Items

Maximum allowable TTRs for safety-critical functions will be established by the Safety organization. Safety-critical maintenance activities will not exceed these established requirements. Verification will include both analysis and maintenance demonstrations.

4.10.3 Fault Detection

Fault detection requirements, including requirements for automatic fault detection, will be as established in the EIS or Software Requirements Specification (SRS). Additional detection-rate goals will be established as required to ensure a fault detection capability that is consistent with the MMH/Y requirements in accordance with SSP 41000, International Space Station Systems Requirement Document.

4.10.4 Fault Isolation

Fault isolation requirements, including requirements for automatic fault isolation, will be as established in the EIS or SRS. Additional isolation rate goals will be established as required to ensure a fault isolation capability, that is consistent with the MMH/Y requirements in accordance with SSP 41000, International Space Station Systems Requirement Document

4.10.5 False Alarm Rate

The false maintenance requirement rate considering both system equipment and BIT/BITE shall not exceed the requirements established in the EIS or SRS. False maintenance requirement is defined as a fault indicated by BIT/BITE or other monitoring circuitry where no fault exists. Analyses and tests will be done to optimize the overall sensitivity of BIT/BITE. Sensitivity is kept at an optimum level which ensures that all failures will be detected while the number of false alarms will be kept under the acceptable limit.

4.11 Maintainability Mathematical Model

Maintainability Mathematical Models are developed and/or utilized to accurately represent system design characteristics that pertain to maintainability. The models are developed to predict:

- 1) The probability of detection and isolation faults to a single ORU
- 2) Mean Time to Repair
- 3) Maintainability Man-Hours per Year (MMH/Y)

- 4) Subsystem and ORU quantitative maintainability characteristics required to support system level requirements

A Probability Density Function (PDF) Model is created to predict Time to Repair (TTR) for both on-orbit and ground maintenance of the end item. A log normal function is employed by Oceaneering in their model.

4.12 Maintainability Prediction

The basic methodology of MIL-HDBK 472 procedure IV is used to perform maintenance tasks time prediction. This procedure incorporates the following input data:

- a) 1g testing and ground simulation
- b) Historical on-orbit data
- c) Operational data
- d) Engineering analyses/estimations

5.0 Data

The Reliability Engineer utilizes PRISM Software, which is a program that offers a variety of general and system output reports to provide summarized visibility into the details of reliability predictions. As previously mentioned, the Reliability Engineer also utilizes the Government Industry Data Exchange Program (GIDEP), which provides a controlled method of ALERT initiation, investigation, and response, as well as part obsolescence for new design.

The PRISM Software creates and stores reliability predictions within the program and contains a list of all of the reliability predictions resident in the PRISM database. From a project standpoint, excel databases are also maintained as a means of tracking predictions and part obsolescence.