

**ATTACHMENT J-4**

**DATA REQUIREMENTS DESCRIPTIONS**

## **Preface**

### **1.0 SCOPE**

This preface identifies and defines the Data Requirements (DRs) to be provided and monitored by the contractor during the period of performance of this contract. As used in this Attachment, “DR” and “DRs” are generic references to data or data submittals being provided to NASA.

### **2.0 DESCRIPTION**

The Data Requirement Descriptions (DRDs) define, by individual DR, the information and data required for each deliverable document. If there is conflicting language between the requirements in the SOW and DRDs, the language in the SOW shall take precedence.

Data types are used to identify the approval and control required for each DR.

DRs submitted 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.

All DRs shall be delivered using the NASA Electronic Document Management System (EDMS) workflow.

### **3.0 DATA REQUIREMENT DESCRIPTION (DRD) EXTENSION NUMBERS**

Extension numbers are used for those DRs where more than one deliverable document is described. These extension numbers are used to identify distinct delivery dates, data types, or content requirements for those DRs which specify multiple deliverables. The extension numbering system will begin with the DR number (e.g., PC07) and then be extended to include a distinct suffix (e.g., PC07-1, PC07-2, PC07-3, and PC07-4) for each distinct item or deliverable required under that DRD.

### **4.0 DATA TYPES**

The following describes the document types pertaining to DRs:

**Type 1** Type 1 data requires NASA’s approval prior to being viewable in EDMS. The NASA Contracting Officer’s Technical Representative (COTR) will approve Type 1 deliverables in EDMS after concurrence from the NASA Office of Primary Responsibility (OPR) unless otherwise noted in the DRD. 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. Type 1 data that has received written COTR or designee approval prior to its submittal into EDMS will be viewable in EDMS upon delivery. A Type 1 document can be implemented after written NASA COTR or designee approval (either within EDMS or by written approval prior to its submittal into EDMS).

Type 1 submissions shall be marked “TYPE 1 PRELIMINARY -- PENDING NASA APPROVAL” or “TYPE 1 APPROVED BY NASA” after NASA approval. Additional special designations and deviations may be required on specific submissions in accordance with configuration management requirements.

**Type 2** The NASA Office of Primary Responsibility (OPR) has a 30 work day review period to approve Type 2 deliverables in EDMS. During that review period, Type 2 data shall not be viewable in EDMS unless prior approval has been received. After the 30 work-day review period, if the contractor has not received any NASA comment, the document will be considered accepted. If a NASA comment is received prior to the expiration of the 30 work-day review period, the comment shall be appropriately dispositioned by the contractor and resubmitted into EDMS. Once the document is resubmitted after dispositioning NASA comments, the 30-day review period starts over. A Type 2 document can be implemented after NASA OPR approval within EDMS or after the expiration of the 30 work-day review period without any NASA comments.

Type 2 submissions shall be marked “TYPE 2 PRELIMINARY -- PENDING NASA APPROVAL”, “TYPE 2 -- APPROVED BY NASA” after NASA approval within EDMS, or “TYPE 2 – ACCEPTED WITHOUT COMMENT” if acceptance is based on the expiration of the 30 work-day review period and no NASA approval or comments have been made. The use of different acceptance terminology is used above to differentiate between active (i.e. “approved”) versus passive (i.e. “accepted”) acceptance.

**Type 3** That information and documentation which is provided to NASA for surveillance, information, review, and/or management control. This information does not require NASA’s approval prior to its release in EDMS and will be released in EDMS upon delivery. Information in this category would include documents such as design solutions, status, and cost/schedule reporting; analyses and test results, handbooks, and other designated lists, reports, etc.

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

## **5.0 ELECTRONIC FORMAT**

DRs shall be maintained electronically in a format specified within the DRD.

## **6.0 EDMS WORKFLOW PROCESS**

As specified in earlier sections, the contractor shall deliver a DR to NASA electronically using the EDMS workflow. Approval of DRs is based on the prescribed data type, which is discussed in Section 4.0. A DR will follow a workflow process once it is delivered into EDMS where it may either be approved or “reworked”. If NASA approves a DR, the contractor will get notification via e-mail that the DR has been approved. If the DR is rejected, NASA will provide comments to the contractor through the “rework” process detailing why it has not been approved. The contractor has 30 work days from the date the DR was rejected to disposition NASA comments and resubmit the DR electronically into EDMS. The DR will then be either approved or sent back again to the contractor via the “rework” process. There is not a limit on how many times a DR can go through the “rework” process before it is finally approved.

## **7.0 STATEMENT OF WORK DATA DELIVERIES**

Data required in accordance with a SOW statement which does not have a DR reference will be delivered to NASA electronically using the EDMS workflow, indicating the applicable SOW paragraph. This information does not require NASA's approval prior to its release in EDMS and will be released in EDMS upon delivery.

## **8.0 NUMBER OF COPIES AND DISTRIBUTION REQUIREMENTS**

The contractor shall deliver one electronic copy of each DR into EDMS for NASA Data Management. With the implementation of EDMS, hard copies are no longer required by NASA Data Management. All other distribution requirements including number of copies for each DR (hard and soft) are specified within the DRD. Additional distribution shall be made as directed by the Contracting Officer. The number of hard copies required will not exceed the limits set forth in Clause H-2, Printing and Duplicating, without prior Contracting Officer approval.

## **9.0 SUBMISSION INFORMATION**

In the DRDs under "First Submission Date," or "Frequency of Submission," if delivery is specified as "at SRR" or at any other program event, then delivery shall be required at the start or initialization of the event. Similarly when delivery is specified as a discrete amount of time before a program or project event (i.e., SRR minus 60 days) then delivery will be required that discrete amount of time before the start of the program or project event. In addition, whenever delivery is specified as after an event, (i.e., SRR plus 30 days) delivery shall be required after the end of the event.

## **10.0 CLOSEOUT OF DRD REQUIREMENTS**

Closeout of DRD requirements shall be as addressed in the approved SOW Evidence of Completion Matrix (DRD F-PM-09). For circumstances where the approved DRD F-PM-09 does not adequately cover closeout of a DRD requirement, closeout shall occur through written concurrence by the NASA COTR or Contracting Officer.

## **11.0 DRD TABLE OF CONTENTS AND DRDs**

The following pages set out the documentation requirements of this contract, starting with a Table of Contents for the DRDs contained within Attachment J-4. Each DRD includes the required data product content, schedule, type, and other information applicable to specific data submission requirements.

DRD	DATA TYPE	DRD TITLE	SOW PARAGRAPH	REVISED BY
OP03		Deleted		1660
PC05	3	Merged with F-VE-09	2.5.3.2.a	1660
PC06	3	Integrated Program Schedules	1.2.5.1	1660
PC08	3	Acceptance Data Package	7.4.1	1660
PC18	3	Modification Package Acceptance Data Package	7.4.2	1660
PC19	3	Time Compliance Technical Instructions for Modification Packages	7.4.2	1660
PC20		Deleted		1660
PC22	1	Integration and Operations Management Products	H.37	1660
PC24		Deleted		1660
PC25	3	On-Orbit Installation Drawings	3.3.2.8.1 3.3.2.8.2	1660
PC27	3	Contractor Financial Management Report (533M)	1.2.3.1	1660
SE02	2	Integrated Flight Loads (IFLs) and Software Package	3.3.7.3.1 3.3.7.2.3 3.3.7.2.4	1660
SM02		Deleted		1660
SM03	3	Mishap and Investigation Reports	3.8.1.4	1660
<b>SM04</b>		<b>Merged with F-SA-05</b>		1327
<b>SM05</b>		<b>Merged with F-SA-06</b>		1327
SW01		Deleted		1660
VE06		Deleted		1660
VE09	2	Materials Identification and Usage Lists (MIUL)	3.4.6.1	1660
VE10	1	Materials Usage Agreements (MUAs)	3.4.6.1	1660
VE12		Deleted		1660
VE15		Deleted		1660
VE20	2	Integration and Verification Requirements for U.S. Segments & ISS System	3.2.1.11.3	1660
VE23	2	ISS System and Vehicle Subsystems Analyses and Analytical Models	3.2.1.11.3	1660
VE24	3	Specification Traceability and Compliance Reports	3.2.1.11.3	1660
VE28	2	Integrated Signal Lists (ISL)	3.3.7.2.5	1660
VE32	2 and 3	Vehicle Engineering Data	3.3.2.9.2 3.3.4.1.1	1660
VE42		Deleted		1660
F-CM-01	1	Configuration Management Plan	1.3.1.1	1356
F-EC-01	2	Export Control Audit Results	1.5.2	1356
F-LM-01	3	ISS On-Orbit Logistics Supportability Assessment Report	3.3.8.2.2 3.3.8.2.5	1660
F-LM-02	3	ISS ORU Ground Supportability Assessment Report	3.3.8.2.2	1660
F-LM-03	1	Increment Definition and Requirements Document (IDRD) Annex 2, On-Orbit Maintenance Plan	3.3.8.2.3	1430
F-LM-04	3	Parts Obsolescence Monitoring	3.3.8.5.3	1356
F-MA-12	3	Certification of Flight Readiness (CoFR)	3.2.1.6	1333
F-MI-01	2	Certification of Flight Readiness (CoFR) Plan	3.2.1.6	1231
F-MI-02		Deleted		1547
F-MI-03		Deleted		1547

F-MI-05		Deleted		1547
F-MI-06		Deleted		1547
F-MI-07		Deleted		1547
F-MI-08		Deleted		1547
F-MI-09		Deleted		1547
F-MI-11		Deleted		1962
F-MI-12	1	Payload Unique Integration Agreements	8.2.1.9	1333
F-PA-02		Deleted		1547
F-PA-03		Deleted		1547
F-PA-04		Deleted		1547
F-PA-06		Deleted		1547
F-PA-07		Deleted		1547
F-PA-08		Deleted		1547
F-PA-09		Deleted		1547
F-PA-10		Deleted		1547
F-PA-14	3	Element Level and Truss Level Payload Engineering Analysis Reports	8.3.3.3	1333
F-PA-15	3	ISS Level Payload Engineering Integration Reports	8.3.3.4	1333
F-PA-16	1	Payload Unique Hardware Interface Control Documents	8.2.1.23	1430
F-PA-17	1	Unique Payload Software Interface Control Documents	8.4.1.2	1333
F-PA-19	3	Payload Operations Guidelines and Constraints Document	8.3.3.5	1333
F-PA-20	3	Verification Reports	8.3.2.5	1333
F-PA-21	3	Configuration Layout/Interface Schematics	8.3.3.8, 8.3.3.9	1333
F-PA-25		Deleted		1547
F-PA-27	3	Increment Capability Reports	8.3.3.6	1333
F-PC-03	3	Workforce Reports	1.2.3.3	1619
F-PC-04	1	Work Breakdown Structure (WBS) and Dictionary	1.2.3.4	1619
F-PC-06		Deleted		1660
F-PM-01	1	Management Plan	1.1.1.1	1356
F-PM-02	3	Integrated Financial Review Products	1.1.1.2	1660
F-PM-03	2	Socio-Economic Subcontract Reporting	G.17	1356
F-PM-04	1	Subcontracting Plan	52.219-9	1356
F-PM-07	3	Data Accession List	H.43	1356
F-PM-08	3	Property Reporting with Element Pricing Methodology	H.52	1660
F-PM-09	1	SOW Evidence of Completion Matrix	H.37, H.51	1547
F-PM-10	3	Certification Baseline Documents and Supporting Documentation	3.2.2.3.4	1265
F-RA-01		Deleted		1547
F-RA-02		Deleted		1547
F-RA-03		Deleted		1547
F-RA-04	3	Payload MDM Configuration Files and PCS Displays	8.4.1.15	1333
F-RA-10	3	Payload Product Integrated List (PPIL)	8.4.1.5	1333
F-RA-11	1	Payload Unique Displays Software Requirements Specifications	8.4.1.4	1547

F-RM-03		Deleted		1547
F-SA-01	1	Safety & Mission Assurance/Risk Management Plan	3.8.1.1, 3.8.6.1	1356
F-SA-02	3	Monthly Safety & Health Metrics	3.8.1.4	1356
F-SA-03		Deleted		1660
F-SA-04	2	Hazard Reports	3.8.4.1 3.8.4.2	1660
F-SA-05	1	Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)	2.7.1.a.3 3. 8.5.1	1660
F-SA-06	3	R&M Allocations, Assessment, and Analyses Reports	2.7.1.a.3 2.7.1.a.4 3.8.5.2.1 3.8.5.2, 3.8.5.2.2	1356
F-SE-31	3	Engineering Integration Reports	8.3.3.1, 8.3.3.5, 8.3.3.10	1333
F-SE-44		Deleted		1547
F-SE-46		Deleted		1547
F-SE-47		Deleted		1547
F-SE-49		Deleted		1547
F-SE-50		Deleted		1547
F-SE-57		Deleted		1547
F-SV-03	2	Traceability Verification Requirements	8.5.3.1	1333
F-SW-01	2	Data Integration Standards	3.3.7.2.5	1356
F-SW-02		Deleted		1547
F-SW-03	2	Integrated Software Schedule	3.3.7.11.2	1231
F-SW-05	2	Flight Software Operations Handbook (FSOH)	3.3.7.13	1660
F-SW-12	3	Payload Integrated Flight Load (PIFL) Version Description Drawing	8.5.1.1	1333
F-SW-15	3	EXPRESS Configuration Files	8.4.1.15	1333
F-UT-32	3	PSIVF Flight Products Verification Documents	8.4.1.17	1333
F-UT-39	3	Software Version Description Document (VDD), Software and Data Item Package		1333
F-VE-02	3	Engineering CAD Models	3.3.2.7.1, 3.3.2.7.2	1231
F-VE-03	3	Abstracts for CAD, Thermal, and Structural Models	4.12	1246
F-VE-09	3	Sustaining Engineering Drawings, Mod Kit Drawings and Associated Lists	3.3.2.9.1, 3.3.4.1.2.2	1660
F-VE-13	3	Data Conversion and Interface for GFE/IP Drawings to the VMDB	3.3.4.1.3	1231
F-VE-14	3	Launch Configuration Drawings	3.3.2.9.3	1660
F-VE-15	3	ISS COFR Validation Matrix	3.2.1.11.3.4	1660
F-SSPTS-01		Deleted		1660
F-SSPTS-02		Deleted		1660
F-SSPTS-03		Deleted		1660
F-SSPTS-04		Deleted		1660
F-SSPTS-05		Deleted		1660
F-SSPTS-06		Deleted		1660
F-SSPTS-07		Deleted		1660
F-SSPTS-08		Deleted		1660
F-SSPTS-09		Deleted		1660
F-SSPTS-10		Deleted		1660

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Integrated Program Schedules	<b>2. Date of Current Version</b>  10/01/10	<b>3a. DRD No.</b>  PC06	<b>3b. RFP/Contract No.</b>  NAS 15-10000
<b>1b. Data Type:</b> 3			<b>5. DRD Category</b> <input type="checkbox"/> Technical <input checked="" type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data)  Provide and maintain a consistent and standardized schedule development and status for the International Space Station Program Office			
<b>6. References</b> SOW paragraph : 1.2.5; WBS paragraph 1.2.5		<b>7. Interrelationships</b> (e.g., with other DRDs) PC-27, F-PM-02	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:**

This data requirement is to describe the format and type of data needed for the program integrated schedule. The intent is for the Contractor to continue established standard processes, data structures and reporting conventions to plan, manage, and report the assigned work for the Schedule Coordination Managers and the Space Station Program Office. The resource loaded schedules in this DRD should reconcile with the data reported in DRDs PC-27 and F-PM-02 for authorized work.

**CONTENT:**

- a. The contractor shall provide schedules that specify plans for International Space Station spares and modification tasks (WBS 7.0 and 8.0). For projects greater than \$5M (regardless of fiscal year phasing) reporting is required from authority to proceed (ATP) through project completion. Resource loaded schedules shall be provided for the work within the contract period of performance. Schedules (resource loaded not required) for all activities shall also be provided for work falling outside the period of performance (per contract clause H.57). For projects less than \$5M, vendor schedule data shall be provided once the project baseline is established (status of project milestones will be reported in F-PM-02 from ATP through completion). The contractor is encouraged to utilize modern manufacturing resource planning, industrial engineering techniques and other approaches to ensure schedule stability, accuracy, reliability, predictability, and achievability.
- b. The contractor shall develop, maintain (update), provide and ensure a consistent, accurate, and stable scheduling approach that provides for the identification, coordination, sequencing, control, implementation and tracking of all utilization activities and is easily auditable by the Government.
- c. The approach shall provide the ability to fully identify, analyze, mitigate and control scheduling risks and impacts and allow its users to easily measure the progress towards achieving the intended plan.
- d. For all work required to complete the project, the approach shall not only represent the scheduled work for that activity, but also the commitment from all interfacing organizations.
- e. Provide monthly electronic status and updates.

- f. Provide a Microsoft Project schedule that will represent full detail of project tasks and vendor/subcontractor schedules. Each activity must, at a minimum, contain the following information:
- Unique, fixed Activity ID (Cannot exceed 12 digits)
  - Boeing WBS
  - Activity Title
  - Level Project/SSCN Identification
  - Baseline Start and Finish dates which support latest approved baseline for authorized work and preliminary start and finish dates for work outside the period of performance (H.57 clause).
  - Actual Start and Finish dates
  - Original Duration
  - Percent complete
  - Predecessors (including Type and Lag), if any are assigned
  - Successors (including type and Lag), if any are assigned
  - Total Budget for authorized work.
  - Budget associated with work performed for authorized work.
  - Flight Number
- g. *Schedule consistency* shall be defined as the degree to which the contractor utilized standardized scheduling approaches between similar processing activities and flows. *Accurate scheduling* shall be defined as the accurate representation of work content and tasks duration (predicted vs. actuals). A *stable schedule* shall refer to the degree to which daily schedule changes are minimized and limited to unforeseen hardware/software problems or NASA-directed changes.
- h. Scheduling approaches shall address the following information as a minimum
1. Predicted task duration/labor standards derived from accurate and objective prediction methodologies
  2. Indications of activities by appropriate nomenclature that clearly delineates the task to be performed
  3. Identification of who is responsible for doing the actual work - OBS
  4. Required supporting activities or support from other contractors, outside organizations, agencies, or center.
  5. Special test activities or requirements.

**FORMAT:** electronic

**9. OPR:** OH – ISS Program Planning and Control Office/Assessments, Cost Estimates and Schedules

**10. FIRST SUBMISSION DATE:** First month after contract start, on the first Monday of the month.

**Frequency of Submission:** Monthly, containing status through the last Thursday of the previous month

**Additional Submissions:** N/A

**11. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)

**12. REMARKS:**

## DATA REQUIREMENTS DESCRIPTION

1. DR Title: PC08, Acceptance Data Package
2. DRD Extension Number(s): None
3. TPR Code: DM IPT
4. Data Type: 3
5. Frequency of Submission: Required with each delivery of hardware or software from a manufacturer/developer to a using site or deliveries between using sites.
6. First Submission Date: Submitted with initial shipment/transfer of hardware item or software delivery.
7. As-of-Date: N/A
8. Copies and Distribution: 1 copy distributed to each of the following:
  - (a) Team of Primary Responsibility (TPR)
  - (b) OH/Data Management
  - (c) Program-authorized electronic repository (EDMS or equivalent)
9. Remarks: NONE
10. Use: Provide baseline documentation defining the CIs/CSCIs.
11. References:
  - (a) Statement of Work (SOW); paragraphs 7.4.1
  - (b) SSP 30695, Acceptance Data Package
12. Interrelationships: DR VE32
13. Preparation Information:
  - 13.1 Scope: The ADP is an accumulation of documentation that provides a verified, complete, and current status of deliverable hardware and/or software needed by the procuring/using organization to enable the continuation of required activities.
  - 13.2 Format: The ADP shall be delivered in the Contractor's format in accordance with SSP 30695.

- 13.3 Content: The ADP contents shall be in accordance with SSP 30695. The Integrated Flight Load Software and Ground Reconfiguration data item package shall include installation instructions, any possible or known problems with the software release and problem resolutions (operational workarounds), user documentation, and significant test results. Integrated Flight Load Software and Ground Reconfiguration data item package production tools (including those of the software build environment) are included with the document delivery.
- 13.4 Maintenance: N/A

## DATA REQUIREMENTS DESCRIPTION

1. DR Title: PC18, Modification Package Acceptance Data Package
2. DRD Extension Number(s): None
3. TPR Code: DM
4. Data Type: 3
5. Frequency of Submission: A stand alone Modification Package (here after referred to as a Mod Kit) ADP is required to be delivered to NASA, concurrent with the DD250 to support the delivery of each hardware Mod Kit from the manufacturer/developer, as ordered under this contract via separate Class I changes.
6. First Submission Date: Submitted with delivery to NASA of the applicable hardware Mod Kit, as ordered under this contract by the addition of a Mod Kit to the Contract Deliverable Items List (DIL), via separate Class I changes.
7. As-of-Date: N/A
8. Copies and Distribution: 1 copy distributed to each of the following:
  - (a) Team of Primary Responsibility (TPR)
  - (b) OH/Data Management
  - (c) Program-authorized electronic repository (EDMS or equivalent)
9. Remarks: The ADP shall describe the contents of the Mod Kit that is used to update/revise/modify/retrofit a particular serial numbered item of a CEI/CI which has been delivered to NASA (Post DD250).  
  
Both the Mod Kit and the baseline documentation requirements shall be as per SSP 41170. The content of the Mod Kit ADP shall be as per SSP 30695. The Mod Kit ADP shall be a supplement to the ADP of the originally delivered CEI/CI that is being updated by the Mod Kit.
10. Use: Provide the detailed description of the applicable hardware Mod Kit and the update of the baseline documentation defining the applicable modified CI.
11. References:
  - (a) SSP 30695, ISS Acceptance Data Package Requirements Specification
  - (b) SSP 41170, ISS CM Requirements Document
  - (c) SOW 7.4.2
12. Interrelationships: DRs PC19
13. Preparation Information:

- 13.1 Scope: The Mod Kit ADP represents an accumulation of documentation that provides a verified, complete, and current status of deliverable hardware needed by the procuring/using organization to enable the continuation of required activities.
- 13.2 Format: The Mod Kit ADP is a supplement to the ADP of the originally delivered CEI/CI that is being updated by the Mod Kit and shall be delivered in the Contractor's format in accordance with SSP 30695.
- 13.3 Content: The Mod Kit ADP contents shall be in accordance with SSP 30695.
- 13.4 Maintenance: N/A

## DATA REQUIREMENTS DESCRIPTION

1. DR Title: PC19 Time Compliance Technical Instructions (TCTIs) for Modification Packages
2. DRD Extension Number(s): None
3. TPR Code: DM
4. Data Type: 3
5. Frequency of Submission: A TCTI is required to be delivered to NASA as a part of the Modification Package (here after referred to as a Mod Kit) for each delivery of a hardware Mod Kit from the manufacturer/developer, as ordered under this contract via separate Class I changes.
6. First Submission Date: Submitted with delivery to NASA of the applicable hardware Mod Kit, as ordered under this contract by the addition of a Mod Kit to the Contract Deliverable Items List (DIL), via separate Class I changes.
7. As-of-Date: N/A
8. Copies and Distribution: 1 copy distributed to each of the following:
  - (a) Team of Primary Responsibility (TPR)
  - (b) OH/Data Management
  - (c) Program-authorized electronic repository (EDMS or equivalent)
  - (d) Included in the applicable Mod Kit
9. Remarks: The ISSP Time Compliance Technical Instruction (TCTI) shall be written in one of two styles "Detail" and "Record". The difference is (a) whether the TCTI and the Mod Kit have to be checked out on the ground prior to delivery of the TCTI/Mod Kit and (b) where/who is installing the Mod Kit. Specific requirements are provided in SSP 41170, paragraph 3.4.8 and subparagraphs.

Detail TCTIs provide complete, step-by-step instructions for incorporating a modification. Detail TCTIs are issued when (a) a modification is to be accomplished on flight hardware post DD250/postlaunch and requires installation of the Mod Kit by the on-orbit ISS Crew by either Intra-Vehicular Activity (IVA) or Extra-Vehicular Activity (EVA), or (b) a modification is to be accomplished on the ground and requires installation by anyone other than the Design Center/OEM, or by KSC/Depot Technicians.

Record TCTIs do not contain detailed installation instructions, but do contain all other information included in Detail TCTIs. Record TCTIs list the engineering data required to perform the work if the data is not included as a package in the kit. Record TCTIs may be issued when a modification is to be accomplished by a Contractor or by NASA personnel at KSC on flight hardware after DD250 but prior to launch, or for Non-Flight hardware modifications. However, NASA may direct the issuance of a Detail TCTI regardless of the level of accomplishment which shall be documented in the Class I change that directs the development of the Mod Kit and its attendant TCTI.

An Installation Notification Card (INC) shall be prepared in accordance with the requirements of reference (a) and included with the TCTI that is delivered in the Mod Kit. An INC shall be prepared for each Mod Kit that is every serial numbered CI having a Mod Kit installed shall have its own INC completed to document installation of the Mod Kit. Guidance on TCTIs/INCs is provided by references (b) and (c).

10. Use: The TCTI shall be used for accomplishing and providing a record of any modification/retrofit of delivered hardware, or alteration, to the design or construction of any delivered System and related equipment, site, facility, support system or associated GSE that has been delivered to NASA via DD250.
11. References:
  - (a) SSP 41170, ISS CM Requirements Document
  - (b) SSP 50123, ISS CM Handbook
  - (c) D684-10749-01, ISS Product Support Group TCTI Mod Kit Procedures
  - (d) SOW 7.4.2
12. Interrelationships: DRs PC18
13. Preparation Information:
  - 13.1 Scope: The TCTI is applicable to the modification/retrofit of hardware which has been delivered to NASA via a DD250 accomplished via a Mod Kit.
  - 13.2 Format: The TCTI shall be prepared in accordance with program requirements.
  - 13.3 Content: The TCTI contents shall be in accordance with the requirements. TCTI requirements are included in paragraph 3.4.8 and subparagraphs of reference (a). Guidance on how TCTIs are completed, content of the TCTIs, format of the TCTIs, and how TCTIs are processed is provided by references (b) and (c).
  - 13.4 Maintenance: N/A

### DATA REQUIREMENTS DESCRIPTION

1. DR Title: PC22, Integration & Operations (I&O) Management Products
2. DRD Extension Number(s): None
3. TPR Code: Business Management/BG
4. Data Type: 1
5. Frequency of Submission: Initial Baseline: 90 days after contract award  
  
Yearly Work Plan for January 1 – September 30, 2004: 30 days after contract award.  
  
Yearly Work Plan: September 1<sup>st</sup> of each year except 2008 October 1, 2008 for GFY 2009  
  
Quarterly Work Plan Update: January 31, April 30, and July 31.
6. First Submission Date: Initial Baseline: March 30, 2004  
  
Yearly Work Plan for January 1 – September 30, 2004: January 30, 2004.  
  
Yearly Work Plan: September 1, 2004  
  
Yearly Work Plan Reconciliation: December 1, 2004
7. As-of-Date: N/A
8. Copies and Distribution: 1 copy distributed to each of the following:
  - (a) BG/Contracting Officer
  - (b) LO/Space Station Resources Office
  - (c) OA/COTR
  - (d) Data Management, OH
  - (e) Program-authorized electronic repository (EDMS or equivalent)
9. Remarks: NONE
10. Use: These products will be utilized by Government and contractor personnel to manage the I&O baseline for the contract
11. References: Section H, Special Contract Requirements, H.37 Management of I&O Tasks
12. Interrelationships: I&O Reporting; DR PC27; NASA Form 533

13. Preparation Information:

13.1 Scope:

Initial Baseline: The contractor shall provide a baseline, which documents the negotiated contract value of all I&O tasks throughout the entire period of performance including options through September 30, 2008. The contractor shall provide the negotiated contract value of all I&O tasks at the 3<sup>rd</sup> level WBS for October 1, 2008 through September 30, 2009 by October 15, 2008. The contractor shall provide the negotiated contract value of all I&O tasks at the 3<sup>rd</sup> level WBS for October 1, 2009 through September 30, 2010 by August 15, 2009.

Yearly Work Plan: The plan will be comprised of work packages, which document the content and estimated resources/cost for I&O (the I&O Baseline and forecast) which will be performed in the subsequent fiscal year. For GFY 2009 forward, this will include the time-phased budget and forecast for Sustaining Engineering tasks\* only. Work packages will be jointly developed by the Government and the Contractor and approved by the Government. \*For GFY 2009 and 2010, Sustaining Engineering tasks are defined as all tasks in SOW sections 1.0, 2.0, 3.0 and 8.0 or discrete tasks in SOW section 6.0 that are considered sustaining engineering (vs. a modification). For GFY 2011 and subsequent years, sustaining engineering tasks are defined as all tasks in SOW sections 1.0, 3.0 and 8.0 or discrete tasks in SOW section 6.0 that are considered sustaining engineering (vs. a modification).

13.2 Format: NASA and contractor agreed to format.

13.3 Content:

For the purposes of this DRD, the Work Plan is defined as the summary of all work packages under the contract (for GFY 2009 forward, this will include Sustaining Engineering tasks\* only). Work packages represent a subset of tasks within the work plan.

For each work package include:

- (a) Identifiers – Reference WBS, SOW paragraph number, task title, and team or subteam designation
- (b) Schedules – related to work included in task descriptions.
- (c) Task Descriptions include:
  - (i) Description of the work to be accomplished and how it will be accomplished
  - (ii) Parameters for performance describing limitations of performance scope,
  - (iii) Tangible outputs generated by performance (at a minimum DRD and DIL products should be specified where appropriate)
- (d) Resource requirements – monthly spread of resources, including totals at the work package level
- (e) Reference to tasks required by the Evidence of Completion Matrix (DRD F-PM-09).
- (f) Metrics. For GFY 2009 forward, include the task performance metrics showing progress towards satisfying the completion criteria in the F-PM-09.

Initial Baseline: The initial baseline shall consist of task descriptions, schedule, and resources by contractor team. A summary section shall be provided which documents the resources by lowest level reportable WBS, by each major SOW section (1.0, 2.0, 3.0 and 4.0), by major task and the total I&O level. Resources will include all direct cost elements, other direct costs and indirect costs. The initial baseline for FY 2009 and 2010 shall consist of distributed budget by 3<sup>rd</sup> level WBS.

Yearly Work Plan: The Work Plan shall consist of a compilation of I&O Baseline/forecast Work Packages from designated program functional areas. Each of these Work Packages shall identify the tasks, schedule, resources, basis for resources, and signature block for contractor and government technical managers.

- 13.4 Maintenance: All deliverables shall be maintained electronically. Government approved adjustments to individual Work Packages as a result of added or deleted or modified tasks shall be maintained in the electronic file. The current Work Plan shall be available as a "read-only" file.

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

<p><b>1a. DRD Title:</b> On-Orbit Installation Drawings or Models</p> <p><b>1b. Data Type:</b> 3</p>	<p><b>2. Date of Current Version</b></p> <p align="center">10//01/10</p>	<p><b>3a. DRD No.</b></p> <p align="center"><b>PC25</b></p>	<p><b>3b. RFP/Contract No.</b></p> <p align="center">NAS 15 -10000</p>
<p><b>4. Use:</b> Provide the design data used to install and assemble the ISS On-orbit. The drawings will be used for flight procedure development/validation, configuration status accounting, contingency planning, and real time mission support.</p>			<p><b>5. DRD Category</b></p> <p align="center"><b>X</b> Technical — Administrative — SR&amp;QA</p>
<p><b>6. References</b></p> <ul style="list-style-type: none"> <li>(a) Statement of Work (SOW); paragraph 3.3.2.8.1, 3.3.2.8.2</li> <li>(b) ASME Y14.100-2000, Engineering Drawing Practices</li> <li>(c) ASME Y14.35M-1997, Revisions of Engineering Drawings and Associated Documents</li> <li>(d) ASME Y14.24-1999, Types and Applications of Engineering Drawings</li> <li>(e) ASME Y14.41-2003, Digital Product Definition Data Practices</li> <li>(f) ASME Y14.34M-1996, Associated Lists</li> <li>(g) IEEE/ASTM SI 10-2002, SI 10, American National Standard for Use of the International System of Units (SI): The Modern Metric System</li> <li>(h) MIL-PRF-28002C-1997, Requirements for Raster Graphics Representation in Binary Format</li> <li>(i) SSP 50177 Part II, 3.5.2</li> <li>(j) SSP 50124 RA Sec 3.3.2</li> <li>(k) SSP 50126 Sec 3.3.1</li> <li>(l) SSP 50137 Sec</li> <li>(m) SSP 50127 RB Sec 3.3.2</li> <li>(n) SSP 50301 Sec 3.2.3</li> <li>(o) SSP 41173 Space Station Quality Assurance Report</li> <li>(p) SSP 30695 Acceptance Data Package Requirements Specification</li> </ul>		<p><b>7. Interrelationships</b></p> <p>F-VE-09, Sustaining Engineering Drawings and Associated Lists or Models VE32, Vehicle Engineering Data</p>	

**SCOPE:** This DR establishes the content, format, control, and maintenance of On-Orbit Installation Drawings or Models and associated Indentured Parts Lists or models prepared by the contractors or obtained from subcontractors or vendors for products of this contract. The contractor shall develop and deliver As-Designed On-Orbit Installation drawings or models for all equipment installed (& their connections) On-orbit to US End Items that requires NASA EVA, EVR, & IVA installation. This does not cover installation of items onto or within the IP End Items (except for items directly mated from USOS to IP End Items; i.e. FGB to PMA2 cables, MPLM to Node 1 cables). This includes internal and external installations, but not stowed items, contingency (unplanned) activities and tasks for incorporation of on-orbit changes, including Mod Kits. Those impacts are identified within the associated change. Contractor shall also develop and deliver stage drawing trees for each of these flights.

These drawings or models shall cover at least the following type of assembly activities (in sufficient detail to depict the installation):

- a) element to element berthing
- b) hardware installation (e.g. ORUs, brackets, handrails, thermal blankets)
- c) hardware detachment
- d) relocation of installed equipment
- e) hardware deployment
- f) electrical cable harness and fluid line routing & mating
- g) torque values including temperature effects, in table form with values at minimum, nominal and maximum expected on-orbit installation temperature conditions (EVA only)
- h) equipment preconditioning for an installation (e.g. lubrication application, thermal conditioning, switch positions)
- i) software loading (by reference)

Installation drawings or models, and parts lists shall include sufficient detail to accomplish safe and expedient installation by including the following on the actual drawing or model, and parts list:

- 1) Identify critical cautions and warnings, such as over tightening may damage fine threads, or deactivating fans for duct installation
- 2) Identify special tools required for installation/removal
- 3) Identify any required special surface preparation, such as lubricant or alcohol cleaning
- 4) Identify special handling requirements or techniques, such as gloves or handling of O-rings, etc.
- 5) Identify special idiosyncrasies, such as extra force or that a cap may “pop off” if not installed properly
- 6) Identify requirements for proper clocking or orientation of the hardware during installation
- 7) Identify any special torque requirements, such as temperature dependency for CBM bolts, or torque values or number of turns or turn rate limits (RPMs) for various clamps and fasteners
- 8) Identify special attachment methods such as tie downs or Velcro
- 9) Identify special configurations required, such as valve or handle configurations of MPEV, PPRV, etc., when installing access jumpers

- 10) Include part numbers and reference designators for all major components of the assembly to include wire harnesses, electrical connectors and attaching hardware (nuts, bolts, screws, etc.) related to the assembly task
- 11) Include a depiction of adjacent hardware, which may affect access for installation of electrical connectors, bolts, nuts, latches, QDs, and other fluid connections.

**CONTENT:** Raster images: Raster images are to be Group 4 raster images, prepared per MIL-PRF-28002C and applicable documents. The format and quality verification requirements for Raster images of engineering drawings and related documents shall be in conformance with MIL-PRF-28002C, section 6.4.5 (Ordering data). Ordering data to be used for the interchange of engineering drawing and associated document images are as follows:

- a. The basic requirements for interchange of Raster image of engineering drawings and related documents shall be in accordance with Military Specification MIL-PRF-28002C, Requirements for Raster Graphics Representation in Binary Format,
- b. The type of raster graphics being procured is Type 1 (untiled).
- c. The delivery medium to be used shall be either by magnetic or an electronic transmission.
- d. Proper viewing orientation shall be based on a pel path direction of 0 degrees and a line progression direction of 270 degrees, as defined in section 6.4.6, and shown in Figures 1 and 2 of MIL-PRF-28002C.
- e. Raster image pixel element (pel) spacing shall be a minimum of 200 dots per inch (dpi).
- f. No over scanning is required beyond the drawing sizes listed in section 6.4.2; however, over scanning is encouraged to capture ancillary information that is placed outside the border, such as CAD file name or plot date.
- g. Bit ordering shall be most significant bit (MSB) to least signification bit (LBS).
- h. Coding of background and foreground information. To the extent that a drawing represents lines on paper, the picture elements (pels) representing lines shall be coded as "black" and those pels representing the paper background shall be coded as "white". This coding convention shall hold, regardless of the colors used for display on any particular device, and regardless of the coding as "0" or "1" on any particular system. In this way, white pels (paper) may be processed as background, and black pels (lines) may be processed as foreground.

NOTE: The preceding definition of the convention for coding background and foreground has been provided because a choice of convention has not been defined in MIL-PRF-28002C or CCITT Recommendation T.6. This convention is needed to support processing of drawing images without human interpretation.

Stage Drawing Tree content shall be contractor defined and is not subject to the above content requirements.

**FORMAT:** Delivery to NASA of drawings or models and associated lists will be made electronically. All drawings or models and associated lists, except for "A" size book form drawings, shall be delivered bundled into .zip or .tar files. "A" size book form drawings may be delivered in an electronic format other than raster image as mutually agreed to by the NASA and Contractor organizations involved in the interchange. Models shall be delivered in PDF format. Drawings and associated lists shall be delivered in PDF, ASCII, HPGL MS Excel or Raster Image format provided the following criteria are met:

- (a) Engineering flight drawings shall be in accordance with the intent of ASME Y14.100-2000. Models shall be in accordance with the intent of ASME Y14.41-2003.
- (b) All design activities shall use the methods designated in IEEE/ASTM SI 10-2002 to convert dimensional units from one system (SI or English) to another, where required for interfaces with IPs.
- (c) All design activities shall use the U.S. convention on third-angle projection in depicting views on drawings. A model coordinate system shall be depicted by three mutually perpendicular line segments with its origin located at the intersection of the three axes.
- (d) Where design activity material or process specification numbers are called out, the equivalent Government or industry specification numbers shall accompany them wherever a Government or industry specification is applicable.
- (e) Engineering parts list, bill of materials, and note format shall be consistent with ASME Y14.100 and delivered in ASCII format, Raster Image or MS Excel format with each drawing.
- (f) Electronic formats shall provide for magnetic, optical media, or electronic transmission exchanges.

Delivery of drawings or models and associated list files will be electronic. The file formats and structures of drawing or model delivery packages are defined in F-VE-09.

Drawing deliveries will be in one of the following: Raster image format, PDF or HPGL file. Model deliveries will be in PDF.

Other associated lists shall be delivered in one of the following: ASCII text files, PDF, MS Excel format, or Raster image format.

Stage Drawing Trees shall be delivered electronically in Contractor format not subject to the above format and drawing requirements.

8. **OPR:** OM5, Assembly and Configuration Team

9. **FIRST SUBMISSION DATE:**

**Frequency Of Submission:** One release/year. Drawings or models shall be delivered in electronic format to the VMDB.

**Additional Submissions:** After reconciliation and before the next stage, if the hardware is modified, procedure changed or the installation did not occur, then drawings or models will be revised and resubmitted to the VMDB.

11. **MAINTENANCE:** Changes and/or updating of drawings or models and associated lists shall be accomplished in accordance with the Contractor's engineering system and the provisions of the cited applicable documents through Sustaining Engineering for the as-built configuration. Drawings or models shall be maintained electronically. Changes and/or updating of Stage Drawing Trees shall be accomplished by Contractor defined process.

12. **COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** JSC Stage Configuration Website (Stage drawing Trees)

13. **REMARKS:** None

### DATA REQUIREMENTS DESCRIPTION

1. DR Title: PC27, Contractor Financial Management Report (533M)
2. DRD Extensions: None
3. Team of Primary Responsibility (TPR): Program Control (LO)
4. Data Type: 3
5. Frequency of Submission: Monthly
6. DRD Cancellation/Consolidation: This DRD replaces DRDs PC09, PC10, PC11, PC21, and PC23, in their entirety, into one monthly Financial Management report. Consolidated reporting begins with GFY 02 actual data (October 2001).
7. Due Date: Report is due the 15<sup>th</sup> operating day following the close of the Contractor's accounting system for the reported month end data. If the 15<sup>th</sup> operating day falls after the 24<sup>th</sup> calendar day, the report is due the 24<sup>th</sup> calendar day. Variance explanations are due seven calendar days from delivery of the PC27. Instructions are provided in paragraphs 11 and 12.

Due dates reflect the dates the report is received by the TPR and the Cost Accounting Branch/LF6; not the dates the report is generated or mailed by the contractor. It is critical that the NF533M reports are submitted in a timely manner to ensure adequate time for NASA to analyze and record the cost into the NASA accounting system.

8. Distribution:

	Recipient	PC27 Cost Report	Comments
a	LO/Team of Primary Responsibility (TPR)	3 copies	Hand Deliver to Bldg 4S, Rm 3814D
b	LF6/Cost Accounting Branch	1 copy	Hand Deliver to Bldg 12, Rm 118
c	OH/Data Management	1 copy	Hand Deliver
d	Program Repository (EDMS)	1 copy	Electronic copy
e	NASA HQ/Suite 7K39/J. Davis	1 copy	Mail
f	JSC/OA/Lorraine Anderson	1 copy	Mail
g	BG/Contracting Officer	1 copy	Electronic copy

9. USE: The NASA Form 533 (NF533M) 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.

## 10. Preparation and Content Information:

### 10.1 General 533M Reporting Instructions.

The contractor shall submit the agreed to modified NASA Form 533M prepared in accordance with instructions contained in NASA Contractor Financial Management Reporting, NASA Procedures and Guidelines (NPG) 9501.2D, or its most current revision, which 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. The 533M is the official control document for actuals expended to date and all other resource management reports will reconcile to the current actuals to date.

Cost shall be identified and recorded in the period of time when the benefit is received or incurred without regard to the date of payment. The data provided shall reconcile with DRD F-PM-02 and DRD F-PC-06. Monthly forecast costs shall reflect the most current and reliable data recognized by both Boeing technical community and finance personnel. 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.

Examples of accrual accounting for common cost elements reported on the NASA Form 533M follow:

Labor: Reported to NASA as hours are incurred.

Equipment and Materials (commercial off the shelf): generally reported to NASA when received and accepted by the contractor. 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.

Manufactured Equipment: Reported to NASA as costs are incurred.

Travel: Reported to NASA as costs are incurred.

Subcontracts: Actual and estimated costs reported by contractors shall include subcontractors' incurred costs for the same accounting period. Major subcontractor as identified in PC27 G, costs will be separately identified on NF533M reports. The 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 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 contractor's NF533M to enable the contractor to properly report to NASA. For Firm Fixed Price subcontracts with a contract value greater than \$500,000, the contractor is required to document the methodology used to generate the subcontractor costs reported and provide this information to the Contracting Officer and Center Deputy Chief Financial Officer (Finance). EPs are a financial measurement of resources used in accomplishing a specified purpose, such as performing a service or carrying out an activity as related to a specific skill.

Unfilled Orders: Reported as the difference between the cumulative cost incurred to date and amounts obligated to suppliers and subcontractors.

Fee: Fee shall 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 NF533M following the "Total Cost" line. Fee shall be reported by the following categories: Fixed Fee, Maximum Award Fee, FY 2000 Forward Technical Performance Award Fee, FY 2000 Forward Cost Performance Award Fee, FY2004 Forward Performance Fee, Base Fee, Authorized/Unfinalized Change, Total Award Fee, Fixed Fee (Provisions I/F), Schedule III Performance Fee, and Total Fee.

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 NF533M below the cumulative cost amounts for the contract, if applicable.

The NF533M 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 NF533M must be reconcilable to the NF533M.

Prior period cost adjustments should be reported in the current month actual (column D) and CTD actual (column E). Provide reasons/amounts for the adjustments in the Executive Summary.

For contracts that have multiple schedules, a summary NF533M is required to provide a cumulative from inception cost for the contract, regardless of schedule. 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.

#### 10.2 Specific Format Reporting Instructions.

PC27 A - Total Contract Summary – top level summary of all contract cost elements, EPs and hours;

PC27 B - Summary of all contract cost elements, Boeing direct and major subcontractor EPs and Boeing hours by category of work, i.e., 1st level of the WBS (DDT&E, I&O, OPD, Modifications and Spares);

PC27 C - Specific Contract Summary – Summary of all contract cost elements, Boeing EPs and hours at the 2nd level of the WBS by category of work (OPD, spares, modifications, and I&O). For DDT&E, the requirement is to report cost elements, Boeing EPs and hours at the 3rd level of the WBS;

PC27 D - Specific Detail:

1. Cost, Boeing direct and major subcontractor EPs and Boeing direct hours for DDT&E at the 4th level and a summary roll up of cost and EPs at the total DDT&E level;
2. Cost and Boeing direct and major subcontractor EPs for I&O, spares, modifications and OPD at the 3<sup>rd</sup> level including the exceptions listed in the Appendix and a roll up of cost and EPs to the 2<sup>nd</sup> level and then totaled at the first level.

PC27 E – Provide specific detail for all Material Pool WBS's; 5.14.7.1.5-Repairs, 5.14.7.1.6-Transitions, 5.14.7.2.2-Commercial Bill of Lading (CBL), 5.14.7.2.3-Residual Assets and 5.14.7.2.4-Parts Procurement. Provide monthly costs per individual WBS including EPs and Total Dollars. Boeing shall also provide specific detail for the new Material Pool WBS's starting in FY2014; 5.14.6.1-Repairs, 5.14.6.2-Transitions, 5.14.6.3-CBL, 5.14.6.4-Residual Assets, 5.14.6.5-Parts Procurement. Provide monthly costs per individual WBS including EPs and Total Dollars. History under WBS 2.14.7.8 Material acquisition for Post Production Support (PPS) will also be included.

PC27 F - Specific Detail for WBS 3.20 and 7.0, Spares. Each major subcontractor as identified in PC27 G, will report dollars and EPs.

PC27 G - Major Subcontractor Summary by WBS. Top-level summary of total cost and EPs. Major subcontractors are those previously identified as major subcontractors from contract inception and provide a specific skill, excluding purchased labor and non-labor; or whose subcontract has an annual contract value of \$3M or greater and provide a specific skill, excluding purchased labor and non-labor.

11. Variance Explanation: All variance explanations are based on prior month's forecast for current month's report.
- 11.1 Executive Summary Narrative: The contractor shall provide a top-level variance report by the three categories of work (DDT&E, I&O, spares, modifications, and OPD) in a narrative section at the beginning of each submitted PC27. A variance explanation is required whenever a +/- 5% variance occurs between the monthly forecasted cost and the actual cost for that month for resolution of major outstanding financial issues. The computation is (Forecasted Monthly Cost – Monthly Actual Cost) / Monthly Forecasted Cost.
  - a. Any Prior Period Adjustment to previously reported actuals will require a thorough explanation and reconciliation.
  - b. All Formats and Sections of the 533 report must reconcile to the total Contract Summary page.
- 11.2 Detail Variance Report: The contractor shall provide a detailed variance explanation at the second level of the WBS whenever a +/-10% and +/- \$250,000.00 variance occurs between the current month's forecast and the actual cost for the month. The contractor shall provide a detailed variance explanation at the second level of the WBS whenever a +/-10% and +/-10 Boeing EP variance occurs between the current month's forecast and the actual EPs for the month. This explanation is due seven (7) calendar days from delivery of PC27. The variance explanation shall identify the lower level WBS contributing to the variance. In addition variance explanations need to detail what caused the variance (i.e., NASA change in direction, unexpected problem, discrepancy due to a change order). Also addressed will be any impact to delivery, schedule, other affected WBS's; and the contractor's plan for resolving the effect of the variance. The forecast plan needs to be adjusted to reflect a change in plan.
12. Statement of Work (SOW) Changes – The contractor will report (listing and amount) contract value changes as part of the contractor's Executive Summary for the month in which the changes occur.
13. Inter-relationships and Applicable Documents:
  - NPG 9501.2D or latest version, NASA Contractor Financial Management Reporting
  - NMI 9501.1, NASA Contractor Financial Management Reporting System
  - NFS 1852.242-73, NASA Contractor Financial Management Reporting
  - DR F-PM-02 (Integrated Management Review Products)
  - DR F-PC-06 (Cost, Schedule and Technical Report for Avionics and Software)
  - SOW 1.2.3.1
14. Maintenance: Contractor must provide a revised NF533M immediately to correct significant errors. The revised NF533M must be delivered prior to closure of the JSC accounting system for the month.

Monthly financial 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 financial reports as long as estimates for the following period are included. If the final cost of a contract changes after submission of the "final" contractor cost report, the contractor must submit a revised financial report in the month the cost change is recognized.

#### Appendix

#### **I&O—Exceptions to include along with all I&O at the 3<sup>rd</sup> level**

- 5.4.1.1 EME
- 5.4.1.2 EEE Parts
- 5.4.1.3 Environments
- 5.4.1.4 Materials
- 5.16.1.1 Requirements and Interfaces
- 5.16.1.2 Test and Verification Integration
- 5.16.1.3 Vehicle Integrated Performance & Resources
- 5.16.1.4 Vehicle Data Integration
- 5.16.1.5 Nonprime Integration
- 5.16.3.1 Project Office & Project Engineering
- 5.16.3.2 Proposal Preparation

#### **OPD—Exceptions to include along with all OPD at the 3<sup>rd</sup> level**

- 3.13.1.1 FSE/OSE
- 3.13.1.2 Storage
- 3.13.1.3 Carriers

#### **Modifications – Exceptions to include along with all Modifications at the 3<sup>rd</sup> level**

##### WBS 8.25.2 Docking System

- WBS 8.25.2.1 Common Docking Adapter
- WBS 8.25.2.2 Docking System Development
- WBS 8.25.2.3 Docking System Production

##### WBS 8.25.3 Docking Hub System

- WBS 8.25.3.1 Docking Hub
- WBS 8.25.3.2 DHS Launch Service
- WBS 8.25.3.3 DHS Orbital Transfer System

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Integrated Flight Loads (IFLs) and Software Package  <b>1b. Data Type: 2</b>	<b>2. Date of Current Version</b>  10/01/10	<b>3a. DRD No.</b>  SE02	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) Describes the contents of the software delivery package including the Integrated Flight Load (IFL) for users.			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) Contract F, Statement of Work (SOW) – paragraph 3.3.7.3.1, 3.3.7.2.3, 3.3.7.2.4		<b>7. Interrelationships</b> (e.g., with other DRDs) DRD F-SW-03	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** Includes the delivery of sustaining engineering software applications, patches, PPLs and IFLs and their associated software products including VDDs, PDDs, RDFs, CDDs, and delta ADPs. IFLs identify an integrated Flight Software and Data Subsystem configuration for a particular Flight Configuration and are used for formal integrated testing and for Flight.

**CONTENT:** The contractor shall produce and deliver software application packages in the form of Integrated Flight Loads (IFL) to the user community. The contractor shall deliver both planned IFL deliveries and unplanned IFL deliveries.

The products delivered along with the software application, patch, and/or pre-positioned load (PPL) will include the functionality as follows:

- Document the delivery of the sustaining engineering software applications, patch, and/or PPL to NASA
- Document the detailed description of the software application (CSCI), patch, and/or PPL and the instructions on how to upload to the Space Station.
- Document the physical data pertaining to the software and configuration definition of the software application, patch, and/or PPL.
- Document the engineering values for all instances/versions of a patch and/or PPL or Adaption Data Table (ADT).
- Document the transfer of accountability for each delivered item.

The delivered sustaining engineering software applications/Patches/PPLs will be uploaded into the IFL in the Mission Build Facility with “Read-Only” capability.

**FORMAT:** NASA/Contractor agreed format currently used by ISSP.

**9. OPR:** OD/Avionics and Software Office

**10. FIRST SUBMISSION DATE:** First IFL after start of new contract

**Frequency Of Submission:** Product schedule will support Block releases for Flight CSCIs, Stage, Operations, and Launch IFL releases or as required by applicable software control panel approved/authorized make operable change

Additional Submissions: **As required by applicable software control panel approved/authorized make operable change.**

**11. MAINTENANCE:** (The documents shall be maintained electronically.) Update products as documented with an approved change to maintain currency and accuracy in accordance with SSP 41170.

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (MBF or equivalent)

**13. REMARKS:** This DRD provides the mechanism for the Contractor to deliver software application versions, patches, and/or PPLs as designated by the software schedule control forum in the form of an Integrated Flight Load (IFL) and approved by the ASCP.

## DATA REQUIREMENTS DESCRIPTION

1. DR Title: SM03, Mishap and Investigation Reports
2. DRD Extension Number(s): N/A
3. TPR Code: S&MA AIT
4. Data Type: 3
5. Frequency of Submission: Frequency of submission shall be in accordance with NMI 86211.1. Type C injury mishaps occurring offsite at contractor facilities shall be reported in a monthly summary of such injuries.
6. First Submission Date: As required. Type C injury summary due first month after DRD change.
7. As-of-Date: N/A
8. Copies and Distribution: 1 copy distributed to each of the following:
  - (a) Team of Primary Responsibility (TPR)
  - (b) OH/Data Management
  - (c) Program-authorized electronic repository (EDMS or equivalent)
9. Remarks: NONE
10. Use: Provide notification and status of investigation of accidents or incidents related to the ISS Program.
11. References:
  - (a) Statement of Work (SOW), paragraph 3.8.1.4, 7.2
  - (b) NHB 1700.1, Basic Safety Manual
  - (c) NMI 8621.1, Mishap Reporting and Investigating
  - (d) NASA Letter OE-96-007, April 15, 1996
12. Interrelationships: NONE
13. Preparation Information:
  - 13.1 Scope: These reports shall encompass CEI mishaps occurring during the contracted period as follows:

All mission failures and type A and B mishaps resulting in injury to contractor personnel or equipment damage occurring onsite at NASA facilities and offsite at contractor facilities.

Type C mishaps resulting in equipment damage onsite at NASA facilities and offsite at contractor facilities.

Type C mishaps resulting in injury to contractor personnel located onsite at NASA facilities.

Incidents and close calls occurring onsite at NASA facilities.

- 13.2 Format: The mishap report is to be recorded on NASA Form 1627. Telephonic reports are to be reported in accordance with 1627a.
- 13.3 Content: The mishap report shall be in accordance with NHB 1700.1 (VI-B) and NMI 8621.1.
- 13.4 Maintenance: These reports shall be maintained electronically.

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Materials Identification and Usage Lists (MIUL)  <b>1b. Data Type: 2</b>	<b>2. Date of Current Version</b>  10/01/2010	<b>3a. DRD No.</b>  <b>VE09</b>	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data)  To identify and document the materials and processes used on all flight hardware and on ground support equipment specified by SSP 30233. Provide a complete identification of all materials usages in configuration items excluding piece-part electronics.			<b>5. DRD Category</b> _x_ Technical — Administrative — SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW paragraph 7.2, 3.4.6.1 Specialty Engineering		<b>7. Interrelationships</b> (e.g., with other DRDs) VE10	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** To provide a searchable data base of materials and processes that are used in contractor provided ISS hardware and denote where materials and processes that do not meet the requirements of SSP 30233 have been approved by Material Usage Agreements (MUAs). The information shall reflect the final design and as-built hardware.

**CONTENT:** The system shall identify, as a minimum, the following applicable information using the instructions in Section 13, REMARKS

1. Associate Contractor by number (assigned by the Contractor or a conversion code supplied by the Associated Contractor and approved by the Contractor)
2. Part number
3. Next assembly
4. Material code
5. Material specification
6. Process specification (s)
7. MUA number and/or rationale code for category III MUAs

**FORMAT:** Guidelines for MIUL format and field sizes are provided in Section 13, REMARKS.

**9. OPR:** OB/Vehicle Office

**10. FIRST SUBMISSION DATE:** As required for new hardware delivered on this contract.

**Frequency Of Submission:** Updates as required to reflect changes to hardware sustained on this contract or new items delivered.

**Additional Submissions:**

**11. MAINTENANCE:**

The Contractor shall maintain such files as necessary for tracking, reporting status, and traceability of submittals for the as-built and delivered MIULs.

(These files shall be maintained electronically and updated as required)

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (MAPTIS or equivalent)

**13. REMARKS:**

**GUIDELINES FOR PREPARATION OF MATERIALS IDENTIFICATION USAGE LIST**

An electronic database of CAD/CAM drawings parts list or a separate equivalent electronic parts database with the following data shall be considered the MIUL. The database shall as a minimum contain the following:

a. Associate contractor code number

Associate contractor drawing source number as assigned by the contractor. Not required for CAD/CAM delivery when contractor company identification is on parts list data base. (field length 4 characters with optional electronic data base)

b. Part/drawing number

Part/drawing number is the drawing number or the part number for the MIUL entry. Commercial parts and components used shall be entered at least once for the materials at the level of assembly used for approval of that part. Material codes shall be used for commercial parts where available from NASA. For mechanical parts, the appropriate MS, NP, etc., shall be entered here. (field length 20 characters with optional electronic data base)

c. Next assembly used on drawing number with dash if applicable

Next assembly used on drawing with dash if applicable is for the next used on drawing assembly. (field length 16 characters with optional electronic data base)

d. NASA material code

NASA material code is assigned by NASA and found in MAPTIS. (field length 8 characters)

e. Material specification

Material specification is the specification to which the material is procured. (field length 30 characters with optional electronic data base)

f. Process specification

Process specifications shall include those processes which could have significant effects on the hardware. All major processes called out on the drawing shall be reported. These specifications do not have to be given down to the individual dash number. (field length 40 characters with optional electronic data base)

g. MUA number with rationale code if used

MUA number shall have the assigned associate contractor code number followed by a dash and four digit number beginning with 0001. Category III MUAs shall use the Associate Contractor code number followed by a dash then a 9 and the three digit rationale code. Other formats may be used if given prior approval by the Contractor. When an alternate format is used, a code key shall be provided to show the correlation between the alternate format code and this code. (field length 12 characters with optional electronic data base)

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Materials Usage Agreements (MUAs)  <b>1b. Data Type: 1</b>	<b>2. Date of Current Version</b>  10/01/2010	<b>3a. DRD No.</b>  <b>VE10</b>	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> To identify for NASA and provide rationale and approval for use of materials and processes that are exceptions to the requirements found in SSP 30233 that are considered acceptable for use on the program.			<b>5. DRD Category</b> _X_ Technical — Administrative — SR&QA
<b>6. References</b> (SOW, Clause, etc.)  SOW paragraph 7.2, 3.4.6.1 Specialty Engineering		<b>7. Interrelationships</b> (e.g., with other DRDs) VE09	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** To provide rationale for use of materials and processes that are exceptions to the requirements found in SSP 30233, and are considered acceptable for use on the program. A tiered MUA system with three categories shall be used: Category I are those considered a hazard to the safety of the mission, crew, or vehicle, or affect the mission success; Category II are those that fail a screening of requirements and are not considered a hazard in their use but for which no Category III rationale code exists; and Category III are those that shall be reported in the MIUL system or electronic data system utilizing the approved rationale codes in Appendix C of SSP 30233 or as described in F-VE-09, item g.

**CONTENT:** Category I MUAs shall be prepared using the form and instructions from page B-2 of SSP 30233 or approved equivalent and reviewed and approved by the Contractor. The MUA will then be submitted to the NASA Program Office for approval. Category II MUAs shall be prepared using the form and instructions from page B-2 of SSP 30233 or approved equivalent, reviewed and approved by the Contractor, and reviewed and approved by the NASA ISS M&P Manager. Both Category I and II MUAs shall contain attachments providing detailed treatment of the material application, photographs, sketches, drawings, test data and rationale to the extent necessary for usage acceptability. Category III MUAs shall be reported in the MIUL system or electronic drawing data system utilizing the approved rationale codes in SSP 30233.

**FORMAT:** Category I and II MUAs shall be prepared using the form and instructions from page B-2 of SSP 30233 or approved equivalent. The form shall be in an electronic format compatible with MAPTIS; attachments shall be in Adobe Acrobat format.

**9. OPR:** OB/Vehicle Office

**10. FIRST SUBMISSION DATE:** As required.

**Frequency of Submission:** As required.

**Additional Submissions:** As required.

**11. MAINTENANCE:**

The Contractor shall maintain such files as necessary for tracking, reporting status, and traceability of submittals for the MUAs.

(These files shall be maintained electronically and updated as required)

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management (Category I MUAs only)

**1 electronic copy:** to a Program authorized repository (MAPTIS or equivalent)

**1 electronic copy:** to MAPTIS (Category I and Category II MUAs)

**13. REMARKS:** None

## DATA REQUIREMENTS DESCRIPTION

1. DR Title: VE20, Integration and Verification Requirements for U.S. Segments & ISS System
2. DRD Extension Number: None
3. TPR Code: Verification IPT
4. Data Type: 2
5. Frequency of Submission: Preliminary copy at L-18 for the applicable ISS DIL Configuration stages reviewed; final documents submitted for approval no later than L-12 for the final ISS DIL Configuration launch. Post 9/30/10: Twice: One updated VE20 for ISS Assembly Complete following last Shuttle flight (ULF5/6); and a final VE20 for ISS Assembly Complete following Flight 3R.
6. First Submission Date: IDR
7. As-of Date: N/A
8. Copies and Distribution: 1 copy distributed to each of the following:
  - (a) Team of Primary Responsibility (TPR)
  - (b) OH/Data Management
  - (c) Program-authorized electronic repository (EDMS or equivalent)
9. Remarks: Submittals shall reflect the relationship of the incremental stage buildup to the ISS System.
10. Use: Document integration and verification requirements for the ISS System. In addition, this DR documents and provides a cross-reference of interim assembly stage nominal capabilities as defined in the Capabilities Description Documents. These requirements are necessary for the preparation of verification procedures and analyses.
11. References:
  - (a) Statement of Work (SOW); 3.2.1.11.3
  - (b) Other: N/A
12. Interrelationships: DRs, VE24, VE23
13. Preparation Information:
  - 13.1 Scope: This document establishes ISSA Program detailed integration and verification requirements for the incremental stage buildup of the ISS to meet ISS requirements (SSP 41000) at Assembly Complete.
  - 13.2 Format: The document shall be delivered in the Contractor's format.

- 13.3 Content: This document shall be written by Stage and shall contain all stages from FEL to Assembly Complete, as defined by SSP 50110. All U.S. On-orbit requirements shall be addressed in this document.
- (a) These documents shall identify each requirement, specification and constraint (functional and environmental) applicable to the ISS stages.
  - (b) The detailed verification requirement shall include allowable tolerances for standards of judgment to be used in determining acceptable performance. For tests/demonstrations, test types, levels and durations shall be included.
  - (c) For tests/demonstrations, qualification test requirements shall include test-level margins and factors of safety.
  - (d) The integrated Verification Logic Networks (VLNs) for the Stages shall be contained in this document.
- 13.4 Maintenance: The document shall be maintained electronically.

## DATA REQUIREMENTS DESCRIPTION

1. DR Title: VE23, ISS System and Vehicle Subsystems Analyses and Analytical Models
2. DRD Extension Number(s): None
3. TPR Code: VIPER/OM
4. Data Type: 2
5. Frequency of Submission: As needed.
  
6. First Submission Date: SDR;
7. As-of-Date: N/A
8. Copies and Distribution: 1 copy distributed to each of the following:
  - (a) Team of Primary Responsibility (TPR) – CD ROM
  - (b) VIPER Quality Records Custodian – CD ROM
  - (c) OH/Data Management
  - (d) Program-authorized electronic repository (EDMS or equivalent)
9. Remarks: NONE
10. Use:
  - (a) Provide NASA with the analysis information as part of the evidence that the vehicle and subsystems (including structures) have the capabilities to meet the intent of all applicable requirements in accordance with SSP 41000.
  - (b) Provide analytical models to ensure proper structure and content, and to aid in the evaluation of the Contractor's designs.
11. References:
  - (a) Statement of Work (SOW) paragraph 3.2.1.11.3, 3.2.1.2
  - (b) Other: N/A
12. Interrelationships: DRs VE20, VE24, VE32
13. Preparation Information:
- 13.1 Scope:
  - (a) Analysis reports shall document all input data, assumptions and boundary conditions, analysis methodology, and analysis results for analyses intended to:
    - (1) Demonstrate the proper design of the ISS DIL Configuration vehicle or subsystem in consideration of all design constraints. This includes analysis of vehicle performance and the performance of integrated subsystems with or without the effects of the Shuttle Orbiter and other orbiting vehicles.
    - (2) Demonstrate that the ISS vehicle or subsystem capabilities meet specific requirements. This includes analyses performed as part of the formal verification program.

- (b) Analysis models that are developed for vehicle or subsystem end-to-end performance analysis shall be documented and submitted in accordance with this DR.
- (c) Analysis and data developed to demonstrate the ISS vehicle Solar Array Operational Constraints meets the NASA PHALCON ability to respond to nominal and contingency operations shall be documented and submitted in accordance with this DR.

13.2 Format: ISS Analysis results and models shall be delivered in accordance with the following:

- (a) Results of analyses shall be documented in two data items:
  - (1) An informal copy of the team's internal memorandum or report documenting the results shall be submitted as required, in hard copy or electronic format, to the Vehicle Integrated Performance and Resources VIPER Team. This document will be retained by VIPER. Suggested contents of this documentation are:
    - Summary of the analysis or study along with the activity objectives and relation to other analyses.
    - All boundary conditions, inputs, ground rules, assumption, and identification of all data sources.
    - Analysis methodology including analytical study elements (models, equations, algorithms). Discuss validation of the analysis methodology.
    - Analysis results, conclusions, and recommendations.
  - (2) A one- to two-page abstract of the analysis in the common format defined by the VIPER team shall be submitted in electronic format. This abstract shall be published in the formal submittal of VE23 and electronically configuration controlled. This common abstract shall include the analysis title, author, and date as well as a description of the analysis including background, assumptions, analysis discussion, analytical models, operational constraints, issues, summary, and verification closure recommendations.
  - (3) A Systems Engineering and Integration memo written to NASA OM which includes a summary of analysis performed and data files delivered in support of the PHALCON Solar Array operations tool. The data files are delivered in an electronic format and submitted, as required with delivery of this DR.

- (b) Models shall be documented with three data items.
- (1) An informal copy of the team's internal memorandum or report documenting the models shall be submitted to the VIPER Team and should include the following information:
    - Inputs
    - Methodology
    - Results
    - Validation

This document will be retained by the VIPER team.
  - (2) A separate abstract or a paragraph included in the abstract of the analysis per the content in 13.2.(2). This abstract shall be published in the formal submittal of VE23 and electronically configured. This paragraph should name the analytical models used in the analysis and, if specifically developed for the analysis, the inputs, outputs, and limitations should be described. Evidence of model certification should be included and a description of the model and data configuration control and location.
  - (3) An electronic copy of the model shall be submitted as requested for formal configuration control in a format agreed upon by NASA and the Contractor.

13.3 Content: This DR includes:

- (a) The documentation of analyses results conducted at the Product Groups and the Contractor demonstrating vehicle or subsystem performance. Each team is responsible for identifying the significance of the assessments (per 13.1 ) to determine the need for formal submittal. All analyses not determined to require formal submittal of results shall have documentation maintained by the team that performed the assessment.
  - (1) Design process analyses to determine ISS vehicle, subsystem and element and lower level hardware and software design characteristics.
  - (2) Analyses for ISS vehicle, subsystem, and element and lower level hardware and software functional performance under specified natural and induced environment conditions and operational conditions.
  - (3) Microgravity quasi-steady, structural dynamic and vibroacoustic analyses as specified in the Microgravity Control Plan, VE16, to determine ISS DIL Configuration compliance with microgravity requirements.
  - (4) ISS DIL Configuration Human engineering/crew systems analyses

- (5) The Analysis Master Plan and Schedule documenting the end-to-end analyses performed in support of the Design or Verification Analysis Cycles. This plan will include (as a minimum):
- A description of each assessment.
  - Schedule for completion.
  - Vehicle configuration and groundrules used in the assessments.
  - Identification and control of data to be used in the assessments.
  - Coverage matrix showing assessments conducted.
  - Assessment interdependencies.
  - Analysis results.
- (a) Abstract of the integrated analyses of the end-to-end ISS thermal control system performance and ISS vehicle loads and dynamics analyses shall be documented under this DR.
- (c) Models submitted electronically and configuration controlled are those used in the end-to-end performance analyses of the vehicle and will include analytical models used to perform the assessments listed in 13.3a
- 13.4 Maintenance: Deliverables shall be maintained electronically such that analysis results reflect changes in analysis input data and models.

## DATA REQUIREMENTS DESCRIPTION

1. DR Title: VE24, Specification Traceability and Compliance Reports
2. DRD Extension Number: None
3. TPR Code: Verification IPT
4. Data Type: 3
5. Frequency of Submission: Preliminary copy in SIR data package for applicable specifications reviewed at SIR Post 9/30/10: Twice: One updated VE-24 for ISS Assembly Complete following last Shuttle flight (ULF5/6); and a final VE-24 for ISS Assembly Complete following Flight 3R.
6. First Submission Date: System Specification Only: SRR; Next submittal: SIR Post 9/30/2010: Launch + 3 months (ULF5/6)
7. As-of Date: N/A
8. Copies and Distribution: 1 copy distributed to each of the following:
  - (a) Team of Primary Responsibility (TPR)
  - (b) OH/Data Management
  - (c) Program-authorized electronic repository (EDMS or equivalent)
9. Remarks: NONE
10. Use: Document specification traceability to closure for the ISSA System Specification as modified by Appendix C, U.S. On-Orbit Segment Specification and Configuration Item Specifications. Document traceability from the ISS System Specification to the International Partners/Participants and U.S. Ground Segment.
11. References:
  - (a) Statement of Work (SOW); paragraphs 3.2.1.11.3
  - (b) Other: N/A
12. Interrelationships:DRs, VE20, VE23
13. Preparation Information:
  - 13.1 Scope: The Specification Traceability and Compliance Reports document the requirements traceability flowdown and verification closure for:
    - (a) ISS System specification as modified by Appendix C.
    - (b) U.S. On-Orbit Segment Specification

13.2 Format: The Specification Traceability and Compliance Reports shall be delivered in the Contractor's format.

13.3 Content:

- (a) The Specification Compliance Report shall contain the following for the ISS System Specification, and U.S. On-orbit, and Configuration Item/component specifications requirements:
  - (1) Specification numbers
  - (2) Specification titles
  - (3) Section 3 paragraph # and title
  - (4) Requirement text
  - (5) Requirement identification number
  - (6) Section 4 paragraph # and text
  - (7) Detailed verification objective number
  - (8) Verification objective text
  - (9) Verification activity title
  - (10) Verification report number and title
  - (11) Verification closure documentation
  - (12) Requirements Status.
  
- (b) The Specification Traceability Report shall contain the following for the ISSA System Specification and U.S. On-Orbit Specification:
  - (1) Requirements with no lower level requirements.
  - (2) Requirements with no parent requirements.

13.4 Maintenance: The reports shall be maintained electronically.

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Integrated Signal Lists (ISL)  <b>1b. Data Type:</b> 2	<b>2. Date of Current Version</b>  10/01/10	<b>3a. DRD No.</b>  VE28	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> The ISL will support the ISS Design, Development, Test, and Operational phases and will be used to support the development of the onboard Command and Control processor telemetry and display definition software, timeliner software, and ground test and operations software.			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW paragraph 3.3.7.2.5		<b>7. Interrelationships</b> (e.g., with other DRDs) None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** The ISL shall be electronic files containing an integrated definition of all the contractor USOS signals including: hardware, firmware, and software primitives, data acquisition, command and telemetry definition, firmware controller/MDM channelization, 1553 bus messaging and calibration. The ISL shall also include USOS, International Partners (e.g. core data) and Payload (e.g. core data) and signal data processed by the USOS Command and Control Processor for the purpose of display and telemetry/command to/from the ISS S-Band system or the Shuttle OIU. The list shall also identify all critical commands and hazardous parameters.

**CONTENT:** Shall be as defined in the Mission Build Facility Standard Out Definition document (D684-10177-1).

**FORMAT:** The ISL shall be delivered as specified in the Mission Build Facility Standard Out Definition document (D684-10177-1).

**9. OPR:** OD/Avionics and Software Integration Office

**10. FIRST SUBMISSION DATE:** As defined by the Program Software Integrated schedule

**Frequency Of Submission:** As defined by the Program Software Integrated schedule approved by Avionics Software Control Board (not more than 4 per year)

**Additional Submissions:** Updates as scheduled

**11. MAINTENANCE:** (The document shall be maintained electronically.)

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (MBF or equivalent)

**13. REMARKS:** The ISL provides an integrated definition of all the USOS signals including: hardware, firmware, and software primitives, data acquisition, command and telemetry definition, firmware controller/MDM Channelization, 1553 bus messaging, and calibration This integrated list is a critical deliverable in the implementation of the USOS avionics hardware and software integration and flight-to-ground interfaces. Assembly of all signal data provided by the Contractor, GFE, Payloads, and International Partners (e.g. core data) into a single list assures uniformity in the definition and application of these signals by the onboard core software and the ground processing systems.

**DATA REQUIREMENTS DESCRIPTION  
(Based on JSC-STD-123)**

<b>1a. DRD Title:</b> Vehicle Engineering Data  <b>1b. Data Type:</b> 2 – Plan 3 – Data Set	<b>2. Date of Current Version</b>  10/01/10	<b>3a. DRD No.</b>  VE32	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use:</b> This DR defines the data categories that will reside in the Designated Program Repository (VMDB or <i>equivalent</i> ) and is the responsibility of the contractor to capture, store, sustain, integrate, and configuration manage.			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References:</b> SOW 3.3.2.9.2, 3.3.4.1.1, 7.2		<b>7. Interrelationships:</b> F-VE-09, Sustaining Engineering Drawings and Associated List, DRD F-SA-04 Hazard Reports and Systems Description	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:**

This DRD encompasses the capture, storage, loading, integration, sustaining and configuration management of Vehicle engineering data and GFD that will reside in the Vehicle Master Database (a Government Furnished Database) or equivalent.

Vehicle engineering data providers shall be Program Integration and Control Contract, the Mission Integration Contract, the Cargo Mission Contract, and the USOS Acceptance and ISS Vehicle Sustaining Contract. Teams Authorized to provide Vehicle engineering data shall be listed and maintained in the Designated Program Repository (VMDB or equivalent).

GFD providers shall be IPs (reference BDEALS) and the manufacturers of GFE (reference SSP 50177, Government Furnished Data Description Document Part I U.S. Sources).

**CONTENT:**

- a) The ISS Vehicle, as defined by SSP 41000 and modified by latest revision, engineering and safety Data shall include:
- (1) Configuration Data
    - Drawings and schematics
    - Master Equipment List (MEL) (Indentured Parts List (IPL))
    - Identification of as-built configuration (SSAV)
    - Grapple Fixtures
  - (2) Resource Data
    - Mass Properties (weight and c.g.)
    - Power and Thermal characteristics
    - Electrical Power usage (Component Electrical Power during steady-state, standby, startup, and peak operations)
    - Thermal Consumption Data

- (3) Configuration Data/Assembly Data
    - Assembly Sequence
    - Traffic Model
  - (4) Performance and Characteristics Data (Space Station Operations Data Book (SSODB)).
    - Constraints and Operational Limits, Design Limits, Hardware
    - Characteristics for the operating envelope
  - (5) Electromagnetic and Environment Interference (RF Survey Reports)
  - (6) Safety and Mission Assurance
    - Safety Hazards
    - Limited Life Items
  - (7) Parts Selection and Control
    - Electrical, Electronic, and Electromechanic Parts
  - (8) Configuration Aerodynamic Properties
- b) The GFD engineering and safety data shall include applicable items of:
- (1) Configuration Data
    - Drawings and schematics
    - Master Equipment List (MEL) (Indented Parts List (IPL))
    - Identification of as-built configuration (CSAS)
  - (2) Resource Data
    - Mass Properties (weight and c.g.)
    - Power and Thermal characteristics
    - Electrical Power usage (Component Electrical Power during steady-state, standby, startup, and peak operations)
    - Thermal Capacity Data
  - (3) Safety and Mission Assurance
    - Safety Hazards

**FORMAT:**

Data shall be stored, managed and controlled in VMDB or Program authorized repository electronic format.

For VMDB or Program authorized repository supplied data, the data inventory shall be electronically generated and available as a report from the VMDB or Program authorized repository.

Copy of all GFD hard copy data received for conversion into electronic format shall be retained in contractor provided storage.

**9. OPR: OH**

**10. FIRST SUBMISSION DATE:**

Inventory - February 27, 2004

Data set - February 27, 2004

Data Management Plan – April 30, 2004

**Frequency of Submission:**

Data set and inventory updates - Provide data as mutually established by NASA and Contractor.

Data Integration Plan – Subsequent updates as required.

**11.MAINTENANCE:** The DR shall be maintained electronically.

**12.COPIES/DISTRIBUTION:**

**1 record (hard copy):** OH/Data Management (Data Inventory)

**1 copy (electronic):** Program authorized repository-VMDB or equivalent  
(Data Inventory)

Program authorized repository – EDMS or equivalent  
(Data Management Plan)

**13. REMARKS:** The Program Authorized Repository (VMDB or equivalent) shall be the authoritative source for Vehicle engineering data utilized by the Contractor and the ISS Program participants to accomplish Vehicle integration and operations.

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Configuration Management Plan  <b>1b. Data Type: 1</b>	<b>2. Date of Current Version</b>  01/01/04	<b>3a. DRD No.</b>  F-CM-01	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> This plan is prepared by the contractor to describe the assignment of responsibility organizationally and the procedures used in accomplishment of the specific configuration management requirements as stated in the SOW and SSP 41170.			<b>5. DRD Category</b> <input type="checkbox"/> Technical <input checked="" type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW 1.3.1.1		<b>7. Interrelationships</b> (e.g., with other DRDs) NONE	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** This CM plan defines the requirements, responsibilities, and procedures for the CM system pursuant to SSP 41170 and as it applies to this contract.

**CONTENT:** The CM plan shall address, as a minimum, the following:

1) **Management Organization**, (including reference documents)

- a) Identification, Relationships and Integration of contractor's proposed organization
- b) Responsibility and authority for CM including roles in configuration control boards and technical reviews
- c) Interfaces between contractor's CM organization and NASA, Subcontractors, and other contractor's/contracts
- d) Training plans

2) **Configuration Identification**

- a) Selection of CI's (Hardware, CSCI's and firmware)
- b) Establishment of the functional, allocated and product baselines for the H/W and S/W
- c) Assignment and application of configuration identifiers including serial numbers, part numbers, lot codes, software and firmware identifiers

3) **Configuration Control**

- a) Establishment of internal configuration and contractual baselines
- b) Implementation of Internal and NASA configuration control
- c) Support to configuration control boards and processes
- d) Identification of processes to control changes, deviations, and waivers to program baselines (both class I and II)
- e) Subcontractor and vendor control
- f) Systems & tools

#### 4) Configuration Status Accounting (CSA)

- a) Hardware/Software Configuration Status Accounting processes and provisions for reports and/or access to CSA data
- b) Description and methods of processes and tools to provides:
  - i.) Identification of current approved configuration documentation and configuration identifiers associated with each CI
  - ii.) Status of proposed engineering changes from initiation to implementation
  - iii.) Waiver/deviation status and processing
  - iv.) Results of configuration audits; status and disposition of discrepancies
  - v.) Traceability of changes and confirmation of change incorporation
  - vi.) Methods of access to information
- c.) Retention of historical data
- d.) Systems and tools (including data elements)

#### 5) Configuration Verification/Audits

- a.) Audit conduct, policies, procedures, documentation, access, and support
- b.) Processes, plans, schedules for internal CM audits and subcontractor CM audits

#### 6) Data Management

- a) Development, approval, release and submittal of configuration data/documentation (including drawings) in relation to program and contractual events (DRD's technical reviews, FCA/PCA, Acceptance reviews, COFR, etc.)
- b) Plan for subcontractor data management deliveries/control and access
- c) Establishment and operation
- d) Process for documentation control (i.e., DCNs)
- e) Retention of historical data
- f) Systems and tools

**FORMAT:** Electronic

**9. OPR:** OH/NASA ISS Configuration Management Office

**10. FIRST SUBMISSION DATE:** Sixty (60) days following contract award

**Frequency Of Submission:** One time

**Additional Submissions:** Updated id major systems or processes are changed.

**11. MAINTENANCE:** as required (see additional submissions).

**12. COPIES/DISTRIBUTION:**

**1 record (hard copy):** OH/Data Management

**1 copy (electronic):** Program authorized repository EDMS or equivalent.

**13. REMARKS:** None

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Export Control Audit Results  <b>1b. Data Type: 2</b>	<b>2. Date of Current Version</b> 1/1/04	<b>3a. DRD No.</b> F-EC-01	<b>3b. RFP/Contract No.</b> NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) To provide insight into the Contractor's Export Control processes		<b>5. DRD Category</b> <input type="checkbox"/> Technical <input checked="" type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
<b>6. References</b> (SOW, Clause, etc.) NFS 1852.225-70 and clause H.19, SOW 1.5.2.		<b>7. Interrelationships</b> (e.g., with other DRDs) None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** Audits should include a thorough examination of all export control processes 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.

**FORMAT:** a, b, c, & d must be submitted to the Center Export Administrator (CEA) at the end of each fiscal year for review & approval and be in an acceptable format (e.g. Microsoft Word, Excel, etc.) that is compatible with the Program authorized repository

**9. OPR:** JSC Export Control Office or Center Export Administrator

**10. FIRST SUBMISSION DATE:** September 30, 2004

**Frequency Of Submission:** annually, at the end of each fiscal year

**Additional Submissions:**

**11. MAINTENANCE:** The document shall be maintained electronically.

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)

Contracting Officer/BG

Center Export Administrator/JA

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

<b>1a. DRD Title:</b> ISS On-Orbit Logistics Supportability Assessment Report  <b>1b. Data Type: 3</b>	<b>2. Date of Current Version</b>  10/01/10	<b>3a. DRD No.</b>  F-LM-01	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data)  To provide assessment of resources and requirements for the maintenance of the International Space Station to determine if it can be logistically supported as designed.			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW, paragraph 3.3.8.2.2, 3.3.8.2.5		<b>7. Interrelationships</b> (e.g., with other DRDs)  NONE	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** The Logistics Supportability Assessment Report is applicable to the maintainable systems of ISS Vehicle provided by the programs' partners and participants. Resources requirements are evaluated against design. These include but are not limited to spares and repair parts, locations for storage of spare part hardware, tools for performing the required maintenance, robotic capability, extravehicular activity capability, as well as the transportation of supplies to the space station. Logistics concerns and issues are documented in this assessment to minimize impacts to the programs limited resources or system downtimes, and aid in providing for a safe and habitable environment for the crew.

**CONTENT:** The Logistics Supportability Assessment Report shall evaluate USOS, ISS Vehicle, and Payload Facilities (Boeing Sustained and non-Sustained (see SOW Appendix L for non-Sustained) supportability in terms of crew time, up mass and functional availability. Additional supportability performance characteristics may be used as needed to evaluate USOS, ISS Vehicle, and Payload Facilities supportability.

**FORMAT:** In a format supported by electronic library.

**9. OPR:** OB511

**10. FIRST SUBMISSION DATE:** 6/1/04

**Frequency Of Submission:** Bi-Annual (months of August and February)

**Additional Submissions:**

**11. MAINTENANCE:** Shall be maintained and updated electronically

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)

**13. REMARKS:** NONE

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> ISS ORU Ground Supportability Assessment Report  <b>1b. Data Type: 3</b>	<b>2. Date of Current Version</b>  10/01/10	<b>3a. DRD No.</b>  F-LM-02	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data)  To provide assessment of ground ORU supportability			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW, paragraph 3.3.8.2.2		<b>7. Interrelationships</b> (e.g., with other DRDs) NONE	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** The ground supportability assessment pertains to the ORU and includes the repair posture, repair location, parts inventory, part obsolescence status and supplier viability. Ground supportability assessment does not include non-Boeing sustained Payload Facilities.

**CONTENT:**

1. List repair agencies, identify ORUs maintained, identify readiness status, identify emerging problem areas
- 2) List inventory totals, identify top ten usage items, identify emerging problem areas
- 3) Status parts obsolescence activities
- 4) Status supplier viability

**FORMAT:** In format supported by the electronic repository

**9. OPR:** OB511

**10. FIRST SUBMISSION DATE:** 06/01/04

**Frequency Of Submission:** Bi-Annual

**Additional Submissions:**

**11. MAINTENANCE:** Shall be maintained and updated electronically

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)

**13. REMARKS:** NONE

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Increment Definition and Requirements Document (IDRD) Annex 2, On-Orbit Maintenance Plan  <b>1b. Data Type: 1</b>	<b>2. Date of Current Version</b>  03/15/2009	<b>3a. DRD No.</b>  F-LM-03	<b>3b. RFP/Contract No.</b>  NAS 15 -10000 Modification 1568
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data)  To document on-orbit maintenance planning for the ISS Vehicle			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW, paragraph 3.3.8.2.3		<b>7. Interrelationships</b> (e.g., with other DRDs)  NONE	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** The IDRD Annex 2 shall contain preventive and corrective maintenance planning for the Increment, as well as planned spares deliveries to ISS Vehicle. The IDRD Annex 2 shall integrate maintenance planning for International Partners. The IDRD Annex 2 shall document housekeeping tasks for ISS Vehicle. The IDRD Annex 2 shall document ISS system performance and data collection tasks.

**CONTENT:** The IDRD Annex 2 shall contain comprehensive maintenance planning for the ISS Vehicle.

**FORMAT:** In a format supported by the electronic library.

**9. OPR:** OB511

**10. FIRST SUBMISSION DATE:** Not earlier than 60 days from contract award

**Frequency Of Submission:** Increment IDRD Release + 15 Days, 6 Months, 3 Months and /or as driven by operational requirements.

**Additional Submissions:**

**11. MAINTENANCE:** Shall be maintained and updated electronically.

**12. COPIES/DISTRIBUTION:**

**1 electronic copy:** OH/Data Management

**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)

**13. REMARKS:** Due to International Partner (IP) impacts Data Submitted under this DRD will be submitted in EDMS as Early Release. At the date of this upload, this data will be considered delivered to NASA.

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Parts Obsolescence Monitoring  <b>1b. Data Type: 3</b>	<b>2. Date of Current Version</b>  01/01/04	<b>3a. DRD No.</b>  F-LM-04	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) Obsolescence reporting and Single Source Supplier Analysis (SSSA) alerts the ISS Program that production is concluding for a specific part, and provides the identification of single source suppliers and plans and methods to be used to provide for the continued support of the ISS through its operational life.			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical ___ Administrative ___ SR&QA
<b>6. References</b> (SOW, Clause, etc.) Statement of Work (SOW); paragraphs 3.3.8.5.3		<b>7. Interrelationships</b> (e.g., with other DRDs) None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** Scope: Parts Obsolescence Monitoring shall consist of Parts Obsolescence and Single Source Supplier Analysis (SSSA).

**Parts Obsolescence Monitoring:** The contractor shall identify and resolve hardware and component obsolescence issues and loss of failure analysis, production and repair capabilities in compliance with Program management and control requirements. Loss of capabilities includes, but is not limited to, loss of skills or a supplier going out of business. The contractor shall deliver parts provisioning data for all repairable parts and parts containing EEE parts to support management of parts obsolescence. The contractor shall obtain government approval for hardware changes as required by NSTS 07700 and SSP 41170.

The Contractor shall compile a list of their sole source, single source (where requalification may be required) “production” suppliers for essential consumable industrial materials, parts, components, systems, and critical facilities and perform an analysis of those suppliers to identify areas of concern relative to supporting the program mission. This analysis and plan shall address consumables, hardware (including flight hardware), , and expendable items requiring recurring procurement over the Station’s life. This analysis shall encompass all subcontractors regardless of tier. The Contractor shall perform an analysis of those single source suppliers to identify areas of concern relative to supporting program mission. The Contractor shall prioritize the analysis to ensure that any subcontractors / suppliers that are leaving the program near term are addressed first, with the remaining scheduled based on their contract completion dates. The contractor shall identify those subcontractors / suppliers which have already completed their production requirements.

**CONTENT:** The SSSA shall consist of the following:

A list of single source suppliers (includes all subcontractors regardless of tier)

The items that the single source suppliers provide.

Identify any risks associated with proprietary processes, environmental issues and foreign ownership of the resultant suppliers outside the continental United States.

Provide recommendations to protect the items from production stoppages and ensure availability of materials, consumables and facilities.

This report shall document items that have been previously identified as obsolete and the actions taken to ensure support for the life of the program (i.e. life of type procurements)

**FORMAT:** Parts Obsolescence and SSSA content submittal shall be submitted in a format supported by the electronic library or as otherwise agreed to by NASA and the contractor.

**9. OPR:** OB511

**10. FIRST SUBMISSION DATE:** 03/01/04

**Frequency Of Submission:** Quarterly Report

**Additional Submissions:**

**11. MAINTENANCE:** Shall be maintained and updated electronically

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)

**13. REMARKS:** None

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

<p>1a. DRD Title: Certification of Flight Readiness (CoFR)</p> <p>1b. Data Type: 3</p>	<p>2. Date of Current Version 10/01/05</p>	<p>3a. DRD No. F-MA-12</p>	<p>3b. RFP/Contract No. NAS15-10000</p>
<p>4. Use (Define need for, intended use of, and/or anticipated results of data) This DR defines payload safety and operational readiness as required by the ISS Payloads Office.</p>			<p>5. DRD Category X Technical __Administrative __SR&amp;QA</p>
<p>6. References (SOW, Clause, etc.) SOW paragraph 3.2.1.6</p>		<p>7. Interrelationships (e.g., with other DRDs) None</p>	

8. PREPARATION INFORMATION: The contractor shall prepare the deliverable as follows:

SCOPE: This DR establishes the preparation and maintenance requirements for the Certification of Flight Readiness (COFR) for SOW Section 8 Payload Integration only. This includes flight and stage specific CoFR implementation focused on Launch Package Assessment (LPA) and Stage Operation Requirements Review (SORR). A formal and disciplined process with readiness certification statements is required by the ISS Program Manager to support flight readiness decisions on ISS payloads and organizations for flight, increment, on-orbit and return.

CONTENT: Contents: Certification of items per flight and stage must be included in accordance with SSP 52054 Latest Revision. This includes:

1. CoFR endorsements for all Utilization Hardware for launch, including integrated racks
2. CoFR endorsements for Utilization Hardware remaining on-orbit from the previous stage
3. CoFR for descent Utilization Hardware
4. Stage-specific Open Work Tracking Log

FORMAT: Per SSP 52054, latest revision.

9. OPR: OZ

10. FIRST SUBMISSION DATE: Per negotiated work plan.

Frequency Of Submission: Updated for any ascent or on-orbit conditions or anomalies affecting original certification. For each flight and stage that supports payloads at L-6 weeks.

Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: This data requirement is applicable to SOW 8.0 Payload Integration only.

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Certification of Flight Readiness (CoFR) Plan  <b>1b. Data Type: 2</b>	<b>2. Date of Current Version</b>  01/01/04	<b>3a. DRD No.</b>  F-MI-01	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) To provide a management approach and implementation plan for Certificate of Flight Readiness (CoFR) endorsement			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical — Administrative <input checked="" type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW 3.2.1.6 SSP 50108		<b>7. Interrelationships</b> (e.g., with other DRDs)  None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** Scope: The plan shall describe the approach and implementation for accomplishing the contractor's CoFR responsibilities and requirements to provide endorsement per each type of flight (i.e. - International Partner/Participant, Logistics, Utilization, Assembly) and stage assessments.

**CONTENT:** Address all contractor responsibilities for preparing for and providing the CoFR endorsement in accordance with SSP 50108. The Plan must address relationship to NASA counterparts and the division of responsibility for the CoFR endorsement activities.

**FORMAT:** Contractor format is acceptable

**8. OPR:** OB for ISSP H/W, OD for ISSP S/W, OM for ISSP Robotics

**10. FIRST SUBMISSION DATE:** Submit draft within 30 days after contract award

**Frequency Of Submission:**

**Additional Submissions:**

**11. MAINTENANCE:** Changes to the plan shall be incorporated once/year. Changes to Flight Readiness Status and Endorsements shall be made as required. The contractor shall maintain a historical file of Flight Readiness Status.

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)

**13. REMARKS:** None

**Reviewed By:** \_\_\_\_\_

**Concurrence:**

\_\_\_\_\_  
Date

Chief,  
Date  
Cost Accounting, Reports,  
and Property Branch  
Financial Management Division

Chief Financial Officer



**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

1a. DRD Title: Payload Unique Integration Agreements	2. Date of Current Version  10/01/05	3a. DRD No.  F-MI-12	3b. RFP/Contract No.  NAS15-10000
1b. Data Type: 1			
5. Use (Define need for, intended use of, and/or anticipated results of data) Documents integration requirements between a specific payload developer and the ISS Program.			5. DRD Category X Technical __Administrative __SR&QA
6. References (SOW, Clause, etc.) SOW paragraph 8.2.1.9		7. Interrelationships (e.g., with other DRDs) None.	

8. PREPARATION INFORMATION:

SCOPE: Payload Unique Integration Agreements address generic requirements for the planned life cycle of the payload. These agreements include Pressurized Payload Integration Agreements (PIAs), Unpressurized PIAs, Small PIAs, EXPRESS Integration Agreements (EIAs), and Worf Integration Agreements (WIAs).

CONTENT: Requirements contained in the Payload Unique Integration Agreements are in addition to those established in the Standard Payload Integration Agreements. Also, any requirements deviations or unique responsibilities between the Payload Developer and ISS Program are defined in the unique Payload Integration Agreement. These may include but are not limited to: management roles and responsibilities; flight and ground safety requirements; interface design requirements; verification and testing requirements; operational requirements; launch/landing site processing requirements; resource and interface commitments.

FORMAT: Per SSP 50010-01, Documentation Requirements, Standards and Guidelines.

9. OPR: OZ

10. FIRST SUBMISSION DATE: Next revision as required.

Frequency Of Submission: Once with updates as required to maintain agreements and requirements for the payload life cycle.

Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: EXPRESS and Worf Integration Agreements will be developed within the Payload Data Library.

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

1a. DRD Title: Element Level and Truss Level Payload Engineering Analysis Reports  1b. Data Type: 3	2. Date of Current Version  10/01/05	3a. DRD No.  F-PA-14	3b. RFP/Contract No.  NAS15-10000
6. Use (Define need for, intended use of, and/or anticipated results of data) This report is used to demonstrate US Lab, CAM, and truss element level payload compatibility.			5. DRD Category X Technical __Administrative __SR&QA
6. References (SOW, Clause, etc.) SOW paragraph 8.3.3.3		7. Interrelationships (e.g., with other DRDs) None.	

8. PREPARATION INFORMATION:

**SCOPE:** This DR describes the results of the integrated payload and ISS system compatibility analyses performed for each stage for the US Lab, CAM, and truss segments. This report does not describe the compatibility of the JEM or APM, nor the initial flight and stage of the CAM which is NASDA's responsibility. This DR is submitted for each stage covering all payloads operating in the US Lab, CAM, and truss segments.

**CONTENT:** The analyses may include:  
 electrical power system availability and channelization  
 active thermal control availability and channelization  
 payload electrical power stability  
 command and data handling  
 communications and tracking  
 vacuum exhaust and resource  
 environmental control and life support  
 acoustics  
 human factors  
 EVR/EVA  
 translation paths (EVA/IVA)

**FORMAT:** Any format acceptable by the electronic repository.

9. OPR: OZ

10. FIRST SUBMISSION DATE: For planning purposes only L-5 weeks for each stage. However, the actual delivery dates of the products are driven by payload developers schedule as negotiated real time for each stage with NASA/OZ office.

Frequency Of Submission: Updated for each increment and each stage.  
 Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: None.

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

1a. DRD Title: ISS Level Payload Engineering Integration Reports  1b. Data Type: 3	2. Date of Current Version  10/01/05	3a. DRD No.  F-PA-15	3b. RFP/Contract No.  NAS15-10000
7. Use (Define need for, intended use of, and/or anticipated results of data) This DR is used to document the results of the ISS level payload complement compatibility analyses performed by the PEI contractor.			5. DRD Category X Technical __Administrative __SR&QA
6. References (SOW, Clause, etc.) SOW paragraph 8.3.3.4		7. Interrelationships (e.g., with other DRDs) None.	

8. PREPARATION INFORMATION:

SCOPE: This DR describes the results of the ISS level payload complement compatibility analyses performed by the PEI contractor. This DR is submitted for each stage.

CONTENT: The analyses may include:

- electrical power availability and channelization
- active thermal control availability and channelization
- command and data handling (US Lab, CAM, and extended into JEM & APM)
- communications and tracking (Integrated payload using USOS downlink)
- environmental control and life support
- external contamination

FORMAT: Any format acceptable by the electronic repository.

9. OPR: OZ

10. FIRST SUBMISSION DATE: For planning purposes only L-5 weeks for each stage.

However, the actual delivery dates of the products are driven by payload developers schedule as negotiated real time for each stage with NASA/OZ office.

Frequency Of Submission: Update for each stage as required.

Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: None.

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> <b>Payload Unique Hardware Interface Control Documents</b>  1b. Data Type: 1	<b>2. Date of Current Version</b>  <p align="center"><b>05/22/07</b></p>	<b>3a. DRD No.</b>  <p align="center"><b>F-PA-16</b></p>	<b>3b. RFP/Contract No.</b>  <p align="center">NAS15-10000 <b>Modification 1430</b></p>
<b>8. Use</b> (Define need for, intended use of, and/or anticipated results of data) This DR documents unique payload hardware interfaces.			<b>5. DRD Category</b> X Technical __Administrative __SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW paragraph 8.2.1.23		<b>7. Interrelationships</b> (e.g., with other DRDs) None.	

**8. PREPARATION INFORMATION:**

**SCOPE:** The payload specific ICD and verification applicability will contain specific design and verification requirements applicable to an individual payload/experiment relating to interface compatibility and safety, which must be complied with for transportation and subsequent integration into the appropriate ISS accommodations. This DR includes all pressurized payloads (facility class and non-rack mounted), payloads to be integrated into an EXPRESS rack or onto an EXPRESS Logistics Carrier, WORF payloads, and all attached payloads. This DR also includes the integrated EXPRESS rack or Logistics Carrier being integrated into US payload accommodations, to include IP modules/elements and the EXPRESS Transportation Rack.

**CONTENT:** This DR will contain (1) the payload unique ICD which defines, by discipline, the payload to ISS or EXPRESS facility hardware interfaces representing the as-built (or as-designed) hardware in order to ensure payload interface compatibility for integration into the ISS or EXPRESS facility; (2) the integrated payload rack unique verification applicability matrix which describes the verification requirements associated with each design requirement identified in the ICD and establishes verification methods and data requirements which must be performed and supplied to ensure interface compatibility and safety.

**FORMAT:** Per SSP 50010-01, Documentation Requirements, Standards and Guidelines.

**9. OPR:** OZ

**10. FIRST SUBMISSION DATE:** Final baseline delivery for each payload is L-18 months of manifested flight. However, actual delivery dates of the products are driven by the payload developer schedule as negotiated for each flight with the NASA/OZ office.  
 Frequency Of Submission: One time for each hardware ICD, with updates as required to support payload and program milestones.  
 Additional Submissions: None.

**11. MAINTENANCE:** The data item shall be maintained electronically or as otherwise directed by NASA.

**12. COPIES/DISTRIBUTION:** NASA Data Management electronically using EDMS or follow-on system

**13. REMARKS:** This document will be updated either by the IRN process or document revisions in accordance with SSP 41170.

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

1a. DRD Title: Unique Payload Software Interface Control Documents  1b. Data Type: 1	2. Date of Current Version  10/01/05	3a. DRD No.  F-PA-17	3b. RFP/Contract No.  NAS15-10000
9. Use (Define need for, intended use of, and/or anticipated results of data) This DR is used as an agreement between a rack or truss level payload integrator and the ISS Program of the payload to ISS software interface implementation. This payload specific data package will document the interface, safety, and verification requirements between the payload and the ISS program necessary for transportation to and subsequent integration into the ISS.			5. DRD Category X Technical ___Administrative ___SR&QA
6. References (SOW, Clause, etc.) SOW paragraph 8.4.1.2		7. Interrelationships (e.g., with other DRDs) None.	

8. PREPARATION INFORMATION:

SCOPE: This DR provides the rack to ISS software interface implementation data. It also provides documentation of the payload implementation of the interface. This DR is developed jointly with the rack or truss level payload integrator. This DR is not used for sub-rack or EXPRESS payloads. This DR does not describe IP specific software interfaces. The payload specific ICD contain specific design and verification requirements applicable to an individual payload/experiment relating to interface compatibility and safety, which must be complied with for transportation and subsequent integration into the appropriate ISS accommodations.

CONTENT: This data package will contain: The payload unique ICD which defines, payload design requirements to be met in order to certify payload interface and safety for transportation to and integration into the ISS.

FORMAT: Per SSP 50010-01, Documentation Requirements, Standards and Guidelines.

9. OPR: OZ

10. FIRST SUBMISSION DATE: Completed under previous contract.

Frequency Of Submission: One time for each hardware ICD with updates as required to support payload and program milestones.

Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: This document will be updated either by the IRN process or document revisions in accordance with SSP 41170.

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

<p>1a. DRD Title: Payload Operations Guidelines and Constraints Document</p> <p>1b. Data Type: 3</p>	<p>2. Date of Current Version</p> <p align="center">10/01/05</p>	<p>3a. DRD No.</p> <p align="center">F-PA-19</p>	<p>3b. RFP/Contract No.</p> <p align="center">NAS15-10000</p>
<p>10. Use (Define need for, intended use of, and/or anticipated results of data) This DR is used by the Payload Operations Integration Function (POIF) in planning and executing payload operations.</p>			<p>5. DRD Category</p> <p>X Technical</p> <p>___ Administrative</p> <p>___ SR&amp;QA</p>
<p>6. References (SOW, Clause, etc.) SOW paragraph 8.3.3.5</p>		<p>7. Interrelationships (e.g., with other DRDs) None.</p>	

8. PREPARATION INFORMATION:

**SCOPE:** This DR provides guidelines and constraints for payloads operations on the ISS.  
This document identifies operational guidelines and constraints for US payloads at the EXPRESS rack level, element level (US Lab, CAM, MPLM, and truss) and ISS level.

**CONTENT:** This DR provides guidelines and constraints for payloads operations on the ISS.

**All-Flights Payload Operation Guidelines and Constraints**

This DR contains guidelines and constraints that remain the same for multiple stages in the following areas:

- electrical power system
- thermal conditioning system
- command and data handling
- communications and tracking
- vacuum exhaust and resource
- environmental control and life support
- acoustics
- structures
- fields of view
- EVR/EVA
- Translation paths (EVA and IVA)

**Stage–Unique Payload Operation Guidelines and Constraints**

This DR is submitted for each stage and contains updated guidelines and constraints in the following areas:

- electrical power system
- thermal conditioning system
- command and data handling
- communications and tracking
- vacuum exhaust and resource
- environmental control and life support
- acoustics
- structures
- fields of view
- EVR/EVA
- Translation paths (EVA and IVA)

FORMAT: Contractor format is acceptable.

9. OPR: OZ

10. FIRST SUBMISSION DATE: For planning purposes, the All-flights GL&C first submittal is targeted for January, 2004 and the stage unique document is targeted for 14P. However, the actual delivery dates of the products are driven by payload developers schedule as negotiated real time for each stage with NASA/OZ office.

Frequency Of Submission: Stage Unique documents : Update for each stage or as required; All-Flights document: Update semi-annually or as required.

Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system.

13. REMARKS: None.

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

1a. DRD Title: Verification Reports  1b. Data Type: 3	2. Date of Current Version  10/01/05	3a. DRD No.  F-PA-20	3b. RFP/Contract No.  NAS15-10000
<b>11. Use (Define need for, intended use of, and/or anticipated results of data)</b> This DR is used to demonstrate that each rack and truss level payload has been certified as meeting all verification requirements in the Pressurized Payloads and Attached Payload IRDs and forms the basis for the CoFR Endorsement. This DR is submitted for each stage and covers all USOS payloads manifested for that stage. This DR is also used to demonstrate that the element and ISS level analysis has been successfully completed for each stage (as required by DR F-PA-14 and F-PA-15).			5. DRD Category X Technical ___Administrative ___ SR&QA
6. References (SOW, Clause, etc.) SOW paragraph 8.3.2.5		7. Interrelationships (e.g., with other DRDs) None.	

8. PREPARATION INFORMATION:

**SCOPE:** This DR establishes the content, format, maintenance, and submittal requirement for the verification report. This report will include the qualification and acceptance assessment and test for payload components, subsystems, and the systems verification activities.

**CONTENT:** The Payload Engineering Verification Reports shall contain the following:  
 Status of each Unique Payload's Verification (traceable to unique PVP)  
 Status of Element Level Verification (traceable to PVPP)  
 Status of ISS Level Verification (traceable to PVPP)  
 Status of Requirements Change Assessment Report (RCAR) submittal

**FORMAT:** Any format acceptable by the electronic repository.

9. OPR: OZ

10. FIRST SUBMISSION DATE: For planning purposes, the submittal is targeted at L-5 weeks. However, the actual delivery dates of the products are driven by payload developers schedule as negotiated real time for each stage with NASA/OZ office.

Frequency Of Submission: Final submitted for each stage.

Additional Submissions: None.

11. MAINTENANCE: Single submittal per stage.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: None.

**DATA REQUIREMENTS DESCRIPTION  
(Based on JSC-STD-123)**

<p>1a. DRD Title:  Configuration Layout/Interface Schematics</p> <p>1b. Data Type: 3</p>	<p>2. Date of Current Version  10/01/05</p>	<p>3a. DRD No.  F-PA-21</p>	<p>3b. RFP/Contract No.  NAS15-10000</p>
<p><b>12.</b> Use (Define need for, intended use of, and/or anticipated results of data) Integrated System Schematics: To provide the results of integration of payload drawings and schematics for EXPRESS/WORF, payloads, the ELC and the integrated USL Payload Complement. These schematics will be used for on-orbit malfunction troubleshooting. Payload Stage Configuration Layout - To define the USL, the ELC Payload Hardware configuration and Truss Payload Hardware configuration and by the payload operations, mission operations and training teams as familiarization of the payload complement layout for each stage. EXPRESS/WORF Payload Assembly and Installation Drawings: To use in the physical integration, installation and checkout of EXPRESS/WORF payloads</p>			<p>5. DRD Category X Technical ___Administrative ___SR&amp;QA</p>
<p>6. References (SOW, Clause, etc.) SOW paragraph 8.0</p>		<p>7. Interrelationships (e.g., with other DRDs) None.</p>	

**8. PREPARATION INFORMATION:**

**SCOPE:** Integrated System Schematics - The contractor shall develop integrated schematic drawings for all U.S. elements containing payload hardware and for the EXPRESS rack subsystems. The schematics will be a one-time delivery and will only be updated if the US Lab or EXPRESS Rack subsystems are modified.

Payload Stage Configuration Layout - This DR provides the on-orbit payload complement layout. This DR is submitted for each stage. This DR includes a description of each EXPRESS, WORF, USOS rack, truss level, and ELC payload, locations of the payload on the rack and ELC, US Lab module payload rack and aisle layout drawings, and truss payload layout drawings for the S3 and P3 attach sites. IPs/Partner's layout drawings for bartered payloads into the US Lab are provided by the IPs for incorporation into this DR.

EXPRESS/WORF Payload Assembly and Installation Drawings – This DR defines the requirements for the assembly and installation of the EXPRESS/WORF payloads into the EXPRESS/WORF racks for On-Orbit and MPLM installations.

CONTENT: Integrated System Schematics - The following products shall be delivered once. The schematics will be updated if the US Lab or EXPRESS rack subsystems are modified.

Document Title: Payload Interface Schematics

The contractor shall develop payload interface and configuration schematics for the US Lab and EXPRESS Racks, to include:

- Command and data handling
- Electrical
- Fluids and gases
- Utility Outlet Panels
- Communication and tracking
- Vacuum system

Payload Stage Configuration Layout - This includes a description of each EXPRESS, WORF, USOS rack, truss level, and ELC payload, locations of the payload on the rack and ELC, US Lab module payload rack and aisle layout drawings, and truss payload layout drawings for the S3 and P3 attach sites. IPs/Partner's layout drawings for bartered payloads into the US Lab are provided by the IPs for incorporation into this DR.

Drawings will include a parts list down to the level of the On-Orbit Replacement Units (ORU) that can affect interface compatibility. Input to this DR for the applicable Payloads will be obtained from the Configuration Data Set in the Payload Data Library (PDL).

Document Title: Payload Configuration Layout Drawings

The contractor shall develop payload configuration layout drawings, which include the following:

- U.S. elements payload complement layout
- U.S. truss complement layout
- Static/dynamic envelopes

Payload Assembly and Installation Drawings: The contractor shall develop payload assembly and installation drawings for use in physical integration, installation and checkout of EXPRESS/WORF payloads.

FORMAT: Any format acceptable by the electronic repository.

9. OPR: OZ

10. FIRST SUBMISSION DATE: For planning purposes, the submittal is targeted at L-6 months. However, the actual delivery dates of the products are driven by payload developers schedule as negotiated real time for each stage with NASA/OZ office.

Frequency Of Submission: Update for each stage as required.

Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION:

- (a) Hard copy and CD to MSFC/POIF-for the US Lab and Truss Layout/Schematic
- (b) Hard copy to NASA EXPRESS/WORF Chief Engineer, MSFC/POIF, and KSC Configuration Management (Boeing)/Utilization (NASA) for the EXPRESS/WORF Rack Layouts/Schematics
- (c) Program authorized electronic library (VMDB)
- (d) Payload Data Library (PDL)
- (e) NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: None.



**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

1a. DRD Title: Increment Capability Reports  1b. Data Type: 3	2. Date of Current Version  10/01/05	3a. DRD No.  F-PA-27	3b. RFP/Contract No.  NAS15-10000
13. Use (Define need for, intended use of, and/or anticipated results of data) This DR is used to document the anticipated ISS resources available for payload use during a given increment. The information may be used by NASA and the International Partners for planning payload activities in their respective laboratory elements and the truss.			5. DRD Category <input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
6. References (SOW, Clause, etc.) SOW paragraph 8.3.3.6		7. Interrelationships (e.g., with other DRDs) None.	

8. PREPARATION INFORMATION:

SCOPE: This DR describes the results of the ISS level analysis of major subsystems to define resources available during a given increment. This DR is submitted for each increment.

CONTENT: The analyses may include:

- electrical power availability and channelization
- active thermal control availability and channelization
- command and data handling (USOS busses in USL, truss, CAM, and extended into JEM and APM only)
- communications and tracking (USOS downlink capability only)
- environmental control and life support

FORMAT: Any format acceptable by the electronic repository.

9. OPR: OZ

10. FIRST SUBMISSION DATE: Generically at I-12 months. However, the actual delivery dates of the products are driven by payload developers schedule as negotiated real time for each stage with NASA/OZ office.

Frequency Of Submission: Final submitted for each increment. No updates required.

Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: None.



**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

<b>1a. DRD Title:</b>  Workforce Reports  <b>1b. Data Type:</b> 3	<b>2. Date of Current Version</b>  12/14/09	<b>3a. DRD No.</b>  F-PC-03	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data)  The semi-annual report is used by the LA organization to provide workforce information to senior center management. The supplemental report is used by NASA Headquarters to support congressional inquiries.			<b>5. DRD Category</b> <input type="checkbox"/> Technical <input checked="" type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW 1.2.3.3		<b>7. Interrelationships</b> (e.g., with other DRDs)  All PC and PM DRDs	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** The reports provide workforce data by geographic location. There are two types of reports: 1) a Semi-Annual Workforce Report by location, and 2) a supplemental Workforce Report.

**CONTENT:** The semi-Annual workforce report should provide Equivalent Personnel (EPs) by location, specifically on or near site (JSC), and by State for workforce outside of the Houston area. The report shall include contract labor and subcontract labor. The data should be reconcilable to other financial deliverables. The content and frequency of the supplemental Workforce Report may vary based on specific direction provided by NASA Headquarters to support congressional inquiries. Its most common form is an annual request to provide workforce data by state, congressional district, or Zip Code.

**FORMAT: Semi-Annual submissions: The contractor format is acceptable.**

**Supplemental Submissions:** Specific formatting will be mutually agreed upon by the Contractor and NASA.

**9. OPR:** OH

**10. FIRST SUBMISSION DATE:** Ten (10) Workdays after initial month end

**Frequency Of Submission:**

Semi-Annual Submission: Ten (10) workdays after period end.

Supplemental Submissions: The submission date for supplemental reports will be mutually agreed upon by the Contractor and NASA.

**Additional Submissions:**

**11. MAINTENANCE:** Document will be maintained electronically. Changes shall be incorporated by change page or complete re-issue..

**12. COPIES/DISTRIBUTION:**

(electronic): 1 copy to LO

1 copy to OH

1 copy to a Program authorized repository (EDMS or equivalent)

**13. REMARKS:** None

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

<b>1a. DRD Title:</b>  Work Breakdown Structure (WBS) and Dictionary  <b>1b. Data Type: 1</b>	<b>2. Date of Current Version</b>  3/8/11	<b>3a. DRD No.</b>  F-PC-04	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data)  Provides framework to define work and to establish financial reporting levels and to correlate schedules.			<b>5. DRD Category</b> <input type="checkbox"/> Technical <input checked="" type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW 1.2.3.4		<b>7. Interrelationships</b> (e.g., with other DRDs)  All PC and PM DRDs	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** Contains the contractual Work Breakdown Structure (WBS), the WBS Dictionary, and a map to the ISS Program WBS.

**CONTENT:** Contains the contractual WBS, the corresponding dictionary, Program map, and specific requirements as follows:

- a. WBS: The WBS shall subdivide the total contracted effort into elements that serve as the basis for detailed planning and control of the project, and permit collection of cost and schedule data at element level. These elements include hardware, software, services, tasks, etc. It shall include all subcontracting and major procurement effort at the proper level. It shall be product oriented and structured so that key SOW tasks are at an appropriately high level.
- b. WBS Dictionary: The WBS Dictionary shall define the scope of each WBS element and narratively describe the tasks included in each element
- c. Program WBS Map: The contractor shall provide a mapping of the contract WBS to the ISS Program WBS.
- d. Specific requirements: Integration and Operations (I&O) discrete tasks considered to be “modifications” (not baseline sustaining) shall be reported in WBS 8.0, “Modifications”. Categorization of an I&O discrete task as WBS 5.0 or WBS 8.0 should be agreed to by NASA and Boeing. In general, scope to be reported under WBS 8.0 will meet the following criteria:
  - Hardware or new software CSCIs to be delivered
    - DIL (DD250)
    - GFE (1149)

- Test Support Equipment (TSE)
- Flight Support Equipment (FSE)
- Discrete analysis, integration task, test, study, etc.

All discrete modification effort will go into 8.X unless approved by the NASA COTR. International Travel budget will be distributed to the prime teams's WBS 7.X or 8.X per the PIO or SSCN.

**FORMAT:** Per JSC instructions and in a format supported by the program-authorized electronic library. The WBS shall be in a chart format showing element relationships. The WBS Dictionary shall be ordered in consonance with the WBS and shall reference each WBS element by its identifier and name. Specific formatting for the map to the Program WBS will be done by LO/contractor.

**9. OPR:** OH

**10. FIRST SUBMISSION DATE:** Draft with initial proposal. Baseline submission within thirty (30) operating days after contract start date.

**Frequency of Submission:** Update as required.

**Additional Submissions:**

**11. MAINTENANCE:** Document will be maintained electronically. Information shall be updated as required by the contractor.

**12. COPIES/DISTRIBUTION:**

**(hard copy):** 2 copies to LO

1 copy to OH

1 copy OH/Data Management

**(electronic):** 1 copy to LO

1 copy to OH

1 copy Contracting Officer's Technical Representative (COTR)

1 copy to the Contracting Officer

1 copy to a Program authorized repository (EDMS or equivalent)

**13. REMARKS:** NONE

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

<b>1a. DRD Title:</b>  Management Plan  <b>1b. Data Type: 1</b>	<b>2. Date of Current Version</b>  01/01/04	<b>3a. DRD No.</b>  <b>F-PM-01</b>	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data)  To describe the contractor's management organization, approach and systems.			<b>5. DRD Category</b> <input type="checkbox"/> Technical <input checked="" type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW paragraph 1.1.1.1		<b>7. Interrelationships</b> (e.g., with other DRDs) None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** The Management Plan shall describe the basis for the contractor management organization, approach and systems. It shall provide a comprehensive integration of all management systems of the contractor, subcontractors, and major vendors. The systems will include those specifically required to accomplish the Statement of Work, as well as those systems and procedures that are to be set in place by the contractor.

**CONTENT:** The Management Plan shall address the contractor's plans for work definition and authorization, scheduling, budgeting, data accumulation, Safety and Mission Assurance, risk management, subcontract/material control, indirect cost management, baseline control, and organization structure.

The following issues should also be addressed:

1. A discussion of the new processes/procedures, which will be employed to increase efficiencies on the contract.
2. How the contractor plans to utilize Associate Contractor Agreements to ensure contractual requirements are fulfilled. (Reference clause in section H)
3. A discussion of how new requirements will be fulfilled under this contract. New requirements refer to requirements, which were not being performed under NAS 15-10000 but will be performed under this contract extension.
4. The contractor shall discuss its approach for assessing contract performance. What metrics will be utilized by Boeing Management to monitor performance on this contract? The contractor shall provide the rationale to demonstrate the appropriateness and effectiveness of its proposed assessment approach.

**FORMAT:** Contractor format is acceptable.

9. **OPR:** BG/Contracting Officer  
Contracting Officer's Technical Representative (COTR)

**10. FIRST SUBMISSION DATE:** With initial proposal

**Frequency Of Submission:**

- As necessary to describe and justify major changes in the contractor's management organization, approach and/or systems.
- Within 45 days after the addition/deletion of major content to the contract which is mutually agreed to by the parties.

**11. MAINTENANCE:** Changes shall be incorporated as required by complete reissue.

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)

**13. REMARKS:** None

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b>  <b>Integrated Management Review Products</b>  <b>1b. Data Type: 3</b>	<b>2. Date of Current Version</b>  <p align="center">10/01/10</p>	<b>3a. DRD No.</b>  <p align="center"><b>F-PM-02</b></p>	<b>3b. RFP/Contract No.</b>  <p align="center">NAS 15 -10000</p>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data)  These packages support the monthly management reviews of costs, schedule, and technical performance. The format provides a standardized approach for review materials.			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW paragraph 1.1.1.2 NPG 7120.5A and NG 9501.2D		<b>7. Interrelationships</b> (e.g., with other DRDs)  <p align="center">All PC and PM DRDs</p>	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** These data packages document the monthly and quarterly integrated management reviews of the cost, schedule, and technical performance on the contract. The data provided per the requirements of this DRD should reconcile with the data provided per the requirements of DRD PC27 (Contractor Financial Management Report (533M), and PC-06. This DRD shall be delivered monthly for work in WBS 7.0 and 8.0 (spares and modifications) and shall be delivered quarterly for I&O (WBS 5.0).

**CONTENT:** These packages support the monthly and quarterly management reviews of cost, schedule, and technical performance. The metrics shall be developed and defined by the contractor with concurrence from the Government. These metrics shall provide linkage to Program level metrics in the Management Information System. Metrics that effectively indicate the level of success in the execution of contract requirements and the status of the contractor's achievement against the performance standards contained within this statement of work or elsewhere in this contract shall be presented at the program review. The format provides a standardized approach for review materials.

The Monthly and Quarterly Integrated Review package:

Summary Section:

- Status of fiscal year Program cost (budget and actuals/forecast), staffing (plan and actuals/forecast), management reserve, undistributed budget, risks and opportunities, schedule, and technical performance.

- Cumulative variance explanations (to fiscal year plan) and End-Of-Year trend variance explanations.
- Major Contract Milestone Schedule

Component Sections (done at major element/organization/subsystem level)

Include all Summary Section items.

- Budget and forecast trace (*shall be provided for all WBS's by subsystem level*)
- I&O Sustaining Task Status and associated metrics: Should include a status to the baselined work plan on work accomplished vs. planned, work not completed or delayed, and major work to be completed in the next 90 days. Status should contain detail sufficient for NASA to understand progress of completing work plan.
- Project status and schedule for projects (I&O Modifications, OPD, and Spares) less than \$5M: major milestones and progress toward milestone completion..
- Project status and schedule for projects (I&O Modifications, OPD, and Spares) greater than \$5M. This value includes the entire project regardless of fiscal year expenditures. This should include metrics showing actual work completed vs. work scheduled to be completed and actual cost expended vs. cost budgeted for work.
- DIL Status
- IMP/IMS Spotlight Schedule

**FORMAT:** Specific formatting to be tailored by NASA/contractor

**9. OPR: OH**

**10. FIRST SUBMISSION DATE:** The first Monthly input should support a review 20 working days after the initial financial month end.

**Frequency Of Submission:** Monthly for spares and modifications (WBs 7.0 and 8.0)  
Quarterly for I&O (WBS 5.0): October-December data, January-March data, April-June data,  
July-September data

**Additional Submissions:**

**11. MAINTENANCE:** Changes shall be incorporated as required by change page or complete reissue.

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management  
8 copies LO  
1 copy LW  
1 copy OH  
1 copy Contracting Officer's Representative (COTR)

**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)  
1 copy to LO  
1 copy to LW  
1 copy to OH  
1 copy to Contracting Officer's Technical Representative (COTR)  
1 copy to BG/Contracting Officer  
1 copy to OC/Boeing Contract Monitor

**13. REMARKS:** None

**DATA REQUIREMENTS DESCRIPTION  
(Based on JSC-STD-123)**

<b>1a. DRD Title:</b> Socio-Economic Subcontract Reporting  <b>1b. Data Type: 2</b>	<b>2. Date of Current Version</b>  <p align="center">03/01/06</p>	<b>3a. DRD No.</b>  <p align="center"><b>F-PM-03</b></p>	<b>3b. RFP/Contract No.</b>  <p align="center">NAS 15 -10000</p>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data)  To report contractor's efforts and progress toward meeting the contractor's socio-economic goals established in Clause G-17 of the subject contract.			<b>5. DRD Category</b> <input type="checkbox"/> Technical <input checked="" type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) <i>G.17 SOCIO-ECONOMIC SUBCONTRACTING GOALS</i> NFS 1852.219-76 NASA 8 Percent Goal		<b>7. Interrelationships</b> (e.g., with other DRDs) F-PM-04	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** To document contract and subcontractor efforts and progress to foster subcontracting opportunities for small, small disadvantaged, and women-owned small businesses.

**CONTENT:**

a) Metrics - The report shall provide the contractor's metrics providing actual expenditures for the preceding quarter and the current fiscal year, inclusive of lower-tier subcontractor actuals. Breakdown will include metrics by category as indicated in clause G.17.

b) Reporting of actions taken and a description of efforts expended by contractor and subcontractors toward enhancing small business, small disadvantaged business, and women-owned business utilization.

**FORMAT:** Contractor format is acceptable.

**9. OPR:** BG

**10. FIRST SUBMISSION DATE:** April 30, 2004

**Frequency Of Submission:** Quarterly submissions for January 1<sup>st</sup> – March 31<sup>st</sup> and July 1<sup>st</sup> – September 30<sup>th</sup> are due no later than the 21<sup>st</sup> day after the close of the quarter. Quarterly submissions for April 1<sup>st</sup> – June 30<sup>th</sup> and October 1<sup>st</sup> – December 31<sup>st</sup> are due no later than the 30<sup>th</sup> day after the close of the quarter.

**11. MAINTENANCE:** Changes shall be incorporated as required by change page or complete reissue.

**12. COPIES/DISTRIBUTION:**

- 1 original/record (hard copy):** OH/Data Management
- 1 electronic copy:** to a Program authorized repository (EDMS or equivalent)
- 1 copy to Contracting Officer

**13. REMARKS:** None



**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Subcontracting Plan  <b>1b. Data Type: 1</b>	<b>2. Date of Current Version</b>  01/01/04	<b>3a. DRD No.</b>  F-PM-04	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) To update the contractor's subcontracting plan in accordance with FAR 19.702(a)(1). The government will review the plan to verify compliance with the FAR.			<b>5. DRD Category</b> <input type="checkbox"/> Technical <input checked="" type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) Clause 52.219-9		<b>7. Interrelationships</b> (e.g., with other DRDs) SF 294 submissions	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** To document contract and subcontract efforts to foster subcontracting opportunities for all socio-economic small businesses.

**CONTENT:** The contents of the revised subcontracting plan shall be in accordance with paragraph (d) of FAR clause 52.219-9.

**FORMAT:** Contractor format is acceptable.

**9. OPR:** BG

**10. FIRST SUBMISSION DATE:** Submit with initial proposal

**Frequency Of Submission:** Semiannually on February 1<sup>st</sup> and August 1<sup>st</sup> of each year. The revision submitted on February 1<sup>st</sup> shall incorporate all reportable actions from July 1<sup>st</sup> to December 31<sup>st</sup> of the previous year. The revision submitted on August 1<sup>st</sup> shall incorporate all reportable actions from January 1<sup>st</sup> to June 30<sup>th</sup> of the present year. A reportable action is defined as a modification to this contract which increases the contract value by greater than \$500,000.

Any individual change valued at over \$50 Million requires an update to the plan. Any outstanding modifications shall be rolled into the plan at that time (not waiting for the six month interval).

**11. MAINTENANCE:** Changes shall be incorporated as required by change page or complete reissue.

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)

1 copy to Contracting Officer

**13. REMARKS:** No submission is required on February 1, 2004

**DATA REQUIREMENTS DESCRIPTION  
(Based on JSC-STD-123)**

<b>1a. DRD Title:</b> Data Accession List  <b>1b. Data Type: 3</b>	<b>2. Date of Current Version</b>  03/16/2004	<b>3a. DRD No.</b>  F-PM-07	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) To provide an index of data that is available on request. It is a medium for identifying contract internal data, which has been generated by the contractor in compliance with the work effort described in the statement of work and other contract requirements.			<b>5. DRD Category</b> <input type="checkbox"/> Technical <input checked="" type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) All SOW Paragraphs Clause H. 43 ACCESS TO CONTRACTOR DATA		<b>7. Interrelationships</b> (e.g., with other DRDs) None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** The Data Accession List shall be a cumulative listing of all contractor-generated documentation including drawings. The Data Accession List serves as a medium for identifying internally released data, which has been generated by the Contractor and his Subcontractors/Suppliers in compliance with the work effort described in the Statement of Work.

**CONTENT:** The Data Accession List shall provide a listing of all data requirement documentation plus other project-pertinent documents. The format and content of this list shall be prepared by the contractor to document compliance with the statement of work and other contract requirements. The list shall be a cumulative listing of contractor-generated documentation generated to date, data released during the past quarter, and data submitted to NASA. The list shall include the related document number, title, date, and revision.

**FORMAT:** On-line access to the data listing can be provided in lieu of hard copy listings.

**9. OPR:** OH

**10. FIRST SUBMISSION DATE:** **Quarterly Delivery** - April 15, 2004  
**Annual Delivery** – October 15, 2004

**Frequency Of Submission:** Quarterly update shall be a complete new submittal incorporating all data into a consolidated listing delivered electronically only. Annual delivery shall include both electronic and hardcopy.

**11. MAINTENANCE:** Changes shall be incorporated as a complete reissue.

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy) - Annually:** OH/Data Management  
**1 electronic copy - Quarterly:** to a Program authorized repository (EDMS or equivalent)

**13. REMARKS:** None

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Property Reporting with Element Pricing Methodology  <b>1b. Data Type: 3</b>	<b>2. Date of Current Version</b>  10/01/10	<b>3a. DRD No.</b> F-PM-08	<b>3b. RFP/Contract No.</b> NAS 15-10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) To report NASA Property in the custody of contractors per the (3) reporting types		<b>5. DRD Category</b> <input type="checkbox"/> Technical <input checked="" type="checkbox"/> Administrative <input type="checkbox"/> SR&QA	
<b>6. References</b> (SOW, Clause, etc.) 1) Procurement Information Circular (PIC) 04-12* 2) NASA FAR Supplement 1845.7101 3) ISS Major Element Values 4) Clause H.52		<b>7. Interrelationships</b> (e.g., with other DRDs) None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

- SCOPE:**
- 1) Quarterly reporting shall be in compliance with NASA PIC 03-14, 04-12\* and additional requirement for the 1<sup>st</sup> tier subcontractors.
  - 2) Annual reporting shall be in compliance with NASA FAR Supplement Subpart 1845.7101.
  - 3) ISS Major Element Values

**CONTENT:**

STANDARDS FOR ALL REPORTS

- A. Acquisition costs shall be developed using actual costs to the greater extent possible, especially costs directly related to fabrication such as labor and materials. Where estimates are used, there must be a documented basis. Supporting documentation shall be maintained and available for all amounts reported.
- B. Items that are considered obsolete in the plant clearance cycle or heritage assets must be reported separately. Obsolete property is property for which there are no current plans for use in their intended purpose. Examples of obsolete property are items in configurations which are no longer required or used by NASA or items held for engineering evaluation purposes only. NASA may have approved the retention of these items for programmatic reasons even though they have no current plans to be used.

**1) QUARTERLY PROPERTY FINANCIAL REPORTS** -The quarterly report shall be submitted using the format described in the Contractor-Held Asset Tracking System (CHATS) User's Manual. Contractors shall report all NASA-owned property in US dollars (regardless of the location) to include: real property and equipment, special test equipment, special tooling, agency peculiar property greater or equal to \$100,000, and material and contract work in process of any value in their possession (including subcontractors). Negative reports are required.

**2) ANNUAL REPORTS** - provides financial data on government-furnished and contractor-acquired property to which NASA has title. Contractors shall report all NASA-owned property in US dollars (regardless of the location), to include: real property and equipment, special test equipment, special tooling, agency peculiar property, and material and contract work in process regardless of cost (including subcontractors). Negative reports are required. This reporting shall be completed in accordance with the NASA FAR Supplement Subpart 1845.7101 and any supplemental guidance provided by the contracting officer.

**3) ISS MAJOR ELEMENT VALUES REPORTS** - provide ISS major elements property (Airlock, FGB, Lab, Node 1, P1, P3, P4, P5, P6, PMA 1, PMA 2, PMA 3, S0, S1, S3, S4, S5, S6, Z1, Subsystems, and Mission Software) estimated value for the purpose of NASA HQ FMD financial reporting and subsequent depreciation of Government-owned ISS.

**9. FORMAT:**

- 1) **Quarterly Property Financial Report**—The quarterly report shall be submitted electronically into CHATS using the format described in the CHATS User’s Manual.
- 2) **Annual Report**—NASA Form 1018
- 3) **ISS Major Element Values Report**—Agreed to by Contractor and NASA using the Element methodology outlined within the element pricing package.

**10. OPR: BG**

**11. FIRST SUBMISSION DATE:**

- 1) **Quarterly Property Financial Report:**
  - Due 7/21 for period ending 6/30
  - Due 10/15 for period ending 9/30
  - Due 1/21 for period ending 12/30
  - Due 4/21 for period ending 3/31
- 2) **Annual Report:** Due 11/30
- 3) **ISS Major Element Values Report:** Submit along with each quarterly and annual report

**12. MAINTENANCE:** Revisions shall be incorporated by change page or complete reissue.

**13. COPIES/DISTRIBUTION:**

- 1) **Quarterly Property Financial Report:**
  - a. Submit electronically into CHATS at <http://nasachats.gsfc.nasa.gov> and to the NASA JSC Property Administrator
  - b. 1 hardcopy to the PCO
- 2) **Annual Report:**
  - a. Submit electronically through the NASA Form 1018 Electronic Submission System (NESS)
  - b. 1 hardcopy to PCO
- 3) **ISS Major Element Values Report:**
  - a. Submit electronically along with each quarterly and annual report (submit to the NASA Contract Property E-mail address as CHATS nor NESS can currently support attachments of this size)
  - b. 1 soft (electronic) copy to PCO

**14. REMARKS:** None

**\*Although PIC 04-12 requires monthly reporting, the NASA ISS Program has not yet given authorization to implement the monthly submission. Until such time, please deliver as described within the body of this DRD.**

## DATA REQUIREMENTS DESCRIPTION

(Based on JSC-STD-123)

<b>1a. DRD Title:</b> SOW Evidence of Completion Matrix	<b>2. Date of Current Version</b> 10/14/05	<b>3a. DRD No.</b> <b>F-PM-09</b>	<b>3b. RFP/Contract No.</b> NAS 15-10000
<b>1b. Data Type:</b> 1			<b>5. DRD Category</b> <input type="checkbox"/> Technical <input checked="" type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) To provide closure criteria for each paragraph of the Statement of Work			
<b>6. References</b> (SOW, Clause, etc.) Clauses H.37 and H.51		<b>7. Interrelationships</b> (e.g., with other DRDs) None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** The contractor shall provide a matrix defining completion criteria for each numbered paragraph of the statement of work.

**CONTENT:** This document shall identify the completion requirements for each numbered statement of work paragraph. Completion requirements shall be identified within the matrix in terms of products, events or time period. Paragraphs within the matrix will be categorized as I&O, DDT&E, OPD and/or Spares. Updates to the Evidence of Completion Matrix will be made in response to approved supplemental agreements and Work Plan Revision Requests (WPRRs) compiled and submitted on an annual basis.

**FORMAT:** The specific format of the document (e.g. Microsoft Word, Excel, etc.) shall be mutually agreed to between the parties and shall be compatible with the Program authorized repository

**9. OPR:** BG

**10. FIRST SUBMISSION DATE:** March 30, 2004 for the baseline submission

Frequency Of Submission: Baseline plus annually on the 1<sup>st</sup> of September

Additional Submissions: None.

**11. MAINTENANCE:** The document shall be maintained electronically.

**12. COPIES/DISTRIBUTION:**

Electronic copy: to a Program authorized repository (EDMS or equivalent)

Contracting Officer/BG

COTR/OA

**13. REMARKS:** None

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Certification Baseline Documents and Supporting Documentation <b>1b. Data Type:</b> 3	<b>2. Date of Current Version</b>  Various	<b>3a. DRD No.</b>  F-PM-10	<b>3b. RFP/Contract No.</b>  NAS 15-10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data)  The Certification Baseline document will define the certified performance for the ORUs and document agreements to operate outside of the defined parameters used in CoFR analysis. In addition, the Certification Baseline document will summarize the analyses performed for extending the operational lifetime of the ISS until 2028.		<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical ___ Administrative ___ SR&QA	
<b>6. References</b> SOW paragraph :3.2.2.3.4		<b>7. Interrelationships</b> (e.g., with other DRDs) PC08 – Acceptance Data Packages VE32- Vehicle Engineering Data	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:**

This DR establishes the content, format, maintenance, and submittal requirements for the Certification Baseline Document. The products of this DRD are:

- a) Volume 1, SSP 50699-01 (ORUs only)
- b) Volume 2, SSP 50699-02 (ORUs only)
- c) Templates (flat files) (ORUs only)
- d) Supporting Documentation (ORUs only) – all supporting documentation referenced in templates, which has not been previously delivered to the authorized Program repository. (ORUs only)
- e) Volume 4, SSP 50699-04 (ISS Lifetime Extension)

**CONTENT:**

**a) Volume 1, SSP 50699-01**

Volume 1, SSP 50699-01, shall describe the performance design capabilities of USOS ORUs.

The ORU portion of Volume 1 shall compile the performance, environment, and physical constraints of the ORU as identified in the corresponding ATP/41172 data. Common to each ORU will be the main data information for Performance, Environment and Physical characteristics. One additional “Other” category will serve as means to cover some peculiar aspect of an ORU, which may fall outside of the aforementioned headings. For "Performance", depending on the ORU type, categories would include:

1. Power Consumption
2. Electrical Power
3. Resistance
4. Impedance
5. Current
6. Gain
7. Torque
8. Force
9. Closure Cycles
10. External Leakage
11. Internal Leakage
12. Command Response Time
13. Operating Pressure
14. Temperature (Operational Set Point)
15. Deployment Speed
16. Cable Length
17. Cable Tension
18. Displacement
19. Other

For "Environments" typical categories are:

1. Temperature (Thermal Cycling)
2. Thermal Vacuum
3. Vibration in the x, y, z axis
4. Acoustics
5. Leakage
6. Oxygen Compatibility (For O2 ORUs)
7. Burn-In
8. Corona
9. Depress/Repress
10. Pyro-Shock
11. EMI/EMC
12. Pressure

Items 9 - 11 are performed during the qualification phase of the ORU as noted per SSP 41172.

For "Physical", the weight of the ORU is identified.

For each of the above categories, the limit values are entered in the "Data" column as established per applicable Acceptance Test Procedure(s) (ATP). That is max and/or min values with corresponding units. The method and ATP (current version) in which these limits may be found are entered in the last two columns of the table.

Figure 8.2.1-1. Sample ORU template:

Flight: 7A Nomenclature: ORU NAME Boeing P/N: 683-XXXX-1, -2  
 System: ECLSS Vendor P/N: BXXXX-1, -3  
 Subsystem: ACS Supplier: Name here

Specification Requirements	Data Per ATP	Verification		
		Method	ATP	
<b>Performance</b>				
Electrical Power	Voltage: 120 +6/-7 Vdc	T		
Operating Pressure	Max. 3400 psig	T	CRA-1385, Rev. C	
	Min. 0 psig			
	Proof 5100 psig			
Closure Cycles	Min. 100 Cycles	T	CRA-1385, Rev. C	
	Performed Burn -In @ 3450 psig			
External Leakage	Max. $1 \times 10^{-3}$ scc/sec He	T	CRA-1385, Rev. C	
	Min. NS scc/sec He			
Internal Leakage	Max. $2.5 \times 10^{-4}$ scc/sec He	T	CRA-1385, Rev. C	
	Min. NS scc/sec He			
Command Reponse Time	Open 1 to 2.5 sec	T	CRA-1385, Rev. C	
	Close 1 to 10 sec			
<b>Environmental</b>				
Temperature	Max. 55 °F		CRA-1385, Rev. C	
	Min. -40 °F			
Depress/ Repress Rate	Max. 10 psia	T	Ref Vendor Ltr dated 9/8/99 available	
	Min. 5.5 psia			
	Rate 0.001 psia/sec			
Vibration	Freq. Range	Min PSD	T	CRA-1385, Rev. C
	20-200	0.01 G <sup>2</sup> /Hz		
	20-200	3dB/oct		
	80-350	0.05 G <sup>2</sup> /Hz		
	350-2000	-3dB/oct		
	2000	0.07 G <sup>2</sup> /Hz		
	Overall: 6.1 grms duration: 1 minute in each axis			
EMC	Designed to be electromagnetically compatible with itself and with all interfacing equipment	A	N/A	
Corona	Designed to preclude damaging or destructive corona in any ISS operating environment	A	N/A	
<b>Physical</b>				
Weight	Max. ≤ 5 lb	T	CRA-1385, Rev. C	
<b>Reliability</b>				
Storage Life	10 yrs	A	N/A	

Method = A - Analysis; N/A - Not Applicable; NS - Not Specified; T - Test;  
 ATP = Acceptance Test Procedure

**b) Volume 2: SSP 50699-02**

Volume 2, SSP 50699-02, shall describe the ISS Program agreements and supporting rationale to operate the ISS ORUs outside the values identified in Volume 1.

**c) Templates (flat files)**

Individual Excel spreadsheet templates used to document the parameters for each ORU as individual flat files; one flat file for each completed template

**d) Supporting Documentation**

Supporting documentation referenced in the templates that has not been previously delivered into the ISS authorized Program repository.

**e) Volume 4: SSP 50699-04**

Volume 4, SSP 50699-04, shall describe the overall ISS Program plan regarding the extension of the ISS operational lifetime until 2028. The document will summarize and reference completed analysis reports, summarize issues identified from the analysis, and the program disposition of those issues relative to ISS lifetime extension. This document will be used as objective evidence for flight certification (CoFR) after the certified operational lifetime for ISS elements have expired based on launch date.

**FORMAT:**

- a) Volume 1, SSP 50699-01 –  
This document shall be delivered in the Contractor’s format compatible with the ISS Program Electronic repository.
- b) Volume 2, SSP 50699-02 –  
This document shall be delivered in the Contractor’s format compatible with the ISS Program Electronic repository.
- c) Templates (flat files) –  
The Contractor shall electronically deliver the individual Excel spreadsheet templates used to document the parameters for each ORU as individual flat files; one flat file for each completed template.
- d) Supporting Documentation –  
Documents shall be delivered in the Contractor’s format compatible with the ISS Program Electronic repository.
- e) Volume 4: SSP 50699-04  
This document shall be delivered in the Contractor’s format compatible with the ISS Program Electronic repository.

**9. OPR: Vehicle Office**

**10. FIRST SUBMISSION DATE:**

- a) **Volume 1, SSP 50699-01:**  
The final released version shall be delivered twelve (12) months after contract definitization.
- b) **Volume 2, SSP 50699-02:**  
The final released version shall be delivered twelve (12) months after contract definitization.
- c) **Templates (flat files):**  
Electronic flat files will be delivered incrementally beginning three months after contract definitization. All flat files shall be delivered twelve (12) months after definitization.
- d) **Supporting Documentation:**  
Supporting documentation requiring delivery shall be delivered beginning three months after contract definitization.
- e) **Volume 4, SSP 50699-04**

The first baseline shall be released December 2011.

**Frequency Of Submission:**

- a) **Volume 1, SSP 50699-01:**  
Every 6 months as required for updates to hardware ADPs.
- b) **Volume 2, SSP 50699-02:**  
Every 6 months as required for updates to agreements on ORU operation.
- c) **Templates (flat files):**  
Every 6 months as required for updates to hardware ADPs.
- d) **Supporting Documentation:**  
Every 6 months as required for updates to hardware ADPs or updates to agreements on ORU operation.
- e) **Volume 4, SSP 50699-04**  
Every 12 months as required aligning with the completion of ISS lifetime extension analysis phases.

**Additional Submissions:** N/A

**11. MAINTENANCE:**

- a) **Volume 1, SSP 50699-01:**  
Update as required via the ISS change process to maintain currency and accuracy, in accordance with SSP 41170, Configuration Management Requirements.
- b) **Volume 2, SSP 50699-02:**  
Update as required via the ISS change process to maintain currency and accuracy, in accordance with SSP 41170, Configuration Management Requirements.
- c) **Templates (flat files):**  
If the Volume 1 templates are updated, then the corresponding electronic flat files shall be updated as well.
- d) **Supporting Documentation:**  
Volume I or Volume II templates are updated, in accordance with the ISS Change Process, then the corresponding supporting data shall be provided.
- e) **Volume 4, SSP 50699-04**  
Update as required via the ISS change process to maintain currency and accuracy, in accordance with SSP 41170, Configuration Management Requirements.

**12. COPIES/DISTRIBUTION:**

- a) **Volume 1, SSP 50699-01:**
  - 1 original/record (hard copy): OH/Data Management
  - 1 electronic copy: To the Program authorized electronic repository (EDMS or equivalent).
- b) **Volume 2, SSP 50699-02:**

1 original/record (hard copy): OH/Data Management  
1 electronic copy: To the Program authorized electronic repository (EDMS or equivalent).

**c) Templates (flat files):**

1 original/record (hard copy): OH/Data Management  
1 electronic copy: To the Program authorized electronic repository (EDMS or equivalent).

**d) Supporting Documentation:**

1 original/record (hard copy): OH/Data Management  
1 electronic copy: To the Program authorized electronic repository (EDMS or equivalent).

**e) Volume 4, SSP 50699-04**

1 original/record (hard copy): OH/Data Management  
1 electronic copy: To the Program authorized electronic repository (EDMS or equivalent).

**13. REMARKS:** None

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

1a. DRD Title: Payload MDM Configuration Files and PCS Displays  1b. Data Type: 3	2. Date of Current Version  10/01/05	3a. DRD No.  F-RA-04	3b. RFP/Contract No.  NAS15-10000
14. Use (Define need for, intended use of, and/or anticipated results of data) This DR provides reconfiguration files to be resident on the Payload MDM, and payload-unique PCS displays and reconfiguration files to be resident on a PCS.			5. DRD Category X Technical __ Administrative __ SR&QA
6. References (SOW, Clause, etc.) SOW paragraph 8.4.1.15		7. Interrelationships (e.g., with other DRDs) None.	

8. PREPARATION INFORMATION:

SCOPE: This DR includes the delivery of all reconfiguration files which are used by the Payload MDM and the PCS in support of payload operations, and the VDDs associated with those files when appropriate.

CONTENT: These files include reconfiguration data that is used by the Payload MDM and the PCS in the conduct of payload operations. The files will be provided electronically to the MBF and PIMS. The data files will be provided along with a VDD and Transfer of Accountability (DD 1149).

FORMAT: Contractor format (per SSP 50010-01) is acceptable, and must be compatible with the Payload MDM design and the PCS design.

9. OPR: OZ

10. FIRST SUBMISSION DATE: As required per negotiated work plan.

Frequency Of Submission: Typically there will be a preliminary, interim, and final delivery of the products. Actual delivery dates of the products are driven by payload developer's schedule as negotiated real time for each stage.

Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: (a) Mission Build Facility and PIMS

(b) NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: None.

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

<p>1a. DRD Title: Payload Product Integrated List (PPIL)</p> <p>1b. Data Type: 3</p>	<p>2. Date of Current Version</p> <p align="center">10/01/05</p>	<p>3a. DRD No.</p> <p align="center">F-RA-10</p>	<p>3b. RFP/Contract No.</p> <p align="center">NAS15-10000</p>
<p><b>15.</b> Use (Define need for, intended use of, and/or anticipated results of data) This DR documents the versions of payload-related flight and ground software products used to build payload-related software products. As determined in the PPIL Working Group (PSCP Subpanel), there will be a test PPIL for every major payload test and a flight PPIL for each flight of payloads.</p>			<p>5. DRD Category</p> <p align="center">X Technical __ Administrative __ SR&amp;QA</p>
<p>6. References (SOW, Clause, etc.) SOW paragraph 8.4.1.5</p>		<p>7. Interrelationships (e.g., with other DRDs) None.</p>	

8. PREPARATION INFORMATION:

SCOPE: This DR provides a list of the payload-related flight and ground software products.  
 CONTENT: Provides an integrated list of payload software products that are used to support specific ISS stages or ground test configurations.  
 FORMAT: Any format acceptable by the electronic repository.

9. OPR: OZ

10. FIRST SUBMISSION DATE: As required per negotiated work plan.

Frequency Of Submission: Once with update for each flight of payloads manifested for the ISS.  
 Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: None.

**DATA REQUIREMENTS DESCRIPTION  
(Based on JSC-STD-123)**

<b>1a. DRD Title:</b>  <b>Payload Unique Displays Software Requirements Specifications</b>  <b>1b. Data Type: 1</b>	<b>2. Date of Current Version</b>  <p align="center">10/01/08</p>	<b>3a. DRD No.</b>  <p align="center"><b>F-RA-11</b></p>	<b>3b. RFP/Contract No.</b>  <p align="center">NAS 15 -10000</p>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data)  <p align="center">This DRD provides the requirements for which payload unique PCS displays must be verified.</p>			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW paragraph 8.4.1.4		<b>7. Interrelationships</b> (e.g., with other DRDs) None	

**8. PREPARATION INFORMATION:**

- SCOPE: This DR provides the payload-unique PCS display requirements for payloads.
- CONTENT: Documents the requirements for the Computer Software Configuration Item (CSCI) identified as the Payload Support Systems Portable Computer System (PCS) Display CSCI. This CSCI is provided to support the operation of payloads on orbit.
- FORMAT: Any format acceptable to the electronic repository.

9. OPR: OZ

10. FIRST SUBMISSION DATE: As required per negotiated work plan.

Frequency Of Submission: Once with update for each flight of payloads that require new payload-unique displays to be resident on the Portable Computer System (PCS).  
 Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: None.

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Safety & Mission Assurance/Risk Management Plan  <b>1b. Data Type: 1</b>	<b>2. Date of Current Version</b>  01/01/04	<b>3a. DRD No.</b>  F-SA-01	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b>  The plan is used to identify, evaluate, and eliminate or control risks related to safety, health and mission assurance.			<b>5. DRD Category</b> <input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA
<b>6. References</b> SOW 3.8.1.1, 3.8.6.1		<b>7. Interrelationships</b> None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** Applicable to all contractor sites where the contractor is operational including on-site NASA facilities.

**APPLICABLE DOCUMENTS:** See Contents

**CONTENT:** The plan shall demonstrate the contractor's compliance with NFS Clause 1852.223-73 and NPG 8715.3, Appendix H. In addition, the plan shall address:

- a. S&MA Management (SOW 8.1) - Description of the contractor's processes for establishing and maintaining a Quality Management System to meet SAE AS 9100 Rev A and the requirements for Mishap Investigation and Reporting (NPG 8621.1), Safety and Health (JPG 1700.1, MPG 8715.1 and KHB 1710.2), and Lessons Learned (NPG 7120.5 and AG-CWI-001).
- b. Program Risk (SOW 8.3) - Description of the contractor's process for compliance with SSP 50175, NPG 8000.4 and JPD 306.
- c. System Safety (SOW 8.4) – Description of the contractor's process for establishing system safety tasks and activities to identify, evaluate, and eliminate or control hazards associated with space flight hardware and related operations in accordance with NPG 8715.3 (Chapter 3), SSP 30599, SSP 30309, NSTS 1700.7, SSP 13830, SSP 50021 (as specified between SSP 41000 and SSP 41162) and KHB 1700.7.
- d. Reliability and Maintainability (SOW 8.5) – Description of the contractor's process for compliance with SSP 30234.
- e. Quality Assurance (SOW 8.6) - Description of the contractor's processes for compliance with AS 9100 Rev A, SSP 41173, SSP 30695, SSP 50287 (excluding sections on hardware/software acceptance), SSP 30223 and SSP 30524 for both hardware and software.
- f. Software Assurance (SOW 8.4.4) – Description of the contractor's processes for software safety (SSP 30309), software quality assurance (SSP 41173), software quality engineering (SSP 41173). Software Management Plan (SSP 50482), and software certification (SSP 50287).
- g. Operations Safety (SOW 8.7) – Description of the contractor's processes for compliance with SSP 50437.

**FORMAT:** MS Word

**9. OPR:** OE

**10. FIRST SUBMISSION DATE:**

**Frequency Of Submission:** The safety and health aspects of the plan shall be submitted in final form to address NFS 1852.223-73 and NPG 8715.3 Appendix H requirements (Ref, Sections 8.3.a, b, g, h and i above) at proposal submittal. The remainder of the plan (Sections 8.3.c, d, e and f) shall be submitted in draft form at proposal submittal and revised to provide a final plan for approval within 30 days after contract start.

**Additional Submissions:** The plan shall be reviewed at least annually thereafter and updated as required. If there are no changes since the last update, the Contractor shall re-certify its accuracy NLT 1 October of each year.

**11. MAINTENANCE:** The document shall be delivered and maintained electronically. Changes shall be incorporated as required by change page or complete reissue.

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)

**13. REMARKS:** The Safety and Mission Assurance/Risk Management Plan requires approval of the Manager, S&MA/Program Risk Office. The final plan, as approved by the Contracting Officer, shall be incorporated in the contract as Attachment J-6.

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Monthly Safety & Health Metrics  <b>1b. Data Type: 3</b>	<b>2. Date of Current Version</b>  01/01/04	<b>3a. DRD No.</b>  <b>F-SA-02</b>	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b>  Establishes selected Safety and Health Program metrics in accordance with OSHA Requirements			<b>5. DRD Category</b> ___ Technical ___ Administrative _X_ SR&QA
<b>6. References</b> SOW 3. 8.1.4		<b>7. Interrelationships</b> None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** The scope of the information required is limited to the JSC-administered establishments of Houston Texas at NASA Road One, the Sonny Carter Training Facility, and Ellington Field; MSFC and KSC facilities.

**CONTENT:**

1. Management Commitment and Employee Involvement. Dates and types of meetings (i.e Safety Committee Meetings, Employee Safety Meetings, etc), and number of management, supervisors & non-supervisory attendees. Include electronic copies of minutes or representative information.
2. Worksite Analysis. Number of required and performed hazard analyses, job safety analyses and routine inspections for reported month and year-to-date. Refer to JPG 1700.1 for definitions of terms
3. Hazard Prevention and Control -Identified hazards found during routine and special inspections, close calls, mishap investigations, etc., and require correction. Report number found, closed and open during reported month, previous month and year-to-date. Also, include number of JF 1240's \*(See note) in place. Attach copies of JF 1240's (or equivalent) or send electronically. Indicate JF 1240's where abatement has been completed as closed.
4. Safety and Health Training - List courses specific to loss control initiatives (such as slips/trips falls, material handling; etc.) and report number to be trained, completed training and schedule of training. Report other training as "Generic safety training not otherwise specified" (examples include Hazard Communication, Confined Space entry, HAZWOPER, system safety, job safety analysis, etc.) Do not include job proficiency course work where safety is an issue (such as radiography, welding, painting, etc.) Training should be as specified in accordance with the contractor's corporate safety and health program.

\*Note: For KSC use FORM 6-22 and for MSFC use FORM 4371.

**FORMAT:** Format supported by ISS Management Information System

**9. OPR:** OE

**10. FIRST SUBMISSION DATE:**

**Frequency of Submission:** Monthly the by the 10<sup>th</sup> of the month following month being reported

**Additional Submissions:** none

**11. MAINTENANCE:** The document shall be maintained electronically.

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)

1 copy to Occupational Health Officer/NT2

1 copy to Occupational Safety Branch/SD26

**13. REMARKS:** None



**DATA REQUIREMENTS DESCRIPTION  
(Based on JSC-STD-123)**

<b>1a. DRD Title:</b> Hazard Reports  <b>1b. Data Type: 2</b>	<b>2. Date of Current Version</b>  10/01/10	<b>3a. DRD No.</b>  <b>F-SA-04</b>	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) The ISS SRP will use the Hazard Reports to assess the design and operation of ISS element hardware configuration. The GSRP will use Hazard Reports to assess ISS cargo element/launch packages and ground support equipment design and operations for compliance			<b>5. DRD Category</b> — Technical — Administrative _X_ SR&QA
<b>6. References</b> (SOW, Clause, etc.) 3.8.4.1, 3.8.4.2, 7.2		<b>7. Interrelationships</b> (e.g., with other DRDs) None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** Submittals shall consist of Hazard Reports for all Contractor Provided Hardware and GSE. Additionally, this shall document integrated hazard analyses for the ISS Vehicle, as defined by SSP 41000.

**CONTENT:** Hazard Reports shall be provided that are commensurate with the level of maturity of the design in accordance with SSP 30309.

1. The Contractor shall provide a description of the launch and on-orbit configuration of the hardware and software in accordance with SSP 30599, Safety Review Process. Functional diagrams shall be submitted and supplemented with descriptions of interfaces and operations.
2. Hazard Report: Hazard Reports shall include the following data fields:
  - Hazard Report Number
  - Hazard Title
  - Review Level
  - Revision Date
  - Scope
  - Hazard Description
  - Cause Summary
  - Program Stage
  - Interfaces
  - Status of Work

Remarks

- Submittal Concurrence
- Approval
- Mission Phase
- Severity Category
- Likelihood of Occurrence
- Controls

- Method for Verification of Controls
- Safety Requirements
- Detection and Warning Method
- Cause Remarks
- CIL Reference
- Point of Contact.

For Phase I maturity, Hazard Reports shall reflect the preliminary design and define hazards causes. Additionally, provide the preliminary hazard controls and verification methods when available. For Phase II maturity, the Hazard Reports shall be updated to reflect the critical design and define the finalized hazard controls and verification methods. For Phase III maturity, the Hazard Reports shall be updated to reflect the as-built contractor design and document completion of verification.

**FORMAT:** These deliverables shall be in the format described in SSP 30599.

**9. OPR:** OE

**10. FIRST SUBMISSION DATE:**

**Frequency Of Submission:** 45 days pre safety review

**Additional Submissions:** none

**11. MAINTENANCE:** This specification shall be maintained electronically

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository VMDB or equivalent)

1 copy ISSA Program independent safety review panel\*

1 copy ISS Chairmen, Ground Safety Review Panel, KSC, UB-F \*

1 copy Executive Secretary, Safety Review Panel, NE42\*

\*Note: Submittal of the Hazard Report will be based on associated needs of the Joint ISS and SSP Safety Review Panel (SRP), and Ground Safety Review Panel (GSRP).

**13. REMARKS:** The Hazard Report shall be prepared in accordance with SSP 30599 in support of the safety review process

**DATA REQUIREMENTS DESCRIPTION  
(Based on JSC-STD-123)**

<b>1a. DRD Title:</b> Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)  <b>1b. Data Type: 1</b>	<b>2. Date of Current Version</b>  10/01/10	<b>3a. DRD No.</b>  F-SA-05	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> The FMEA serves as a source that documents the systematic evaluation by item failure mode analysis, the potential impact of each functional or hardware failure on mission success, personnel, and systems safety, system performance, maintenance, and maintainability requirements. Each potential failure is assessed in order that appropriate corrective action(s) may be taken to eliminate or control the high risk items. The CIL documents the item's inability to meet program requirements and/or risk deemed necessary for Program Managements acceptance.			<b>5. DRD Category</b> <input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA
<b>6. References</b> SOW 3.8.5.1 & 7.2		<b>7. Interrelationships</b> None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** The FMEA/CIL shall be performed on program hardware to the equipment level consistent with the identified on-orbit maintenance level, and on ground support equipment, as specified in SSP 30234.

**CONTENT:** The FMEA/CIL Report and worksheet contents are specified by SSP 30234.

**FORMAT:** The data element format shall be specified in SSP 30234. The reports shall be delivered electronically in a MS Word compatible format that can be edited and made accessible in the VMDB.

**9. OPR:** OE (COTR Approval Delegated to OE/Safety & Mission Assurance/Program Risk Office)

**10. FIRST SUBMISSION DATE:** First report due March 31, 2004

**Frequency Of Submission:** As required to support CoFR. individual FMEA/CIL worksheets upon updates

**Additional Submissions:** none

**11. MAINTENANCE:** The document shall be maintained electronically.

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)

**13. REMARKS:** None

**DATA REQUIREMENTS DESCRIPTION  
(Based on JSC-STD-123)**

<b>1a. DRD Title:</b> R&M Allocations, Assessments, and Analyses Reports  <b>1b. Data Type: 3</b>	<b>2. Date of Current Version</b>  01/01/04	<b>3a. DRD No.</b>  F-SA-06	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> The R&M Allocations, Assessments, and Analysis Report shall be used to identify, validate and status quantitative and qualitative R&M allocation and performance characteristics of space station functions and hardware and to document preventive maintenance requirements and limited life items.			<b>5. DRD Category</b> <input type="checkbox"/> Technical <input type="checkbox"/> Administrative <input checked="" type="checkbox"/> SR&QA
<b>6. References</b> SOW 2.7.1.a.3; 2.7.1.a.4; 3.8.5.2, 3.8.5.2.1, & 3.8.5.2.2		<b>7. Interrelationships</b> None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** This report shall provide R&M predictions and analyses for the space station system according to designated capabilities, functions, and on-orbit repairable items. Predicted and/or experienced R&M performance shall be documented according to capability, function, and on-orbit repairable item for each stage of the assembly sequence.

**CONTENT:** The R&M Allocations, Assessments, and Analysis Report shall document the program status and progress in executing the R&M requirements and objectives. The asterisk represents those items no longer required once verification of SSP 41000 is completed. The report shall contain the following:

- (a) \* R&M Requirements Compliance Summary
  - (1) Assess compliance at system, segment, and End Item level.
  - (2) Identify areas of non-compliance and corresponding program approved waiver.
- (b) \* R&M Qualitative Assessments
  - (1) Provide ground rules and assumptions used in assessments.
  - (2) Identify methods/tools used in performing assessments.
  - (3) Provide results summary, conclusions, and recommendations.
- (c) R&M Quantitative Predictions and Analyses
  - (1) Define the approach/process used, including prediction techniques, methodologies, and tools.
  - (2) Identify associated ground rules and assumptions used in making predictions and performing analyses.
  - (3) \* Provide R&M source data in accordance with Table 1.
  - (4) \* Provide EVA, EVR, and IVA maintenance time predictions in accordance with **Table 2** to demonstrate compliance with allocations and assess ISS performance. Modeling of crew maintenance time shall use algorithms in **Table 3**.
  - (5) \* Provide EVA, EVR, and IVA overhead maintenance time predictions.

- (6) \* Provide maintenance action rate predictions.
  - (7) Provide summaries of major contributors to probability of failure and crew maintenance time.
  - (8) \* Provide percentages of failure modes capable of being isolated to a single maintainable equipment item and to the ambiguity group.
  - (9) Identify source data used in analysis.
  - (10) Provide reliability block diagrams and associated data.
  - (11) \* Provide a summary table of current micro-gravity reliability (probability of success) predictions
  - (12) \* Provide manifest and activation flights of all on orbit maintainable items.
- (d) Preventive Maintenance
- (1) \* Perform preventive maintenance analysis per decision matrix enclosed (see Figure 1)
  - (2) Identify any preventive maintenance reassessments and rationale for changing the interval.
  - (3) Identify ground rules and assumptions.
  - (4) Provide preventive maintenance requirements and rationale.

**FORMAT:** These reports shall be delivered electronically in a format supported by MS Word.

**9. OPR:** OE/S&MA

**10. FIRST SUBMISSION DATE:** First report due March 31, 2004 (annually thereafter)

**Frequency Of Submission:** Report submitted annually and individual data items upon updates

**Additional Submissions:** none

**11. MAINTENANCE:**

**12. COPIES/DISTRIBUTION:**

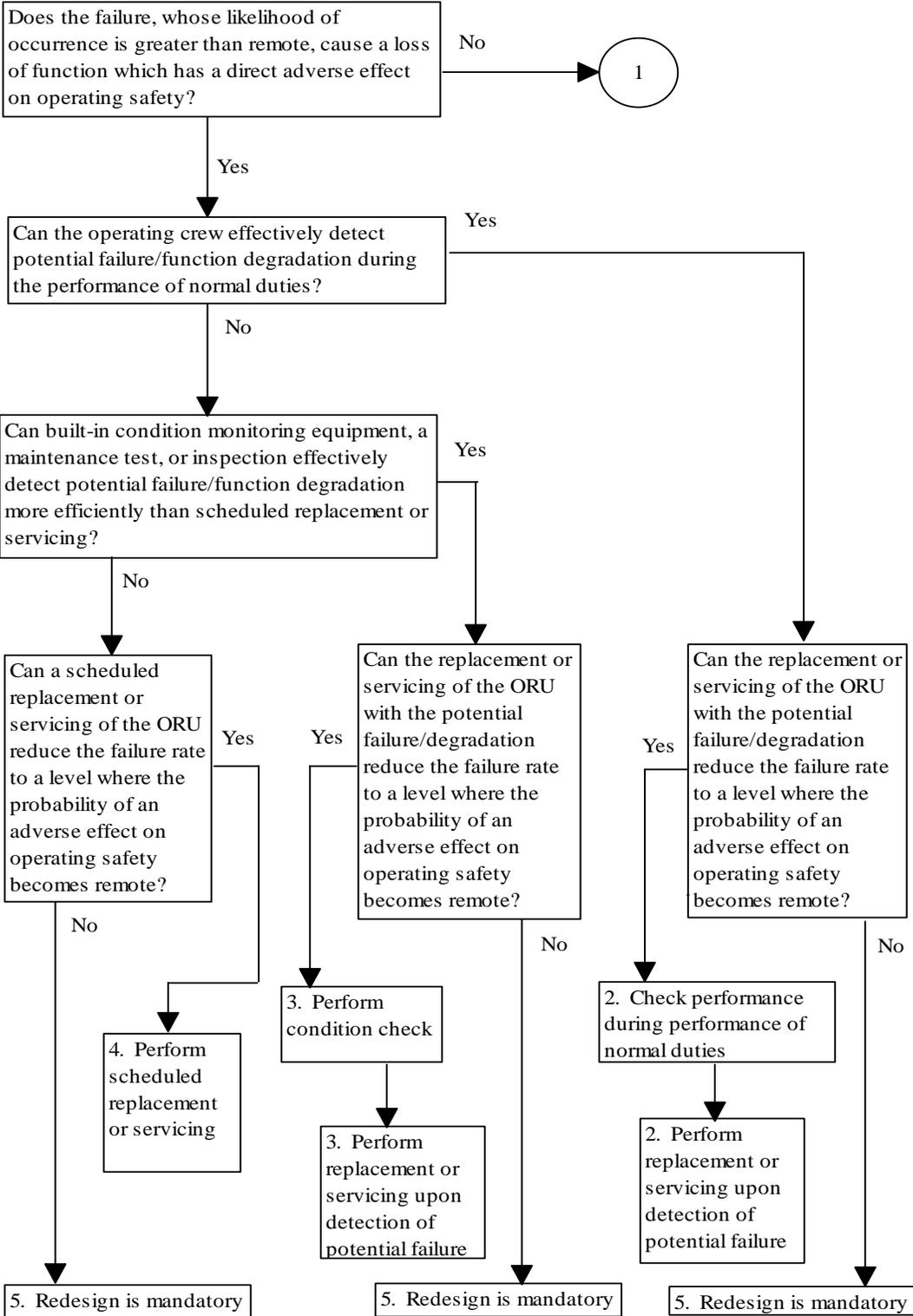
**1 original/record (hard copy):** OH/Data Management

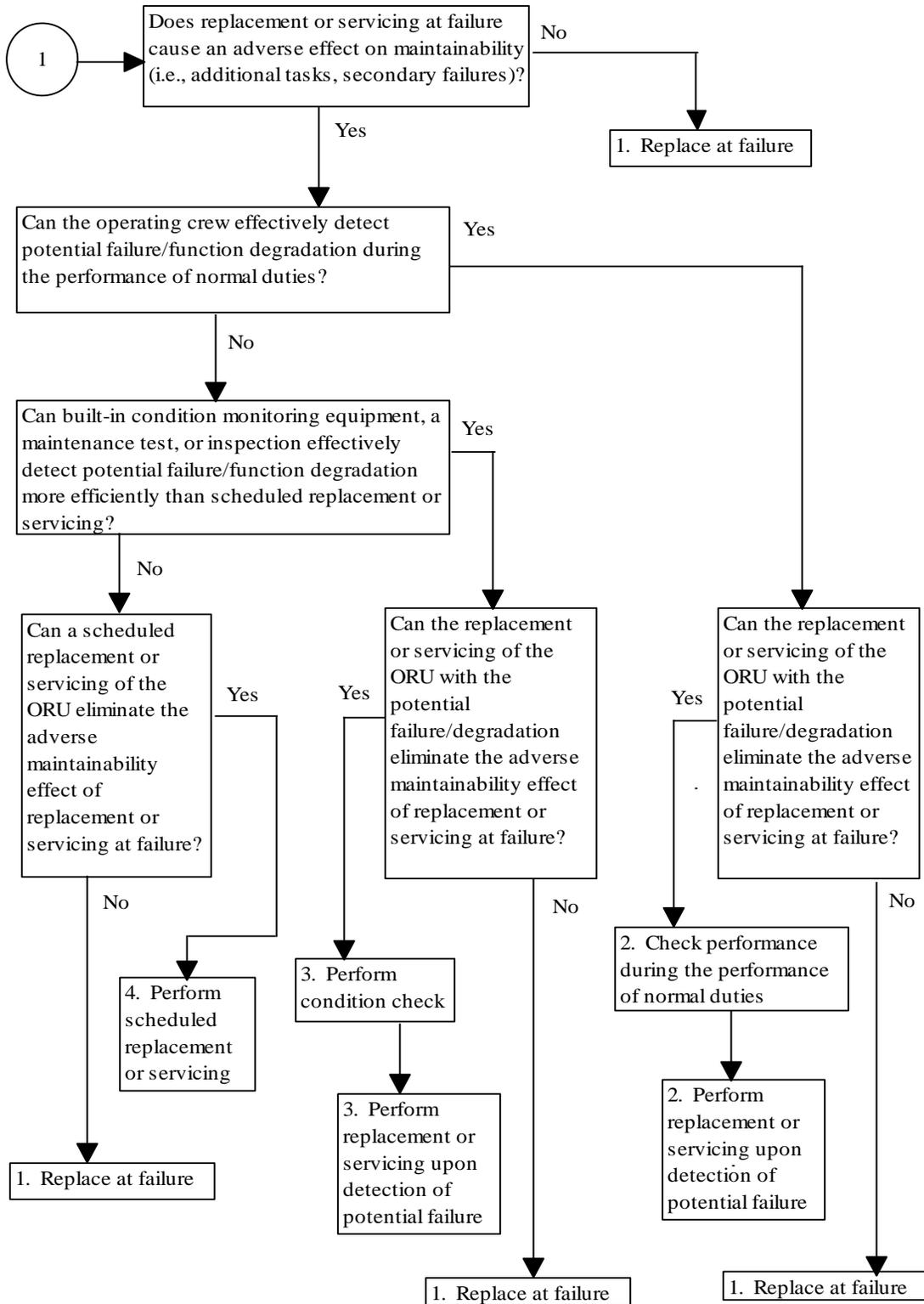
**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)

**1 electronic copy:** to a Program authorized repository (VMDB or equivalent)

**13. REMARKS:** Electronic access of source data shall be made available and compatible with the VMDB

Figure 1 PM Decision Matrix





**TABLE 1: R&M SOURCE DATA FIELD DEFINITION TABLE**

<b>Col</b>	<b>DESCRIPTION</b>
<b>A.</b>	<p><b>Item Name</b> – R&amp;M attributes shall be entered for each item that is to be maintained on orbit. The Vehicle Master Data Base (VMDB) nomenclature shall be used for all R&amp;M reporting. R&amp;M is not responsible to develop the Item Name but shall use it as a reference for reporting R&amp;M parameters. <b>Field specification:</b> Defined by Engineering.</p>
<b>B.</b>	<p><b>Drawing/Part Number</b> – R&amp;M attributes shall be referenced to the Drawing/Part number in the VMDB. R&amp;M is not responsible to develop the Drawing/Part number but shall use it as a reference for reporting R&amp;M parameters. <b>Field specification:</b> Defined by Engineering.</p>
<b>C.</b>	<p><b>Occurrence Number</b> – R&amp;M attributes shall be referenced to a unique Identifying number for each different record of an item that has the same Drawing/Part Number with multiple entries in the VMDB. R&amp;M is not responsible to develop a serial or occurrence number but shall use it, if available, as a reference for reporting R&amp;M parameters. <b>Field Specification:</b> Defined by Engineering.</p>
<b>D.</b>	<p><b>Distributed System Name</b> – The distributed system or subsystem that contains the item in the distributed systems breakdown (i.e., C&amp;DH, EPS, GN&amp;C, etc.). R&amp;M is not responsible to develop a System name but shall use it, if available, as a reference for reporting R&amp;M parameters. <b>Field specification:</b> Defined by Engineering.</p>
<b>E.</b>	<p><b>Subsystem Name</b> – The name assigned to the subsystem of a given distributed system in which an equipment item is located. R&amp;M is not responsible to develop a Subsystem name but shall use it, if available, as a reference for reporting R&amp;M parameters. <b>Field specification:</b> Defined by Engineering.</p>

**TABLE 1: R&M SOURCE DATA FIELD DEFINITION TABLE (CONT'D)**

**Col DESCRIPTION**

**F. Reliability Class** – Reliability classification. This is used to assign the K-factor values of Table 4

**Field specification: II.** The six reliability class codes are as follows:

<b>CODE</b>	<b>DESCRIPTION</b>
<b>1</b>	Electronic – equipment that primarily contains digital or low power analog electronics. Moving parts and high power electrical equipment normally constitute less than 5% of the item failure rate in the classification. Electronic types will typically have a fairly high level of Built-In-Testing (BIT).
<b>2</b>	Electrical – equipment that performs electrical power distribution, power storage, signal distribution, and/or radio frequency radiation functions. Moving parts or low power electronics normally constitute less than 5% of the item failure rate in this classification. Electrical types will typically have a low level of BIT.
<b>3</b>	Electro-Mechanical – equipment which contains electrical/electronic and mechanical parts, including devices which use electrical power to produce mechanical motion, and devices which use mechanical motion to produce electrical power or signals. Electro-mechanical items should contain more than 5% electrical/electronic and more than 5% mechanical parts by failure rate contribution in this classification.
<b>4</b>	Mechanical – equipment that primarily consists of moving parts, fluid handling equipment (including thermal systems), and/or seals. High power electrical equipment or low power electronics normally constitute less than 5% of the failure rate in this classification.
<b>5</b>	Structural with Crew Contact – equipment that is primarily structural but encounters planned crew contact or provides equipment protection. This type specifically includes doors, covers, panels, hatches, micrometeoroid/debris shields, and thermal blankets.
<b>6</b>	Structural with No Crew Contact – equipment that is load bearing. Moving parts, electronics, and electrical equipment normally constitute less than 5% of the failure rate in this classification. Structural items should not normally encounter planned crew contact.

**TABLE 1: R&M SOURCE DATA FIELD DEFINITION TABLE (CONT'D)**

**Col DESCRIPTION**

**G. IVA/EVA/Robotics Code** – The code that describes the level of robotic compatibility of the equipment.

**Field specification: I1.** The codes are as follows:

CODE	DESCRIPTION
0	Equipment located in pressurized area.
1	Equipment can be maintained only by EVA crew member. No robotic support is required or intended.
2	Equipment can be maintained using SPDM without EVA. Equipment is SPDM compatible. Compatibility consists of Equipment to SPDM interface. EVA can provide maintenance support in a backup role.
3	Equipment can be maintained using SSRMS without EVA. Equipment is SSRMS compatible. Compatibility consists of Equipment to SSRMS interface. Equipment must be equipped with SSRMS grapple fixture. EVA can provide maintenance support in a backup role.
4	Equipment requires combined SPDM/EVA operations for maintenance.
5	Equipment requires EVA crew member to be positioned on SSRMS for access to the worksite. Equipment requires no robotic compatibility.
6	Equipment requires the Mobile Servicing System/SSRMS for transportation to the EVA worksite. Dimensions or mass of equipment to be replaced are not compatible with EVA/CETA translation. Equipment must be equipped with SSRMS grapple fixture.

**H. Average Duty Cycle Prior to PHC** – Fraction of time an equipment item’s operating (hot) MTBF is applicable prior to the Permanently Human Capability (PHC) phase. Format is a number from 0.0 to 1.0. Based on the sum of total operating and test hours per year for the given part number divided by the product of 8760 hours per year times the quantity of items with that part number. Cyclic failure rates shall be converted to time-based failure rates and the duty cycle of the parent equipment shall be reported and used to make that correlation. Items having different operating times for various lower-level components may report a duty cycle of 1 and the operating (hot) MTBF shall be adjusted for those different duty cycles accordingly. A duty cycle of 1.0 shall be reported for items with failure rates independent of active operation time such as fluid filled or pressurized containers, lines, and static seals, structure, and static wiring harnesses. Operating time is averaged between shuttle attached and unmanned periods by using total equipment operating hours per year for both states under nominal flight schedules. Optional field. Assumed equal to post-PHC duty cycle unless otherwise stated.

**Field specification: R7.5**

**TABLE 1: R&M SOURCE DATA FIELD DEFINITION TABLE (CONT'D)**

<b>Col</b>	<b>DESCRIPTION</b>
<b>I.</b>	<p><b>Average Duty Cycle after PHC</b> – Fraction of time an equipment item’s Operating MTBF is applicable for the PHC phase for nominal operations. Same format and basis as Average Duty Cycle Prior to PHC except that this is for the period after PHC. <b>Field specification:</b> R7.5</p>
<b>J.</b>	<p><b>MTBF</b> – Mean Time Between Failures (“Hot” or “operating” MTBF). The estimated average time in hours between failures due to random effects under nominal operating conditions at the maintainable equipment level. Redundancy within the maintainable equipment item that is not necessary to meet failure tolerance requirements (e.g., component redundancy used for reducing maintenance demand) shall be modeled so as to improve the reported MTBF. Worst case estimates shall not be used. Failures of components that are used only during installation or removal (such as deployment motors and mechanisms) shall be excluded where maintenance would not be caused by the component’s failure. Failures of components that cause degradation of the equipment within the specified limit shall also be excluded. For complex items having components operating at different duty cycles, the operating MTBF may be adjusted to a duty cycle of 1.0 if the duty cycle is reported as 1.0. MTBF does not include failures due to Micrometeoroid/Orbital Debris (MM/OD). <b>Field specification:</b> R14.2</p>
<b>K.</b>	<p><b>Deleted</b></p>
<b>L.</b>	<p><b>Wearout Life</b> – Expected time to failure (in calendar years at the stated average duty cycles) due to wear-out, degradation, or fatigue conditions in the absence of random failures for age or cycle life limited items. wearout life shall be used as an estimate of characteristic life (L Char) in the algorithms ( Table3). Best available data and engineering judgment should be used to estimate wearout life as the time when 63 percent of a population would have failed due to wearout/aging conditions alone. Minimum design life shall not be reported as the wearout life. No life limit should be reported if the expected wearout life is 15 years or greater. <b>Field specification:</b> R4.2</p>
<b>M.</b>	<p><b>MTBPM: Removal/Replacement</b> – Mean Time Between Preventive Maintenance for Removal &amp; Replacement – The average time in calendar hours (at the stated duty cycles) between all preventive maintenance (PM) replacements. Care should be given when determining if preventive maintenance replacements should be performed in place of waiting until maintenance is required due to gradual performance degradation and eventual wearout (life limits). The ability of the system to effectively accommodate wearout without adverse system function impacts may allow maintenance to be performed on an as required basis instead of at specific time intervals. <b>Field specification:</b> R4.2</p>

- N. MTBPM – Inspect/Service** – Mean Time Between Preventive Maintenance for Inspection – The average time between PM inspections and/or servicing expressed in calendar hours. A single MTBPM – Inspect/Service parameter shall be developed for any equipment items requiring multiple servicing and/or inspection actions.  
**Field specification:** R4.2
- O. CM EVA MTTR** – Corrective Maintenance EVA Mean Time to Repair – Nominal elapsed EVA crew hours at the worksite including nominal EVA crew hours for manual on-orbit fault isolation weighted by the failure rate of failure modes which require such manual isolation. The MTTR includes all elements of crew time beginning with the first step of setting up the worksite and ending after the last step of worksite teardown. Computed for zero-g using task standards.  
**Field specification:** R7.4
- P. CM EVA Crew Size** – EVA crew size normally required for the task described above. If crew sizes are different for individual tasks within the MTTR, the mean crew size shall be reported. This mean crew size shall be determined as the summation of total crew-hours from each step within the MTTR divided by the elapsed time reported to perform all tasks included in that particular MTTR.  
**Field specification:** R3.2
- Q. CM IVA MTTR** – Corrective Maintenance IVA Mean Time to Repair – Nominal elapsed IVA crew hours at the worksite including nominal IVA crew hours for manual on-orbit fault isolation weighted by the failure rate of failure modes which require such manual isolation. The MTTR includes all elements of crew time beginning with the first step of setting up the worksite and ending after the last step of worksite teardown. Computed for zero-g using task standards.  
**Field specification:** R7.4
- R. CM IVA Crew Size** – IVA crew size nominally required for the task described above. If crew sizes are different for individual tasks within the MTTR, the mean crew size shall be reported. This mean crew size shall be determined as the summation of total crew-hours from each step within the MTTR divided by the elapsed time reported to perform all tasks included in that particular MTTR.  
**Field specification:** R3.2
- S. CM EVR MTTR** – Corrective Maintenance EVR (Robotic) Mean Time to Repair – Nominal worksite time in hours for a maintenance task on externally located equipment performed by an IVA crew member operating either the SSRMS or the SPDM for either solely robot-compatible equipment or for equipment requiring co-operative robotic tasks with EVA. Includes nominal time operating robotic systems for manual on-orbit fault isolation weighted by the failure rate of failure modes that require such manual isolation. The CM EVR MTTR includes all elements of crew time beginning with the first step of setting up the worksite and ending after the last step of worksite teardown. If the robotic tele-operator is used jointly with EVA during only a portion of the worksite activity, the CM EVR MTTR may exclude times when the EVR operator is able to be away from the operating station or is using the robotic servicer for other unrelated tasks. Computed for zero-g using task standards.  
**Field specification:** R7.4

**TABLE 1: R&M SOURCE DATA FIELD DEFINITION TABLE (CONT'D)**

Col	DESCRIPTION
T.	<p><b>PM/R&amp;R EVA MTTR</b> – Preventive Maintenance/Remove &amp; Replace EVA Mean Time to Repair – Nominal elapsed EVA crew hours at the worksite for preventive remove and replace. The MTTR includes all elements of crew time beginning with the first step of setting up the worksite and ending after the last step of worksite teardown. Computed for zero-g using task standards. <b>Field specification:</b> R7.4</p>
U.	<p><b>PM/R&amp;R EVA Crew Size</b> – EVA crew size normally required for the task described above. If crew sizes are different for individual tasks within the MTTR, the mean crew size shall be reported. This mean crew size shall be determined as the summation of total crew-hours from each step within the MTTR divided by the elapsed time reported to perform all tasks included in that particular MTTR. <b>Field specification:</b> R3.2</p>
V.	<p><b>PM/R&amp;R IVA MTTR</b> – Preventive Maintenance/Remove &amp; Replace IVA Mean Time to Repair – Nominal elapsed IVA crew hours at the worksite for preventive remove and replace. The MTTR includes all elements of crew time beginning with the first step of setting up the worksite and ending after the last step of worksite teardown. Computed for zero-g using task standards. <b>Field specification:</b> R7.4</p>
W.	<p><b>PM/R&amp;R IVA Crew Size</b> – Crew size required for the task described above. If crew sizes are different for individual tasks within the MTTR, the mean crew size shall be reported. This mean crew size shall be determined as the summation of total crew-hours from each step within the MTTR divided by the elapsed time reported to perform all tasks included in that particular MTTR. <b>Field specification:</b> R3.2</p>
X.	<p><b>PM/R&amp;R EVR MTTR</b> – Preventive Maintenance/Remove &amp; Replace EVR (Robotic) Mean Time to Repair – Nominal worksite time in hours for a preventive remove and replace maintenance task on externally located equipment performed by an IVA crew member operating either the SSRMS or the SPDM for either solely robot-compatible equipment or for equipment requiring co-operative robotic tasks with EVA. The PM/R&amp;R EVR MTTR includes all elements of crew time beginning with the first step of setting up the worksite and ending after the last step of worksite teardown. If the robotic tele-operator is used jointly with EVA during only a portion of the worksite activity, the PM/R&amp;R EVR MTTR may exclude times when the EVR operator is able to be away from the operating station or is using the robotic servicer for other unrelated tasks. Computed for zero-g using task standards. <b>Field specification:</b> R7.4</p>

**TABLE 1: R&M SOURCE DATA FIELD DEFINITION TABLE (CONT'D)**

<b>Col</b>	<b>DESCRIPTION</b>
<b>Y.</b>	<b>PM/Inspect/Service EVA MTTR</b> – Preventive Maintenance/Inspect/Service EVA Mean Time to Repair – Nominal elapsed EVA crew hours at the worksite for preventive inspection. The MTTR includes all elements of crew time beginning with the first step of setting up the worksite and ending after the last step of worksite teardown. Computed for zero-g using task standards. <b>Field specification:</b> R7.4
<b>Z.</b>	<b>PM/Inspect/Service EVA Crew Size</b> – EVA crew size normally required for the task described above. If crew sizes are different for individual tasks within the MTTR, the mean crew size shall be reported. This mean crew size shall be determined as the summation of total crew-hours from each step within the MTTR divided by the elapsed time reported to perform all tasks included in that particular MTTR. <b>Field specification:</b> R3.2
<b>AA.</b>	<b>PM/Inspect/Service IVA MTTR</b> – Preventive Maintenance/Inspect/Service IVA Mean Time to Repair – Nominal elapsed IVA crew hours at the worksite for preventive inspection. The MTTR includes all elements of crew time beginning with the first step of setting up the worksite and ending after the last step of worksite teardown. Computed for zero-g using task standards. <b>Field specification:</b> R7.4
<b>AB.</b>	<b>PM/Inspect/Service IVA Crew Size</b> – IVA Crew size required for the task described above. If crew sizes are different for individual tasks within the MTTR, the mean crew size shall be reported. This mean crew size shall be determined as the summation of total crew-hours from each step within the MTTR divided by the elapsed time reported to perform all tasks included in that particular MTTR. <b>Field specification:</b> R3.2
<b>AC.</b>	<b>PM/Inspect/Service EVR MTTR</b> – Preventive Maintenance/Inspect/Service EVR (Robotic) Mean Time to Repair – Nominal worksite time in hours for a preventive inspection maintenance task on externally located equipment performed by an IVA crew member operating either the SSRMS or the SPDM for either solely robot-compatible equipment or for equipment requiring co-operative robotic tasks with EVA. The PM/Inspect/Service EVR MTTR includes all elements of crew time beginning with the first step of setting up the worksite and ending after the last step of worksite teardown. If the robotic tele-operator is used jointly with EVA during only a portion of the worksite activity, the PM/Inspect/Service EVR MTTR may exclude times when the EVR operator is able to be away from the operating station or is using the robotic servicer for other unrelated tasks. Computed for zero-g using task standards. <b>Field specification:</b> R7.4

**TABLE 2: MAINTENANCE DERIVED DATA FIELD DEFINITION TABLE**

Derived data elements at the PHC on-orbit maintainable equipment level shall be summed up to obtain EVA MMCH/Y, IVA MMCH/Y, EVR MMCH/Y and On-Orbit Maintenance Actions per Year for all like End Items (e.g., sum for all PV modules) or other level at which allocations have been imposed by the Contractor. Those derived data elements shall consist of the following:

- A. EVA Mean Maintenance Crew-Hours per Year (MMCH/Y)** – The estimate of annual average on-orbit allocation-chargeable cumulative time for all crew members at the EVA worksite. Includes all chargeable maintenance tasks that are nominally performed using EVA, including EVA crew time during co-operative EVA/EVR or EVA/IVA tasks. Excludes EVA crew time for contingency EVA maintenance that is normally performed using robotics. Excludes maintenance of equipment that is normally maintained on the ground. Summary data shall include a breakdown of corrective and preventive totals for both O-level and I-level maintenance as well as the combined totals that are compared to the allocations.
  
- B. IVA Mean Maintenance Crew-Hours per Year (MMCH/Y)** – The estimate of annual average on-orbit allocation-chargeable cumulative time for all crew members at an IVA worksite. Includes maintenance of equipment installed or used in the pressurized area. Also includes maintenance of equipment normally installed or used outside the pressurized environment when the item is nominally planned to be maintained in the pressurized environment. Includes IVA support to external maintenance other EVR support when such IVA support is nominally required (for example, for manual on-orbit failure isolation). Excludes EVA and EVR observation time spent by IVA crew members. Excludes maintenance of equipment that is normally maintained on the ground. Summary data shall include a breakdown of corrective and preventive totals for both O-level and I-level maintenance as well as the combined totals that are compared to the allocations.
  
- C. EVR Mean Maintenance Crew-Hours per Year (MMCH/Y)** – The estimate of annual average on-orbit allocation-chargeable cumulative time for all crew members at the tele-operation workstation for worksite activities on external equipment including one crew member and the elapsed time. Includes crew time operating SSRMS and/or SPDM for either co-operative or fully robotic maintenance tasks. Excludes any times that the EVR tele-operator could normally be relieved from duty when the tele-operators are in a safe configuration during cooperative EVA/EVR or during any automated or ground-controlled sequences which do not require operator operative EVA/EVR or during any automated or ground-controlled sequences which do not require operator presence at the workstation. Excludes time for observation of EVR activities by a second crew member. Summary data shall include a breakdown of corrective and preventive totals for both O-level and I-level maintenance as well as the combined totals that are compared to the allocations.

**TABLE 3: MAINTAINABILITY CREW TIME AND  
MAINTENANCE ACTION RATE MODELING ALGORITHMS**

The contractor crew maintenance time estimates reported in Part 2 above shall be developed using standardized steady state deterministic algorithms that approximate the RMAT without the need for Monte Carlo simulation. Where a more precise estimation is needed for a special case, a computational method developed by the Tier I subcontractor may be used with approval by the Contractor. The standard steady state deterministic algorithm for predicting the number of corrective and preventive maintenance actions and crew time per year is summarized below. Steps 1 through 6 shall be used to calculate total MTBMA for corrective maintenance only. Maintenance actions per year for corrective maintenance shall be calculated using the first equation in Step 7. Crew time predictions for corrective maintenance shall be calculated using Step 8. Maintenance actions per year for preventive maintenance shall be calculated using the remaining two equations in Step 7. Crew time predictions for preventive maintenance shall be calculated using Step 8.

1. Unless a more precise estimate is needed for a special case, assume the ratio of 1:35 for Operating (Hot) MTBF to Non-operating (Cold) MTBF ratio, which is defined as follows:

$$R = \frac{\text{MTBF Hot}}{\text{MTBF Cold}}$$

2. To determine Operating Ratio, OP (e.g., Duty Cycle (DC) adjusted for Non-operating MTBF):

$$OP = DC + R - (DC \times R)$$

3. To determine Adjusted MTBF (e.g., a single MTBF value adjusted for NON-operating MTBF):

$$MTBF_{Adj} = \frac{MTBF_{Hot}}{OP}$$

4. To determine MTTF for inherent random and life failures with adjustment for non-operating failures:

$$MTTF_{Adj} = MTBF_{Adj} \times [1 - e^{-(8760 \times L_{CHAR}) / MTBF_{Adj}}]$$

NOTE: L Char may be approximated by the wearout life from Table 1, column L.

If a preventive maintenance removal/replacement is planned (MTBPM R/R reported in column M of Table 1) or the wearout life is greater than the operational lifetime requirement specified in the end item PIDS, the Lchar term should be set to 9,999,999,999 (approximating infinity) to model zero maintenance for wear out in this equation and in Step 6. Preventive maintenance actions using MTBPM R/R should be computed using Step 7.

Caution: Do not calculate corrective maintenance MMCH/Y using a wear out life in Steps 4 and 6 when preventive maintenance MMCH/Y is calculated using MTBPM R/R in Step 7.

**TABLE 3: MAINTAINABILITY CREW TIME AND  
MAINTENANCE ACTION RATE MODELING ALGORITHMS (CONT'D)**

5. To determine MTBMA for random failures and other maintenance occurring at random as defined by the K-factors in Table 4. This MTBMA–Random value includes random occurrences of damage resulting, from replacement for wearout but does not include replacement for wearout itself.

$$\text{MTBMA}_{\text{Random}} = \frac{1}{\frac{1}{\text{MTBF}_{\text{Adj}}} + \frac{(K-1)}{\text{MTTF}_{\text{Adj}}}}$$

6. To determine total corrective MTBMA to include MTBMA–Random and replacement due to wearout:

$$\text{MTBMA}_{\text{Total cm}} = \text{MTBMA}_{\text{Random}} \left[ 1 - e^{-\frac{(8760 \times L \text{ CHAR})}{\text{MTBMA}_{\text{Random}}}} \right]$$

7. To determine the corrective and preventive maintenance actions per year:

$$\text{MA / Y}_{\text{CM}} = \frac{8760 \times \text{Qty}}{\text{MTBMA}_{\text{Total CM}}}$$

$$\text{MA / Y}_{\text{PM R\&R}} = \frac{8760 \times \text{Qty}}{\text{MTBPM}_{\text{R\&R}}}$$

$$\text{MA / Y}_{\text{PM Inspect/Service}} = \frac{8760 \times \text{Qty}}{\text{MTBPM}_{\text{Inspect/Service}}}$$

8. Compute MMCH/Y for each of the categories of maintenance identified in Step 7 as follows using information from Table 1:

a. For corrective maintenance MMCH/Y, use CM EVA MTTR and CM EVA Crew Size for the EVA portion; use CM IVA MTTR and CM IVA Crew Size for the IVA portion; and use CM EVR

MTTR and a crew size of one (1) operator for the EVR portion.

b. For preventive maintenance remove/replace MMCH/Y, use PM/R&R EVA MTTR and PM/R&R Crew Size for the EVA portion; use PM/R&R IVA MTTR and PM/R&R IVA crew size

for the IVA portion; and use PM/R&R EVR MTTR and a crew size of one (1) operator for the

EVR portion.

c. For preventive maintenance inspect/service MMCH/Y, use PM/Inspect/Service EVA MTTR and PM/Inspect/Service EVA crew size for the EVA portion; use PM/Inspect/Service IVA

MTTR and PM/Inspect/Service IVA crew size for the IVA portion; and use PM/Inspect/Service EVR

MTTR and a crew size of one (1) operator for the EVR portion.

$$\text{MMCH / Y} = \text{MA / Y} \times \text{CREW SIZE} \times \text{MTTR}$$

**TABLE 4: MAINTAINABILITY K FACTORS**

Code	Reliability Class	External K-Factor	Internal K-Factor
1	Electronic	1.59	1.31
2	Electrical	1.63	1.34
3	Electro-Mechanical	1.57	1.30
4	Mechanical	1.64	1.35
5	Structural with Crew Contact	1.16	1.16
6	Structural with No Crew Contact	1.16	1.16

**Table 5: FDIR Assessment Data Definition Table**

**Description**

**Function** – Identify the function supported by the ORU.

**ORU** – Identify the ORU associated with the failure mode code.

**24 Hour Autonomous (Y/N)** – Specify whether the function provided by the ORU is required for 24 hour autonomous operations (Yes or No).

**Failure Mode Code** – Reference the failure mode code for each ORU failure mode as identified in the FMEA.

**Cat/Crit Hazard < 24 Hours (Y/N)** – May a critical or catastrophic hazard occur in less than 24 hours as a result of the failure mode (Yes or No).

**Detection: A/M/N** – Specify whether Automatic, Manual or No detection is provided for the failure mode.

**Detection: Failure Signature Algorithms** – Describe the algorithm (including sensor/system states) used to detect the failure mode.

**Detection: SRS/LSAR Reference** – Provided a reference to the SRS that documents automatic detection, and/or the LSAR that documents manual detection procedures.

**Isolation for Recovery: A/M/N** – Specify whether Automatic, Manual or No isolation to the recovery level is provided for the failure mode.

**Isolation for Recovery: Algorithms** – Describe the algorithm (including sensor/system states) used to isolate the failure mode to the recovery level.

**Isolation for Recovery: SRS/LSAR Reference** – Provided a reference to the SRS that documents automatic isolation to the recovery level, and/or the LSAR that documents manual isolation to the recovery level procedures.

**Isolation for Maintenance: Ambiguity Level 1/2/3/>3** – Specify the ambiguity level (1, 2, 3 or greater than 3 maintenance units) that Isolation for Maintenance will be able to achieve.

**Isolation for Maintenance: A/M/N** – Specify whether Automatic, Manual or No isolation to the maintenance level is provided for the failure mode.

**Isolation for Maintenance: Algorithms** – Describe the algorithm (including sensor/system states) used to isolate the failure mode to the maintenance level.

**Isolation for Maintenance: SRS/LSAR Reference** – Provided a reference to the SRS that documents automatic isolation to the maintenance level, and/or the LSAR that documents manual isolation to the maintenance level procedures.

**Recovery: A/M/N** – Specify whether **A**utomatic, **M**anual or **N**o on-orbit recovery is provided for the failure mode.

**Table 5: FDIR Assessment Data Definition Table**

**Description**

**Recovery: Algorithms** – Describe the algorithm (including sensor/system states) used to recover the function lost as a result of the failure mode.

**Recovery: SRS/LSAR Reference** – Provided a reference to the SRS that documents automatic recovery, and/or the LSAR that documents manual recovery procedures.

**Safe: A/M/N** – Specify whether **A**utomatic, **M**anual or **N**o on-orbit safing is provided for the failure mode.

**Safe: Algorithms** – Describe the algorithm (including sensor/system states) used to safe a hazard that results from the failure mode.

**Safe: SRS/LSAR Reference** – Provided a reference to the SRS that documents automatic safing, and/or the LSAR that documents manual safing procedures.

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

1a. DRD Title: Engineering Integration Reports  1b. Data Type: 3	2. Date of Current Version  10/01/05	3a. DRD No.  F-SE-31	3b. RFP/Contract No.  NAS15-10000
16. Use (Define need for, intended use of, and/or anticipated results of data) To provide the results of integration engineering analysis to ensure interface compatibility, safety, and data relating to operational constraints for the integrated EXPRESS Rack, WORF Rack and ELC payloads with the ISS and transportation carrier.			5. DRD Category X Technical ___Administrative ___SR&QA
6. References (SOW, Clause, etc.) SOW paragraph 8.0		7. Interrelationships (e.g., with other DRDs) None	

8. PREPARATION INFORMATION:

SCOPE: Reports describing results of engineering analyses required for EXPRESS/WORF/ELC Payload integration and operations.

CONTENT: The following products shall be delivered on a schedule compatible with individual increment integration requirements.

EXPRESS Rack, WORF, and ELC Compatibility Analysis and Compliance report for each stage: The contractor shall use analyses, test reports, data certificates, and CoCs as the basis for verification submittals per PVPs for the following categories of verification items: (structures/mechanical, EMC, electrical, C&DH, human factors, acoustics, safety, thermal, venting, and gases).

PDL Data Sets: The contractor shall provide inputs to the integrated data sets (, KSC Technical, , and Configuration). Note: KSC Technical Requirements Data Set on an as needed basis.

FORMAT: Any format acceptable by the electronic repository.

9. OPR: OZ

10. FIRST SUBMISSION DATE: Per negotiated work plan.

Frequency Of Submission: Initial, update as required, and final reports.

Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: None.

**DATA REQUIREMENTS DESCRIPTION  
(Based on JSC-STD-123)**

1a. DRD Title: Traceability Verification Requirements  1b. Data Type: 2	2. Date of Current Version  10/01/05	3a. DRD No.  F-SV-03	3b. RFP/Contract No.  NAS15-10000
17. Use (Define need for, intended use of, and/or anticipated results of data) To provide a system that ensures that all design and performance requirements requiring verification are addressed by the verification program and that all verification program requirements are closed out.			5. DRD Category X Technical ___Administrative ___SR&QA
6. References (SOW, Clause, etc.) SOW paragraph 8.5.3.1		7. Interrelationships (e.g., with other DRDs) None.	

8. PREPARATION INFORMATION:

SCOPE: The requirements traceability system shall include all design and performance requirements and all verification program requirements.

CONTENT: The traceability system shall include a record of verification requirements derivation and the subsequent history of where, by what process in the program, and when the requirements were satisfied and certified closed.

FORMAT: Any format acceptable to the electronic repository.

9. OPR: OZ

10. FIRST SUBMISSION DATE: Submit one time for each Contract End Item (CEI) or group of similar CEIs.

Frequency Of Submission: Update as required.

Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: NASA time limited right of 30 workdays to disapprove in writing any issues and interim changes to those issues shall be 60 calendar days for this data submittal.

**DATA REQUIREMENTS DESCRIPTION  
(Based on JSC-STD-123)**

<b>1a. DRD Title:</b> Data Integration Standards  <b>1b. Data Type:</b> 2	<b>2. Date of Current Version</b>  01/01/04	<b>3a. DRD No.</b>  F-SW-01	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>5. Use</b> Documents the data requirements, standards, and formats of system and operational data required to integrate and sustain the ISS flight software and provide insight into the hardware systems and their operational state.			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical — Administrative — SR&QA
<b>6. References</b> (SOW, Clause, etc.) Contract F, Statement of Work (SOW) – paragraph 3.3.7.2.5		<b>7. Interrelationships</b> (e.g., with other DRDs) None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** The Data Integration Standards are used for the signal data either developed or provided for the International Space Station (ISS) program

- Flight software;
- Ground software, including Mission Build Facility (MBF) software;
- Ground Support Equipment (GSE) software and Test Support Equipment (TSE) software;
- Test software, including simulations; and
- Software Verification Facility (SVF) software.

**CONTENT:**

The signal data standards shall be integrated, documented, and managed in a program document. Signal data is identified as Instrumentation Program and Command List (IP&CL). The signal data standards define the IP&CL that provides the Command and Control (C&C) Multiplexer/DeMultiplexer (MDM), International Partner (IP) interfaces, Shuttle interfaces, and Ground reconfiguration facilities with the data necessary for developing/ controlling the on-board and space/ground interfaces with the United States On-orbit Segment (USOS).

Data Integration standards will be used by NASA Mission Operations Directorate, Payload providers, International Partners for the generation of command instances and telemetry format data. Data standards will be used for the dissemination of the final IP&CL for each flight or stage of the ISS.

**FORMAT:** NASA/Contractor agreed format currently used by ISSP

**9. OPR:** OD/Avionics and Software Office

**10. FIRST SUBMISSION DATE:**

Final Draft submission: 90 days after contract start.

Additional Submission: the approved final draft version submitted to Configuration Management for baselining 120 days after contract start.

**11. MAINTENANCE:** (The document shall be maintained electronically.)

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (EDMS or equivalent)

**13. REMARKS:** None

**DATA REQUIREMENTS DESCRIPTION  
(Based on JSC-STD-123)**

<b>1a. DRD Title:</b> Integrated Software Schedule  <b>1b. Data Type: 2</b>	<b>2. Date of Current Version</b>  01/01/04	<b>3a. DRD No.</b>  F-SW-03	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>6. Use</b> (Define need for, intended use of, and/or anticipated results of data) Provide an integrated schedule to manage the delivery of software products.			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical — Administrative — SR&QA
<b>6. References</b> (SOW, Clause, etc.) Contract F, Statement of Work (SOW) – paragraph 3.3.7.11.2		<b>7. Interrelationships</b> (e.g., with other DRDs) PC06	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** The integrated software schedule shall serve as the basis for managing and communicating software milestones and deliveries with NASA.

**CONTENT:** The contractor shall deliver an integrated software schedule identifying software deliveries and Level 2 and Level 3 milestones to satisfy Level 1 program milestones.

**FORMAT:** The Schedule shall be compatible with DRD PC06.

**9. OPR:** Avionics and Software Office (OD) Avionics and Software Control Board (ASCB)

**10. FIRST SUBMISSION DATE:** Start of contract.

**Frequency Of Submission:** Schedule shall be updated on a weekly basis with ASCB approved updates.

**Additional Submissions:** None

**11. MAINTENANCE:** (The document shall be maintained electronically.)

**12. COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (MBF or equivalent), designated Website

**13. REMARKS:** The schedule integrates program participants, consisting of the contractor, NASA institutional support organizations, International Partners/Participants (IPs) and Utilization organizations.

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

<b>1a. DRD Title:</b> Flight Software Operations Handbook (FSOH)  <b>1b. Data Type:</b> 3	<b>2. Date of Current Version</b>  10/01/10	<b>3a. DRD No.</b>  <b>F-SW-05</b>	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> The information will be used by flight controllers to understand the operating characteristics and behavior of the flight software.			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW paragraph 3.3.7.13		<b>7. Interrelationships</b> (e.g., with other DRDs) None	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** The information shall provide flight controllers with information relevant to each ISS system and software release to facilitate display requirements development, procedure development, and effect command and telemetry requirements.

**CONTENT:** The level of detail provided by the electronic data book, per CSCI function, will be determined and agreed to through a joint definition activity between Boeing/SCI/FCI and NASA/OD/DF. The types of information to be considered for inclusion are as follows: math formula descriptions, flow control diagrams, timing diagrams, mode dependencies, and software sequence conditions (e.g. pass and fail criteria).

**FORMAT:** Contractor format

**9. OPR:** OD/Avionics and Software Integration Office

**10. FIRST SUBMISSION DATE:** First scheduled delivery to be 30 days after contract start.

**Frequency Of Submission:** TBD

**Additional Submissions:** As required.

**11. MAINTENANCE:** (The document shall be maintained electronically.)

**12. COPIES/DISTRIBUTION:**

**1 electronic copy:** to a Program authorized repository (MBF or equivalent), designated Website

**13. REMARKS:** The information will provide operational guidance on the use of the ISS Flight Software.

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

1a. DRD Title: Payload Integrated Flight Load (PIFL) Version Description Drawing  1b. Data Type: 3	2. Date of Current Version  10/01/05	3a. DRD No.  F-SW-12	3b. RFP/Contract No.  NAS15-10000
18. Use (Define need for, intended use of, and/or anticipated results of data) Describes the content of the software delivery package including a list of waivers, changes from the previous delivery, and known deficiencies.			5. DRD Category X Technical __Administrative __SR&QA
6. References (SOW, Clause, etc.) SOW paragraph 8.5.1.1		7. Interrelationships (e.g., with other DRDs) None.	

8. PREPARATION INFORMATION:

SCOPE: To be provided with each delivery of each software product.

CONTENT: The document, which accompanies each software release, contains a version number of the software release, the type of release (flight, test, etc.), and/or scope of content of the release. The following specifics shall be addressed in the content where applicable:

- Source nomenclature
- Database
- Test environment
- Documentation
- Software change requests implemented
- Limitations
- Installation instructions
- Operating system specification
- Software discrepancy reports unresolved in this version
- Notes

FORMAT: Any format acceptable to the electronic repository.

9. OPR: OZ

10. FIRST SUBMISSION DATE: Complete

Frequency Of Submission: One time, update as required for each software delivery.  
 Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: None.

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

1a. DRD Title: EXPRESS Configuration Files  1b. Data Type: 3	2. Date of Current Version  10/01/10	3a. DRD No.  F-SW-15	3b. RFP/Contract No.  NAS15-10000
19. Use (Define need for, intended use of, and/or anticipated results of data) Used to establish integrated rack or pallet operating configuration; used to support integrated testing at KSC and on-orbit operation.			5. DRD Category X Technical __Administrative __SR&QA
6. References (SOW, Clause, etc.) SOW paragraph 8.0		7. Interrelationships (e.g., with other DRDs) None.	

8. PREPARATION INFORMATION:

SCOPE: To describe PSIV products.

CONTENT: PSIV products include:

a. EXPRESS configuration files

1. RIC tables for payloads as required in each stage.

2. Two sets of files are to be delivered. One set will be byte-swapped. This will accommodate loading from the laptop or uplink from the HOSC.

b. Payload applications to be loaded on the EXPRESS rack laptop

c. EXPRESS Logistics Carrier (ELC) configuration

FORMAT: PSIV products should be delivered electronically (MBF, PIMS, etc.) and on CDs or as specified by the customer.

9. OPR: OZ

10. FIRST SUBMISSION DATE: As required per negotiated work plan.

Frequency Of Submission: Each stage that requires EXPRESS or ELC based configuration updates

Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: (a) NASA Data Management electronically using EDMS or follow-on system

(b) Program Automated Electronic File (PIMS) – electronic copy

13. REMARKS: None.

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

1a. DRD Title: PSIVF Flight Products Verification Documents  1b. Data Type: 3	2. Date of Current Version  10/01/05	3a. DRD No.  F-UT-32	3b. RFP/Contract No.  NAS15-10000
20. Use (Define need for, intended use of, and/or anticipated results of data) This document is used to document PSIVF verification tests plans, procedures, and results to ensure that payload SW is adequately verified			5. DRD Category X Technical __Administrative __SR&QA
6. References (SOW, Clause, etc.) SOW paragraph 8.4.1.17		7. Interrelationships (e.g., with other DRDs) None.	

8. PREPARATION INFORMATION:

SCOPE: Document contains the verification test plans, test procedures, and test reports for each flight of payloads that the PSIVF is producing a set of flight software.

CONTENT: This DR contains the following:

- verification requirements
- verification procedures
- verification traceability and reports

FORMAT: Any format acceptable to the electronic repository.

9. OPR: OZ

10. FIRST SUBMISSION DATE: As required per negotiated work plan.

Frequency Of Submission: One time, update as required

Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: None.

**DATA REQUIREMENTS DESCRIPTION**  
**(Based on JSC-STD-123)**

1a. DRD Title: Software Version Description Document (VDD), Software and Data Item Package  1b. Data Type: 3	2. Date of Current Version  10/01/05	3a. DRD No.  F-UT-39	3b. RFP/Contract No.  NAS15-10000
21. Use (Define need for, intended use of, and/or anticipated results of data) Describes the contents of the software delivery package including a list of waivers and lists the changes from the previous operational delivery.			5. DRD Category <input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
6. References (SOW, Clause, etc.) SOW paragraph		7. Interrelationships (e.g., with other DRDs) None.	

8. PREPARATION INFORMATION:

SCOPE: Includes all software products.

CONTENT: The documents which accompany each software release contain a version number of the software release, the type of the release (initial, revision, sustaining engineering, or maintenance), and/or the scope of content of the release (Ears, Software Problem Reports incorporated, etc.). It includes source and object code.

The following specifics shall be addressed in the content:

- a. Source Nomenclature.
- b. Data Base.
- c. Test Environment.
- d. Documentation.
- e. Software Change Requests Implemented.
- f. Limitations.
- g. Installation Instructions
- h. Operating System Specification
- i. Software Discrepancy Reports unresolved in this version
- j. Notes

FORMAT: Per SSP 50010-01, Documentation Requirements, Standards and Guidelines

9. OPR: OZ

10. FIRST SUBMISSION DATE: As required per negotiated work plan

Frequency Of Submission: : One time, update as required for each software delivery

Additional Submissions: None.

11. MAINTENANCE: The data item shall be maintained electronically or as otherwise directed by NASA.

12. COPIES/DISTRIBUTION: NASA Data Management electronically using EDMS or follow-on system

13. REMARKS: One delivery for each deliverable item using software. Included with the VDD is all source and executable code, associated data and/or Data Item Package comprising the CSCI. Machine loadable software will be delivered with each software delivery. One CSCI copy per machine delivered.

**DATA REQUIREMENTS DESCRIPTION  
(Based on JSC-STD-123)**

<b>1a. DRD Title:</b> Engineering CAD Models  <b>1b. Data Type: 3</b>	<b>2. Date of Current Version</b>  01/01/04	<b>3a. DRD No.</b>  <b>F-VE-02</b>	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> Input to vehicle integration to support the development of the launch and on-orbit stage models to perform functional performance assessments. The models will be used to support mission design, procedure development, clearance analysis, Shuttle cargo integration, EVA worksite analysis, NBL reconfiguration, solar array shadowing, Aerodynamics/Mass Properties Data Book development, analyze stowage configuration, robotic assembly ops SMS and SSTF training, validate ISS hardware interfaces and ensure hardware will mate on-orbit, and for performing analyses related to IVA operations and Station interior integration.			<b>5. DRD Category</b> <input checked="" type="checkbox"/> <b>Technical</b> <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (a) Statement of Work paragraph 3.3.2.7.1, 3.3.2.7.2 (b) SSP 50124 Sec 3.3.3 (c) SSP 50126 Sec 3.3.2 (d) SSP 50137 Sec R1A-05 (e) SSP 50127 Sec 3.3.3 (f) SSP 50301 Sec 3.2.1 (g) SSP 50177 Part II, Sec 3.5.1		<b>7. Interrelationships:</b> F-VE-09, Sustaining Engineering Drawings and Associated Lists, VE32, Vehicle Engineering Data.	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** End items, elements and/or major assemblies that are assembled and/or reconfigured on-orbit, and that will be launched in the Space Shuttle, HTV and ATV. Best Available and as-designed validated models for planned construction are required. As-built models are required for end items, elements and major assemblies. For Russian elements, only on-orbit (stage) configurations shall be provided. For each stage, a stage configuration model based on integration of all on-orbit elements shall be provided.

**CONTENT:** Program requires 3-D CAD models with sufficient detail that the external and internal geometry shows an accurate depiction of the element. Two levels of fidelity; high fidelity and low fidelity, should be provided for cargo and on-orbit configurations. Reference model should be provided only for the on-orbit configuration.

**Exterior CAD Models**

For all exterior CAD models provided, the model is required to show all payload protuberance from the 87-inch radius of the element as it appears in the Shuttle Cargo Bay. The following details shall be included (but not limited to): docking aids, debris shields, cables, cable clamps, brackets, antennas, cameras, lights, targets, vents, handrails, EVA aids, sensors, thrusters, and element-to-element interface geometry.

Low fidelity cargo and stage models shall be created to correspond to the validated models. They contain less information than the corresponding validated models. Launch and on-orbit configurations are required. Files provided shall be identified uniquely for both launch and on-orbit configurations. Reference models are created for the cargo, but are provided only in the on-orbit configuration.

High fidelity cargo and stage detailed models shall be provided including the ORU's that are planned to be replaced on-orbit. Stage models shall be created based on integration of all elements including the EVA tools. Launch and on-orbit configurations are required. Files provided shall be identified uniquely for both launch and on-orbit configurations.

#### Interior CAD Models

CAD models of interior features are required that may include the following: internal pressure shell, standoffs, hatches, ports, stowage compartments, rack attachments, vents, lights, handrails, racks, seat track, emergency equipment and significant GFE (i.e., CEVIS, IRED, CMRS, etc.) All objects that deploy rotate or otherwise move shall be appropriately documented and modeled with location and limit parameters described.

#### **FORMAT:**

- Models shall be full scale in English (inches) units.
- Models shall be constructed to nominal dimensions.
- Models should be built with respect to element local coordinate system as defined by SSP 30219.
- One of the following formats should be provided to the CAD team by the design agency of the end item, element, or major assembly: CATIA, UG, Pro-E or Microstation.
- Models shall be supplied in CATIA, UG, Pro-E, Parasolid, DGN, SLA, VRML, JT or Microstation formats
- Translation: STEP AP203 neutral file format acceptable only if none of the above formats are available.
- Solid Models Only—Models may be unparameterized “dumb solids” meaning tolerance data; model history, material properties, etc. need not be included. CATIA models must be solid-E.
- Model parts should be individual entities and not fused together. This will allow CAD team to update the model based on hardware measurements. Assembly structure, part names and part numbers would be helpful. However, for controlling file size growth and having redundant geometry, all identical components (i.e., handrails, connectors, etc) will be nested in detail/ditto space/assemblies. For example if 20 identical handrails are used, only one detail is required and the rest should be in ditto space/assembly.
- Description on movement limits for any articulating items should be provided.
- As-designed and As-built (validated and final) models shall be validated to released engineering drawings. Drawings shall be located in the VMDB. Interior models shall be delivered either separate from exterior models, or as an appropriately documented assembly such that interior models can easily be separated leaving both interior and exterior features intact. If supplied as separate models, information to associate interior to exterior shall be provided.

- Where interior subassemblies are supplied as separate models, sufficient documentation shall be provided to support correct geometrical integration of each subassembly into its larger interior element.
- A model tree shall be provided which documents the element model assembly architecture as well as model and subassembly titles.
- Models shall be under configuration management so that the pedigree and source of models are documented and retained.
- Models and associated assembly trees and configuration data shall be delivered electronically via FTP site or as Compact Discs.

**9. OPR:** OM5, Assembly and Configuration Team

**10. FIRST SUBMISSION DATE:**

**Frequency of Submission:**

**EVA**

- High fidelity best available CAD model required at L-21 months, Design Review 1 or Preliminary Design Review.
- High fidelity validated CAD model required at L-15 months, Design Review 2 or Critical Design Review.
- Cargo Low Fidelity CAD model required at L-14 months.
- Stage Validated CAD model required at L-14 months.
- Stage Low Fidelity CAD model required at L-13 months
- High fidelity final CAD model required at L-6 months or Acceptance Data Package.
- Stage Final CAD model required at L-5 months.
- Reference Model required L-20 months.

**IVA**

- **High Fidelity Best Available CAD Model required at L-14 months.**
- **High Fidelity Validated CAD Model required at L-9 months.**

**Additional Submissions:**

**11. MAINTENANCE:** Changes and/or updating of models shall be accomplished in accordance with the Contractor's engineering system and the provisions cited through Sustaining Engineering for the as-built configuration. Models must be maintained electronically.

**12. COPIES/DISTRIBUTION:**

1 original/record (hard copy): OH/Data Management  
**1 electronic copy:** to NASA/ISAC server

**13. REMARKS:** None

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Abstracts for CAD, Thermal, and Structural Models  <b>1b. Data Type: 3</b>	<b>2. Date of Current Version</b>  3/3/04	<b>3a. DRD No.</b>  F-VE-03	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data)  Provide content and format requirements for delivery to NASA of all analytical models, tools, and supporting documentation used to perform assessments to sustain and certify the ISS Vehicle			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) CR8320		<b>7. Interrelationships</b> (e.g., with other DRDs)	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:**

The Cargo Mission contractor (Lockheed) is responsible for maintaining all of the items listed in Appendix 6 of the Cargo Mission contract. To facilitate Cargo Mission's sustaining task, various flight latest CAD, thermal and structural models developed for Flight Support Equipment (FSE) needs to be provided to NASA. In addition, each of these models shall be documented and submitted in accordance with this DRD.

**CONTENT:**

- A. Summary abstracts (usually less than a page in length) for each unique model or category of model will be prepared with the following formatting guidelines:
  - The subsystem team delivering the model.
  - The name of the model with all acronyms defined.
  - The version number of the model delivered.
  - The date of the delivery.
- B. Model/Category of Model Description: This shall be a brief description of the purpose of the model including key input and output parameters, calculation algorithms, and use of the results.
- C. Model Assumptions and Limitations: This shall be a brief discussion of the key assumptions and/or limitations that need to be understood by the user when performing analysis with the model. This discussion should discuss (as applicable to a given model) the uncertainty and/or conservatism of specific inputs and other assumptions that impact the analysis results.
- D. Model Pedigree Discussion: This shall be a brief discussion of the level of validation, verification, correlation, and/or peer review (as appropriate) of the model. The discussion should include results of comparison to test and/or on-orbit data if available. If the model was formally verified or validated via the Verification Analysis Cycle process (Analytical Model Validation Process), provide the appropriate engineering documentation or report number to reference.
- E. Operating Requirements: Describe the hardware and software requirements to operate the analytical model.

**FORMAT:** Electronic format

- 9) **Office of Primary Responsibility:** External Carriers Office, OM6
- 10) **FIRST SUBMISSION DATE:**
- The delivery plan and schedule shall be provided with the proposal.
  - Frequency Of Submission: Provide model abstract in conjunction with the delivery of the electronic model. Model and abstract updates are the responsibility of NASA.
- 11) **MAINTENANCE:** Electronic model and abstract updates are the responsibility of NASA.
- 12) **COPIES/DISTRIBUTION:**
- 1 original/record (hard copy): OL/Data Management
  - 1 electronic copy: to a Program authorized repository (EDMS or equivalent)
- 13) **REMARKS:** This DR was developed for the delivery of CAD, thermal and structural models on CR8320.

**DATA REQUIREMENTS DESCRIPTION**  
(Based on JSC-STD-123)

<b>1a. DRD Title:</b> Sustaining Engineering Drawings, New Development Drawings, Mod Kit Drawings or Models and Associated Lists <b>1b. Data Type: 3</b>	<b>2. Date of Current Version</b>  10/01/10	<b>3a. DRD No.</b>  F-VE-09	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data)  Provide the design data used to manufacture, install, verify, operate, maintain and repair the products of this contract.			<b>5. DRD Category</b> <b><u>X</u> Technical</b> — Administrative — SR&QA
<b>6. References</b> (a) Statement of Work; paragraph 7.2, 3.3.2.9.1, 3.3.4.1.2.2 (b) ASME Y14.34M-1996, Drawings, Engineering and Associated Lists (c) ASME Y14.100-2000, Engineering Drawing Practices (d) ASME Y14.41-2003, Digital Product Definition Data Practices (e) MIL-PRF-28002C, Requirements for Raster Graphics Representation in Binary Format (f) IEEE/ASTM SI 10-2002, SI 10 American National Standard for Use of the International System of Units (SI): The Modern Metric System (g) SSP 41173, Space Station Quality Assurance Report (h) SSP 30695, Acceptance Data Package Requirements Specification		<b>7. Interrelationships</b> (e.g., with other DRDs) PC25, On-Orbit Installation Drawings or Models VE32, Vehicle Engineering Data PC08 Acceptance Data Package	

**8. PREPARATION INFORMATION:** The contractor shall prepare the DRD as follows:

**SCOPE:** This DR establishes the content, format, control, delivery requirements and post delivery maintenance of drawings, schematics, models and associated lists prepared by the contractors and/or obtained from subcontractors/vendors for products of this contract. Subcontractor/vendor drawings, describing items classified as minor procurements or limited development items, which were not developed on CAD systems, are exempt from the electronic transmission and database requirements herein. These drawings shall be accepted by the Contractor and converted to an electronic format using a file format consistent with the requirements in format paragraph for delivery under this DRD.

This DR also covers the drawings or models and associated lists unique to Mod Kits.

- a) Modification Collector Drawing or Models – A drawing or model that lists all the applicable Mod Kit drawings or models for each Class 1 change, by Space Station Change Notice number and is prepared and released by the Design Center Change Engineer assigned the change.
- b) Modification Index Drawing or Model – A drawing or model that depicts the application and sequence of installation for all modifications to an end item. Modification index drawings or models correlate the Mod Kit drawing or model number, Time Compliance Technical Instruction (TCTI), Change Directive number and the production installation drawing or model being modified on the before and after end item identification; also affectivity and serial number to which each modification applies and the prior incorporation sequence requirements when necessary.
- c) Mod Kit Drawing or Model – A drawing or model containing all of the information required to package and identify all the parts assemblies and materials necessary to modify a delivered end item. A Mod Kit also includes modification instructions and special tools, as required.

**CONTENT:**

Raster Images are to be Group 4 raster images, prepared per MIL-PRF-28002C and applicable documents. The format and quality verification requirements for Raster images of engineering drawing and related documents shall be in conformance with MIL-PRF-28002C, section 6.4.5 (Ordering Data). Ordering data to be used for the interchange of engineering drawings and associated document images are as follows:

- a. The basic requirements for interchange of raster image of engineering drawings and related documents shall be in accordance with Military Specification, Requirements for Raster Graphics Representation in Binary Format, MIL-PRF-28002C.
- b. The type of raster graphics being procured is Type 1 (untiled).
- c. The delivery medium to be used shall be either by magnetic or an electronic transmission, as determined by the Contractor and Tier 1 Subcontractor organizations involved in the interchange.
- d. Proper viewing orientation shall be based on a pixel element path direction of 0 degrees and a line progression direction of 270 degrees, as defined in section 6.4.6, and shown in Figures 1 and 2 of MIL-PRF-28002C.
- e. Raster image pixel element spacing shall be 200 dots per inch (dpi) minimum.
- f. No over-scanning is required beyond the drawing sizes listed in section 6.4.2; however, over-scanning is encouraged to capture ancillary information that is placed outside the border, such as CAD file name or plot date.
- g. Bit ordering shall be MSB to LSB (most significant bit to least significant bit).

- h. Coding of background and foreground information. To the extent that a drawing represents lines on paper, the pixel elements representing lines shall be coded as "black" and those pixel elements representing the paper background shall be coded as "white". This coding convention shall hold, regardless of the colors used for display on any particular device, and regardless of the coding as "0" or "1" on any particular system. In this way, white pixel elements (paper) may be processed as background, and black pixel elements (lines) may be processed as foreground.

NOTE: The preceding definition of the convention for coding background and foreground has been provided because a choice of convention has not been defined in MIL-PRF-28002C or CCITT Recommendation T.6. This convention is needed to support processing of drawing images without human interpretation.

**FORMAT:**

Delivery to NASA of drawings or models and associated lists will be made electronically, to the NASA server bundled into a ". zip" or a ". tar" file, as mutually agreed to by the NASA and Contractor organizations involved in the interchange and consistent with the specific requirements discussed below.

Delivery of drawing, models, and associated list files will be electronic. The file formats and structures of drawing or model delivery packages are defined in the attachment.

Drawing or model deliveries will be in one of the following formats as mutually agreed to between the Contractor and NASA: Drawings will be in Raster image format, HPGL plot files, PDF files or Printerleaf files. Models will be delivered in a PDF format. "A" size (8.5x11) book form drawings may be delivered in an electronic format other than raster image (including PDF files) as mutually agreed to be the NASA and contractor organizations involved in the interchange.

Other associated lists, including engineering parts list, shall be delivered in one of the following formats as mutually agreed to between the Contractor and NASA: ASCII text files, MS Excel files, HPGL plot files, Printerleaf files, PDF files or raster image format.

- a. Engineering flight drawings shall be in accordance with the intent of ASME Y14.100-2000. Models shall be in accordance with the intent of ASME Y14.41-2003. For inseparable, integral items, which require no intermediate maintenance activities upon installation and operation, specification of part marking and identification requirements in all applicable product drawings may be considered optional.
- b. Drawings for Ground Support Equipment (GSE), Functionally Equivalent Units, and Facility Outfitting shall be in accordance with the intent of ASME Y14.34M-1996, Level 2 characteristics and the specific tailoring shall be as defined by a Product Group-prepared and Contractor-approved GSE/TSE Tailoring Document submitted and maintained under the associated SDRL. Regardless of tailoring, the following requirements shall be met:

Drawings or models will be provided to the lowest level of assembly subject to replacement during maintenance. Existing drawing, model, or catalog data may be provided for items incorporated without alteration into GSE design.

Processes shall be referenced to military specifications, described in the drawings or models, or when referenced to company standards, the standards shall be provided as part of the drawing or model package delivered per this DR.

ANSI standards shall be used for dimensions and tolerance.

Acceptance test requirements shall be identified for replaceable functional components.

Cable diagrams for the GSE unit shall be provided. Connector reference numbers including commercial-off-the-shelf (COTS) receptacles shall be shown. Identify COTS connectors by the vendor's part number, cage code (if available) and manufacturer's name and address.

- c. Drawings for Facility Outfitting (Software Verification Facility, SVF) shall be in accordance with the intent of ASME Y14.34M-1996 (Level 1 classification) and ASME Y14.100-2000. Models shall be in accordance with the intent of ASME Y14.41-2003.
- d. All design activities shall use the methods designated in IEEE/ASTM SI 10-2002 to convert dimensional units from one system (SI or English) to another, where required for interfaces with International Partners.
- e. All design activities shall use the U.S. convention on third-angle projection in depicting views on drawings. A model coordinate system shall be depicted by three mutually perpendicular lines segments with its origin located at the intersection of the three axis.
- f. Where design activity material or process specification numbers are called out, the equivalent Government or industry specification numbers shall accompany them wherever a Government or industry specification is applicable.
- g. Engineering parts list, bill of materials, and note format shall be consistent with ASME Y14.100 and delivered in ASCII format, Raster Image, PDF or MS Excel with each drawing.
- h. Electronic formats shall provide for magnetic, optical media, or electronic transmission exchanges between the subcontractors and Contractor computer systems.

Delivery of drawings, models and associated list files will be electronic bundled into .zip or .tar files. The file formats and structures of drawing delivery packages are defined in the F-VE-09 Attachment.

Drawing deliveries will be in one of the following formats as mutually agreed to between the subcontractors and the Contractor: Raster image format, PDF or HPGL plot files.

Other associated lists shall be delivered in one of the following formats as mutually agreed to between the subcontractors and the Contractor: ASCII text files, HPGL plot files, MS Excel files, PDF files or Raster Image format.

- i. See the attachment that describes the formats for the Headers, Content and Packaging requirements for delivering engineering drawings or models.

9. **OPR:** OM5, Assembly & Configuration Team

10. **FIRST SUBMISSION DATE:** NA

**Frequency Of Submission:** As required to reflect modification of hardware drawings.

Mod Kits are submitted via separate Class 1 changes.

**Additional Submissions:** Additional submission for any new hardware.

11. **MAINTENANCE:** The document shall be maintained electronically.

Changes and/or updating of drawings, models, and lists shall be accomplished in accordance with the Contractor's engineering system and the provisions of the cited applicable documents.

Drawings or models shall be maintained electronically.

12. **COPIES/DISTRIBUTION:**

**1 original/record (hard copy):** OH/Data Management

**1 electronic copy:** to a Program authorized repository (VMDB or equivalent)

13. **REMARKS:** See F-VE-09 Attachment that describes the formats for the Headers, Content and Packaging requirements for delivering engineering drawings.

## Attachment for F-VE-09

### 1.0 INTRODUCTION

This attachment defines the specific requirements for the delivery of engineering drawings and associated lists.

### 1.1 HOW TO USE THIS ATTACHMENT

This attachment will specify the format in which engineering drawings, models and associated lists are to be delivered by the contractor. Contractor will deliver as described in this attachment.

#### See Section

Drawings and Models	2.1
Change Documents	2.2
Parts Lists	2.3
Other Associated Lists	2.4

### 1.2 APPLICABLE DOCUMENTS

The following specifications are referenced in this document:

- MIL-PRF-28002C, Requirements for Raster Graphics Representations in Binary Formats
- MIL-STD-1840A, Automated Interchange of Technical Information
- ASME Y14-100-2000\*, Engineering Drawings Practices
- ASME Y14.34\*, Associated List
- HP RTL, Reference Guide (Copyright 1994)

*Note: \*Drawings on the previous contract were governed by DOD-STD-100C and MIL-D-1000B, but these references have been retired and ASME Y14.100-2000 and ASME Y14.34 are the equivalent documents.*

### 1.3 GLOSSARY OF TERMS

**ASCII** [American Standard Code for Informational Interchange] The predominant character set encoding of present day computers. The code includes the 128 upper and lower letters, numerals, and special characters, each encoded in a unique 7 or 8-bit binary number.

Text A subset of ASCII, common to virtually all computer devices, consisting principally of printable characters.

**CAGE** [Corporate And Government Entity] The code used to uniquely identify a manufacturer. The CAGE code acronym has replaced former acronym FSCM (Federal Supply Code for Manufacturers).

**CCITT** [International Consultative Committee on Telegraphy and Telephony]

**Delivery** A delivery, or drawing delivery, is a complete delivery made in accordance with F-VE-09. This includes all of the drawings, change documentation, parts lists, associated lists, declaration files, and packaging files for the delivery. A delivery is made-up of multiple drawing packages and packaging files.

**HPGL** [Hewlett-Packard Graphics Language] A widely used computer language for communicating with printers and plotters.

**ISSA [International Space Station Alpha]**

**Package** Packages, or drawing packages, are the collection of files that relate specifically to a single drawing. This includes the drawing itself, change documentation, parts lists, associated lists, and declaration files specific to that drawing.

**Pixels** Physical picture elements.

**PDF** Portable Document Format (PDF) is a universal file format that preserves the fonts, images, graphics, and layout of any source document, regardless of the application and platform used to create it. Adobe PDF files are compact and complete, and can be shared, viewed, and printed by anyone with Adobe reader software.

**Raster** The closely spaced parallel lines produced on a display device. An image is formed by modulating the intensity of the individual pixels. A binary representation, "raster form", of the pixels can be used to digitally represent an image.

**Raster Graphics** The presentation or storage of images in raster form.

**2.0 DOCUMENTS**

This section describes the formats that are to be delivered by the product group. In the tables Describing format, Header refers to the section of this document, which defines the relevant headers for this file format, Content refers to the section of this document, which describes the content of this format, and Packaging refers to the section of this document that describes the methods required to package.

**2.1 DRAWINGS AND MODELS**

Drawing images are to be delivered in one of the following formats, as directed by the SDS. Model Based Definition files are to be delivered in PDF format.

Format	Header	Format	Packaging	dstdocid
Group 4 Raster	3.2	4.3	5.1	CAGE_Dwg_CL_DSI.IMG
Printerleaf	3.4	4.5	5.1	CAGE_Dwg_CL.IPL
HPGL	3.3	4.4	5.1	CAGE_Dwg_CL_DSI.HPL
PDF	3.6	4.7	5.1	CAGE_Dwg_CL_DSI.PDF

TABLE 2.1-1

The dstdocid defines the destination document ID for file headers and delivery packaging purposes. Please note the use of the underscore (“\_”) as a delimiter between lexical tokens. This is very important because the software used to verify deliveries relies on this delimiter. Variable codes (shown in *italicized* font) applied to the file names above are explained in the following table. Static codes (shown in normal font) are applied as shown. Do not forget the period preceding the extension. Variable codes are defined as follows:

Code	Description	Length (max)	Example(s)
CAGE:	Contractor CAGE Code	6 char	018355
Dwg:	Drawing number	40 char/digits	1F12345
CL: <sup>1</sup>	Change Letter	Up to 10 char as req'd	-, A, AY, A01
DSI: <sup>2</sup>	Drawing Sheet Identifier	7 digits/underscore	002_015

TABLE 2.1-2

<sup>1</sup> Up to 10 characters; initial (first) release shall be indicated by a single dash (“-”). ‘NEW’, ‘N/C’, ‘N/A’, or any other designation is not acceptable for an initial release. Each sheet should be marked with its current revision letter.

<sup>2</sup> First three digits indicate current sheet number; last three digits indicate total number of sheets for the drawing.

For example, a raster image of the third page (of six) of Boeing-Huntington Beach drawing 1F12345, ”A” change letter would have the dstdocid of: ”018355\_1F12345\_A\_003\_006.IMG”.

For example, a raster image scanned from a MIL-Std-1840 Condition 4 Aperture Card for pages 5 through 8 (of 16 pages total) of a Boeing-Huntington Beach drawing 1F12345, ”A” change letter would have the dstdocid of: ”018355\_1F12345\_A\_005\_016.IMG”.

A printerleaf document of the same drawing (all sheets are present in a single printerleaf file) would have the dstdocid: “018355\_1F12345\_A.IPL”.

An Adobe PDF document of the same drawing would have the dstdocid: “018355\_1F12345\_A\_003\_006.PDF”.

## 2.2 CHANGE DOCUMENTS

The change document, otherwise known as: Engineering Order (EO), Engineering Change Notices (ECN), Advanced Design Change Notices (ADCN) (unincorporated), or any other document used to describe the type and scope of changes that differentiate the current drawing from its previous revision. If this information is on the face of the drawing, no separate document need be delivered. The change document must contain: the drawing number affected, change letter, the part number affected, description of change, next assembly part number, and effectivity. Change documents are to be delivered in one of the following formats, as directed by the DRD.

Format	Header	Format	Packaging	dstdocid
Group 4 Raster	3.2	4.3	5.1	<i>CAGE_EO_Dwg_CL_DSI</i> .IMG
Printerleaf	3.4	4.5	5.1	<i>CAGE_EO_Dwg_CL</i> .IPL
HPGL	3.3	4.4	5.1	<i>CAGE_EO_Dwg_CL_DSI</i> .HPL
ASCII Text	3.1	4.1	5.1	<i>CAGE_EO_Dwg_CL</i> .LIS
PDF	3.6	4.7	5.1	<i>CAGE_EO_Dwg_CL</i> .DSI.PDF

TABLE 2.2-1

Note: Where *Dwg* this can be either the drawing number or the EO/CR number.

The *dstdocid*, defines the destination document ID for file headers and delivery packaging purposes. Please note the use of the underscore (“\_”) as a delimiter between lexical tokens. This is very important because the software used to verify deliveries relies on this delimiter. Variable codes (shown in *italicized* font) applied to the file names above are explained in the following table. Static codes (shown in normal font) are applied as shown. Do not forget the period preceding the extension. Variable codes are defined in Table 2.1-2.

For example, a raster image of the third page (of six) of the EO for Boeing-Huntington Beach drawing 1F12345, “A” change letter would have the *dstdocid* of: “018355\_EO\_1F12345\_A\_003\_006.IMG”.

A printerleaf document of the same drawing EO (All sheets are present in a single printerleaf file) would have the *dstdocid*: “018355\_EO\_1F12345\_A.IPL”.

An Adobe PDF document of the same drawing EO would have the *dstdocid* of: “018355\_EO\_1F12345\_A\_003\_006.PDF”.

### 2.3 PARTS LISTS

The Parts Lists can be delivered as part of a Raster Image, Printerleaf file, MS Excel spreadsheet or PDF file or as an ASCII file. If delivered in ASCII, the file shall be identified by Drawing Number and Change Letter. The Parts List shall contain, as a minimum, the following data elements for each constituent material: Material Code, description, quantity, and unit of measure. The Parts List shall contain, as a minimum, the following data elements for each component part: Part Number, quantity, description, and vendor CAGE Code (if purchased). Parts lists are to be delivered in the following formats defined in Table 2.3-1.

The *dstdocid*, defines the destination document ID for file headers and delivery packaging purposes. Please note the use of the underscore (“\_”) as a delimiter between lexical tokens. This is very important because the software used to verify deliveries relies on this delimiter. Variable codes (shown in *italicized* font) applied to the file names above are explained in the following table. Static codes (shown in normal font) are applied as shown. Do not forget the period preceding the extension. Variable codes are defined as follows:

Format	Header	Format	Packaging	Dstdocid
Group 4 Raster	3.2	4.3	5.1	CAGE_PL_Dwg_CL_DSI.IMG
Printerleaf	3.4	4.5	5.1	CAGE_PL_Dwg_CL.IPL
HPGL	3.3	4.4	5.1	CAGE_PL_Dwg_CL_DSI.HPL
ASCII Text	3.1	4.1	5.1	CAGE_PL_Dwg_CL.LIS
MS Excel	3.5	4.6	5.1	CAGE_PL_Dwg_CL.XLS
PDF	3.6	4.7	5.1	CAGE_PL_Dwg_CL.DSI.PDF

TABLE 2.3-1

For example, as ASCII text PL for Boeing-Huntington Beach drawing 1F12345, “A” change letter would have the dstdocid of: “018355\_PL\_1F12345\_A.LIS”.

An Adobe PDF document of the same drawing PL would have the dstdocid of: “018355\_PL\_1F12345\_A\_003\_006.PDF”.

### 2.3.1 DELIVERY OF PARTS LISTS ONLY

#### 2.3.1.1 NAMING CONVENTION FOR DATASETS

The naming convention for the dataset of a Parts List only delivery shall be 3a768\_PL\_YYYYMMDD.tar or .zip (where YYYYMMDD shall be the year, month and day). For Boeing Huntsville’s subcontractor PL only deliveries you would add an “s” after the date such as 3a768\_PL\_YYYYMMDDs.tar or .zip.

#### 2.3.1.2 NAMING CONVENTION FOR ASCII MAP FILE

The naming convention for the ASCII Map File shall be 3a768\_PL-Number\_-.TXT. (Note: Where *PL-Number\_-* is the PL number and the Revision Letter or a dash.) For example an ASCII map file for the PL for drawing 9008477 would be 3A768\_PL9008477\_-A.TXT. Each PL can be mapped to only one drawing.

#### 2.3.1.3 ATTACHMENT FILE

Please note the order in which the file names appear within each Parts List package; first the Parts List Declaration File, then the ASCII map file, Parts List files.

Each record shall be a maximum of 80 characters in length, un-padded, followed by a CRLF (ASCII 13 followed by ASCII 10) terminator.

10            20            30            40 50            60            70

123456789 123456789 123456789 123456789 123456789 123456789 123456789  
123456789

3A768\_20020929.DF  
3A768\_20020929.LET  
3A768\_20020929.ATT  
3A768\_DF\_PL9008477\_A.LIS  
3A768\_PL9008477\_A.TXT

3A768\_PL\_PL9008477\_A\_001\_001.IMG  
 3A768\_DF\_PL1J01512\_-.LIS  
 3A768\_PL1J01512\_-.TXT  
 3A768\_PL\_PL1J01512\_-\_001\_002.IMG  
 3A768\_PL\_PL1J01512\_-\_002\_002.IMG

## 2.4 OTHER ASSOCIATED LISTS

Other Associated Lists (AL), those documents which are a part of the drawing package and are not otherwise defined in this document, are to be delivered in the following formats as described in Table 2.1-1, or as directed by the DRD.

Other Associated Lists (AL) must reference: the drawing number, change letter, and the part number (if applicable) of its parent drawing.

The *dstdocid*, defines the destination document ID for file headers and delivery packaging purposes. Please note the use of the underscore (“\_”) as a delimiter between lexical tokens. This is very important because the software used to verify deliveries relies on this delimiter. Variable codes (shown in *italicized* font) applied to the file names above are explained in the following table. Static codes (shown in normal font) are applied as shown. Do not forget the period preceding the extension. Variable codes are defined as follows:

**TABLE 2.4-1**

Format	Header	Format	Packaging	dstdocid
Group 4 Raster	3.2	4.3	5.1	<i>CAGE_AL_Dwg_CL_DSI</i> .IMG
Printerleaf	3.4	4.5	5.1	<i>CAGE_AL_Dwg_CL</i> .IPL
HPGL	3.3	4.4	5.1	<i>CAGE_AL_Dwg_CL_DSI</i> .HPL
ASCII Text	3.1	4.1	5.1	<i>CAGE_AL_Dwg_CL</i> .LIS
PDF	3.6	4.7	5.1	<i>CAGE_AL_Dwg_CL_DSI</i> .PDF

Note: Where *Dwg* this can be either the drawing number or the AL number.

For example, a raster image of the third page (of six) of the AL for Boeing-Huntington Beach drawing 1F12345, “A” change letter would have the *dstdocid* of: “018355\_AL\_1F12345\_A\_003\_006.IMG”.

A printerleaf document of the same drawing AL (All sheets are present in a single printerleaf file) would have the *dstdocid*: “018355\_AL\_1F12345\_A.IPL”.

An adobe PDF document of the same drawing AL would have the *dstdocid* of: “018355\_AL\_1F12345\_A\_003\_006.PDF”.

### 3.0 FILE HEADERS

The file headers for drawing delivery files are detailed in this section. File names, types and content for those files used in the delivery of the drawing package are detailed in section 5.0.

#### 3.1 ASCII TEXT FILE HEADER

Reference: MIL-STD-1840A, Paragraph 5.1.4.1

All text files share the same common file header structure.

Example:

```

10 20 30 40 50 60 70
123456789 123456789 123456789 123456789 123456789 123456789 123456789
1234567890

```

---

```

srcdocid: 1F02676_A.PL
dstdocid: 018355_PL_1F02676_A.LIS
txtfilid: AW
doccls: Unclass
notes:

```

Notes:           srodocid:       Original name of file (if none, use name in dstdocid)  
                  dstdocid:       Destination Document ID as defined in sections 2.1–2.5  
                  txtfilid:      Use as directed in the content description of the text file  
                  doccls:         Use as shown  
*notes:*           *Use as shown, unless directed otherwise.*

#### 3.2 RASTER FILE HEADER

All MIL-R-28002(A) raster files share a common header structure. The following information is provided to clarify the values these fields should take for this application. The raster image files are set up so that the first 2048 bytes contain the header information in ASCII code and the residual bytes containing the image data are encoded in raster CCITT Group 4 code. The first 2048 bytes shall be written with 128 byte ANSI type F fixed-length records using ASCII data. The area provided for data in a given record can be computed by subtracting the length of the record tag (the field name with a colon and space at the end, i.e.; “notes:”) from 128. The notes field in the header can store 121 characters of text (128–7).

Rec	Name	Contents
1	srcdocid	Filename used to uniquely identify this drawing in senders system (80 characters of data max.)
2	dstdocid	Destination Document ID as defined in sections 2.1–2.5
3	txtfilid	The text literal “None”
4	figid	The text literal “None”
5	srcgph	The text literal “None”
6	doccls	The text literal “Unclass”
7	rtype	The text literal “1”, describing a type 1 raster per MIL-R-28002

8	rorient	Two three digit, zero padded character, strings separated by a comma, specifying the integer pel path and line progression, i.e., "000,270:
9	rpelcnt	Two six digit, zero padded character strings separated by a comma, specifying the integer pel count, i.e.; "040800,052800"
10	rdensty	The text literal "0200", specifying a raster density of 200dpi
11	notes	Free test

Example: The first 90 characters of the first 3 records:

```

          10      20      30 40      50 60      70      80
123456789 123456789 123456789 123456789 123456789 123456789 123456789
123456789 123456789
sredocid: DL1F12345 18355 A 000100001U EHN 002
dstdocid: 018355_1F12345_A_001_006.IMG
txtfilid: None
figid: None
sregph: None
doccls: Unclass
rtype: 1
rorient: 000,270
rpelcnt: 040800,052800
rdensty: 0200
Notes: None

```

### 3.3 HEWLETT PACKARD GRAPHIC LANGUAGE FILE HEADER

Hewlett Packard Graphic Language (HPGL) files do not support file headers

### 3.4 PRINTERLEAF FILE HEADER

Do not alter the Printerleaf file headers.

### 3.5 MS EXCEL FILE HEADER

*MS Excel does not require a header.*

### 3.6 ADOBE ACROBAT PDF FILE HEADER

*Do not alter the PDF file headers.*

## 4.0 DATA FILE FORMAT

The file formats for drawing delivery files are detailed in this section. File names, types, and content for those files used in the delivery of the drawing package are detailed in section 5.0.

#### **4.1 ASCII DATA FILE FORMAT**

Files shall be 80 (Portrait) or 132 (Landscape) characters wide, blank padded, followed by a Carriage Return Line Feed (CRLF) [ASCII 13 followed by ASCII 10] terminator. Only 7 bit ASCII characters shall be used in ASCII data files

#### **4.2 DRAWING/MODEL INFORMATION FILE FORMAT**

The drawing information file is an ASCII text file contained variable length records, terminated by a CRLF [ASCII 13 followed by ASCII 10] sequence. See section 2.4 for specific formatting requirements relating to the content of the document.

#### **4.3 RASTER IMAGE FILE FORMAT**

Raster images are to be Group 4 raster images, prepared per MIL-PRF-28002C and applicable documents. The format and quality verification requirements for Raster images of engineering drawings and related documents shall be in conformance with MIL-PRF-28002C, section 6.4.5 (Ordering Data). Ordering data to be used for the interchange of engineering drawing and associated document images are as follows:

- a. The basic requirements for interchange of raster image of engineering drawings and related documents shall be in accordance with Military Specification, Requirements for Raster Graphics Representation in Binary Format, MIL-PRF-28002C.
- b. The type of raster graphics being procured is Type 1 (untiled).
- c. The delivery medium to be used shall be either by magnetic or an electronic transmission, as determined by the organizations involved in the interchange.
- d. Proper viewing orientation for single page per raster fin engineering documents shall be based on a pel path direction of 0 degrees and a line progression direction of 270 degrees, as defined in section 6.4.6, and shown in Figures 1 and 2 of MIL-PRF-28002AC. Multi sheet per raster file engineering documents (i.e., documents scanned from MIL-STD-1840 condition 4 aperture cars) may use one of the other sets of values defined in section 6.4.6 and shown in Figures 1 and 2 of MIL-PRF-28002C, if said values represent the normal viewing orientation.
- e. Raster image pel (pixel element) spacing shall be 200 dpi (dots per inch) minimum.
- f. No overscanning is required beyond the drawing sizes listed in section 6.4.2; however, overscanning is encouraged to capture ancillary information that is placed outside the border, such as CAD file name or plot date.
- g. Bit ordering shall be MSB to LSB (most significant bit to least significant bit).
- h. Coding of background and foreground information. To the extent that a drawing represents lines on paper, the picture elements (pels) representing lines shall be coded as "black" and those pels representing the paper background shall be coded as "white". This coding convention shall hold, regardless of the colors used for display on any particular device, and regardless of the coding as "0" or "1" on any particular system. In this way, white pels (paper) may be processed as background, and black pels (lines) may be processed as foreground.

NOTE: The preceding definition of the convention for coding background and foreground has been provided because a choice of convention has not been defined in MIL-PRF-28002C or CCITT Recommendation T.6. This convention is needed to support processing of drawing images without human interpretation.

#### **4.4 HEWLETT PACKARD GRAPHIC LANGUAGE DATA FILE FORMAT**

*Hewlett Packard Graphic Language (HPGL) files are to be compliant with HPGL/2 as defined in "The HP-GL/2 and HP RTL Reference Guide [A Handbook for Program Developers]", Hewlett Packard, 1994. (HP part number 5959-9733).*

#### **4.5 PRINTERLEAF DATA FILE FORMAT**

Printerleaf files shall be compatible with those produced by Interleaf version 5.x.

#### **4.6 MS EXCEL DATA FILE FORMAT**

*Ms excel files shall be compatible with Windows 97, 2000 or any succeeding version.*

#### **4.7 ADOBE ACROBAT PDF FILE FORMAT**

*Adobe Acrobat PDF files shall be compatible with Adobe Acrobat reader version 4.0 or higher.*

### **5.0 PACKAGING OF DOCUMENTS FOR DELIVERY**

This section details file names, types, and content for those files used in the delivery of drawing packages. Regardless of the methods and formats used, each drawing package must be complete within a submittal when delivered.

Drawings packages split across submittals or incomplete drawing packages will not be accepted. All pages belonging to a multiple-page drawing must be accounted for and included within the drawing submittal and must be delivered in the same submittal

The Drawing Declaration file must include all images files, change document files, associated lists, and parts list files submitted electronically.

Copies of the transmittal letter (5.1.2) and its attachment (5.1.3) are to accompany the electronic portion of the delivery.

### **5.1 PACKAGING OF ELECTRONIC DOCUMENTS FOR DELIVERY**

This section details file names, types, and content for those files used in the delivery of electronic documents in drawing packages. A delivery package consists of one delivery declaration file, one transmittal lever, one attachment file, and one or more drawing packages. Each drawing package may contain from one to 999 drawings and be organized as follows:

**Delivery Declaration file**

**Transmittal Letter**

Attachment (Electronic)

**Drawing declaration file #1**

**One or more data files**

**Drawing declaration file #2**

**One or more data files**

### 5.1.1 DELIVERY DECLARATION FILES

The delivery declaration file is an ASCII file, providing information about the source, destination of the delivery as a whole and specifically the transmittal letter and its attachment.

The destination document ID (dstdocid) for the delivery declaration file shall be a concatenation of the Contractor's six digit CAGE code, an underscore ("\_"), the date of the delivery package's transmittal in the format YYYYMMDD, and the extension ".DF". For example, the dstdocid for a transmittal made on 17 March, 2002 by Boeing-Huntington Beach would be: "018355\_20020317.DF". The file name of the delivery declaration file is to be the file's destination document ID (dstdocid).

The Delivery Declaration File contains 15 records. Each record shall be 80 characters in length, blank padded, followed by a CRLF (ASCII 13 followed by ASCII 10) terminator. Use the format in the example below. Clarification of data fields is provided in the notes after the example. Where "None" or "Unclass" appears, use as shown. Each line in this file consists of a code starting in column 1, followed by a colon, followed by a space, followed by a data field pertinent to the delivery package. These codes are defined in MIL-STD-1840A.

The example below shows the formatting of a typical line srcdocid: "XMIT20020228".

Example of Delivery Declaration File (Do not include ruler):

```
    10   20   30   40   50   60   70
123456789 123456789 123456789 123456789 123456789 123456789 123456789
1234567890
```

---

```
srcsys: Boeing-Huntington Beach 5301 Bolsa Ave, HB CA 92647
srcdocid: XMIT20020123
srcrelid: NONE
chglvl: 20020123
dteis: 20020123
dstsys: The Boeing Company: 13100 Space Center Blvd, Houston, TX 77059
dstdocid: 18355_20020123.DF
dstrelid: NONE
dtetrn: 20020123
dlvacc: F-VE-09
filcnt: T3
ttlcls: Unclass
doccls: Unclass
doctyp: NONE
docttl: NONE
```

Notes:

srcsys: Name and address of subcontractor  
srcdocid: Name of Transmittal Letter file on source system  
chglvl: Date of original document formatted YYYYMMDD  
dteisu: Date of issue of the latest change to this document  
dstsys: Name and address of receiving system  
dstdocid: Destination document ID as defined above  
dtetrn: Date of transmission or mailing date formatted YYYYMMDD  
dlvacc: Contract – use as shown  
filcnt: Number of files – use as shown.

### 5.1.2 TRANSMITTAL LETTER

The transmittal letter is an ASCII text document with no header. The file name and destination document ID (for use in the attachment) for the transmittal letter shall be a concatenation of the subcontractor's six-digit CAGE code, an underscore ("\_"), the date of the delivery package's transmittal in the format YYYYMMDD and the extension ".LET". Please note that with the exception of the extension, the file names of the transmittal letter and the delivery declaration file are identical. For example the dstdocid for a transmittal made on 17 March, 2002 by Boeing-Huntington Beach would be "018355\_20020317.LET".

Use the template below for the format of the Transmittal Letter. Note that it is not a formal contract letter. Formal contract transmittal letters are to be sent by contract administrator.

```
      10  20  30  40  50  60  70
123456789 193456789 123456789 123456789 123456789 123456789 123456789
1934567890
Date: 23-Jan-02
Subject: Space Station Data submittal
1. This is an electronic transmittal of Your Company Name Here drawings enumerated on
the enclosed attachment
2. Distribution of the electronic drawing information has been sent to the computer
database system at Computer Description
Here on January 23, 2002.
3. The number of drawing(s) transmitted: 3
4. A formal contract transmittal letter will follow under separate cover.
```

Each record shall be 80 characters in length, blank padded, followed by a CRLF (ASCII 13 followed by ASCII 10) terminator.

### 5.1.3 ATTACHMENT

The attachment lists all of the destination document IDs for all of the files in a delivery package. The files are the Delivery Declaration File, the Transmittal Letter, the Attachment, and the filenames in each drawing package. The destination document ID for the attachment shall be a concatenation of the subcontractor's six digit CAGE code, an underscore ("\_"), the date of the delivery package's transmittal in the format YYYYMMDD and the extension ".ATT".

Please note the order in which the file names appear within each drawing package; first the Drawing Declaration File, then the image file(s), Change Document files, Parts List files, and any other associated lists. Note also that the drawing title follows only the first image file for each drawing number.

Each record shall be a maximum of 80 characters in length, un-padded, followed by a CRLF (ASCII 13 followed by ASCII 10) terminator.

10            20            30            40            50            60            70

123456789 123456789 123456789 123456789 123456789 123456789 123456789 123456789

018355\_20020123.DF  
018355\_20020123.LET  
018355\_20020123.ATT  
018355\_DF\_1F04087\_B.LIS  
018355\_1F04087\_B\_001\_003.IMG FRAME ASSY, SLING-FLIGHT ELEMENT  
018355\_1F04087\_B\_002\_003.IMG  
018355\_1F04087\_B\_003\_003.IMG  
018355\_EO\_993344\_-.LIS  
018355\_PL\_1F04087\_B.LIS  
018355\_DF\_1F65085\_-.LIS  
018355\_1F65085\_-\_001\_002.HPL BAR, SPREADER - FLIGHT ELEMENT SLING  
018355\_1F65085\_-\_002\_002.HPL  
018355\_EO\_993344\_-.LIS  
018355\_PL\_1F65085\_-.LIS  
018355\_AL\_SP-M-512\_B.LIS  
018355\_DF\_1F65555\_-.LIS  
018355\_1F65555\_-\_001\_002.IMG BRACKET ASSEMBLY-FLIGHT ELEMENT SLING  
018355\_1F65555\_-\_002\_002.IMG  
018355\_EO\_1F65555\_-.LIS  
018355\_PL\_1F65555\_-.LIS  
018355\_AL\_1F65555\_-\_001\_002.IMG  
018355\_AL\_1F65555\_-\_002\_002.IMG

#### 5.1.4 DRAWING/MODEL DECLARATION FILE

The drawing declaration file is, in itself, a header for the drawing package, and consists of only header information. The file name and destination document ID (dstdocid) of the drawing declaration file is "CAGE\_DF\_DWG\_CL.LIS".

The dstdocid, defines the destination document ID for file headers and delivery packaging purposes. Please note the use of the underscore ("\_") as a delimiter between lexical tokens. This is very important because the software used to verify deliveries relies on this delimiter. Variable codes applied to the file names above are explained in the following table. Static codes are applied as shown. Do not forget the period preceding the extension. Variable codes are defined as follows:

TABLE 5.1.4-1

Code	Description	Length (max.)	Example(s)
CAGE	Contractor CAGE Code	6 char	018355
Dwg or Model	Drawing or Model number	40 char/digits	1F12345
CL <sup>1</sup>	Change Letter	Up to 10 char as req'd	-, A, AY, A01

1. One or two characters; initial (first) release shall be indicated by a single dash (“-”). ‘NEW’, ‘N/C’, ‘N/A’, or any other designation is not acceptable for an initial release.  
Reference: MIL-STD-1840A, Paragraph 5.1.1.2

*For example, the drawing file for Boeing-Huntington Beach drawing 1F12345, “A” change letter would have the dstdocid of: “018355\_DF\_1F12345\_A.LIS”.*

Example:

```

          10          20          30          40          50          60          70
123456789 123456789 123456789 123456789 123456789 123456789 123456789
srcsys: Boeing-Huntington Beach 5301 Bolsa Ave, HB CA 92647
srcdocid: 1F04087
srcrelid: NONE
chglvl: B
dteisu: 20020123
dstsys: The Boeing Company: 13100 Space Center Blvd, Houston, TX 77059
dstdocid: 018355_DF_1F04087_B.LIS
dstrelid: NONE
dtetrn: 20020123
dlvacc: F-VE-09
filcnt: R01, T01
titlcls: Unclass
doccls: Unclass
doctyp: PD
docttl: FRAME ASSY, SLING-FLIGHT ELEMENT

```

Notes:

srcsys: Name and address of subcontractor (80 char max.)  
srcdocid: Drawing number (35 char max.)  
srcrelid: Use as shown  
chglvl: Change Letter (use single “-” if new)(2 char max.)  
dteisu: Date of issue of the latest change to this document (YYYYMMDD format)  
dstsys: Name and address of receiving system  
dstdocid: Cage Code, Drawing number and Change letter (use single “-” if new)  
dtetrn: Date of transmission or mailing date formatted YYYYMMDD  
dlvacc: Contract – use as shown  
filcnt: Number of files R01 means one raster file. T4 means four text files, X07 means seven Printerleaf files, and L05 means five HPGL files, E01 means one MS Excel file, and P01 means one PDF file. . (Comma separated)

ttlcls: Use as shown  
doccls: Use as shown  
doctyp: Use as shown  
docttl: Drawing title

The filcnt document types are as follows:

Type	Code
Group 4 Raster Image	R
ASCII Text File	T
Printerleaf File	X
HPGL/2 File	L
MS Excel File	E
PDF	P

**5.1.5 DATA FILE NAMES**

The file name for data files shall be the file's description document ID (dstdocid), as defined in the relevant sections of this document.

**DATA REQUIREMENTS DESCRIPTION  
(Based on JSC-STD-123)**

<b>1a. DRD Title:</b> Data Conversion and Interface for GFE/IP Drawings to the VMDB.  <b>1b. Data Type: 3</b>	<b>2. Date of Current Version</b>  01/01/04	3a. DRD No.  <b>F-VE-13</b>	<b>3b. RFP/Contract No.</b>  NAS 15 -10000
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) Take the design data from GFE/IP hardware providers if the providers cannot provide the format and content required by VMDB and convert to the format and content required by the VMDB.			<b>5. DRD Category</b> <u>X</u> <b>Technical</b> — Administrative — SR&QA
<b>6. References</b> a. Statement of Work; paragraph 3.3.4.1.3 b. ASTM-E380, Standard Practice for Use of the International System of Units c. MIL-PRF-28002C, Requirements for Raster Graphics Representation in Binary Format d. SSP 41173, Space Station Quality Assurance Report e. SSP 30695, Acceptance Data Package Requirements Specification		<b>7. Interrelationships (e.g., with other DRDs)</b>  (a) F-VE-09, Sustaining Engineering Drawings, Mod Kit Drawings and Associated Lists (b) VE32, Vehicle Engineering Data.	

**8. PREPARATION INFORMATION:** The contractor shall prepare the deliverables as follows:

**SCOPE:** This DR establishes the content, format, control, and maintenance of GFE/IP drawings, schematics, and associated lists to be converted and prepared for use and delivery to the VMDB. This DR also makes provisions for the contractor to have the capability to scan hardcopies and put drawings into the electronic format required by the VMDB.

**CONTENT:**

Raster images: Raster images are to be Group 4 raster images, prepared per MIL-PRF-28002C and applicable documents. The format and quality verification requirements for Raster images of engineering drawings and related documents shall be in conformance with MIL-PRF-28002C, section 6.4.5 (Ordering Data). Ordering data to be used for the interchange of engineering drawing and associated document images are as follows:

- a. The basic requirements for interchange of raster image of engineering drawings and related documents shall be in accordance with Military Specification, Requirements for Raster Graphics Representation in Binary Format, MIL-PRF-28002C.
- b. The type of raster graphics being procured is Type 1 (untiled).
- c. The delivery medium to be used shall be electronic transmission.
- d. Proper viewing orientation shall be based on a pixel element (pel) path direction of 0 degrees and a line progression direction of 270 degrees, as defined in section 6.4.6, and shown in Figures 1 and 2 of MIL-PRF-28002.
- e. Raster image pel spacing shall be 200 dots per inch (dpi) minimum.

- f. No over scanning is required beyond the drawing sizes listed in section 6.3.2; however, over scanning is encouraged to capture ancillary information that is placed outside the border, such as CAD file name or plot date.
- g. Bit ordering shall be MSB to LSB (most significant bit to least significant bit).
- h. Coding of background and foreground information. To the extent that a drawing represents lines on paper, the picture elements (pels) representing lines shall be coded as "black" and those pels representing the paper background shall be coded as "white". This coding convention shall hold, regardless of the colors used for display on any particular device, and regardless of the coding as "0" or "1" on any particular system. In this way, white pels (paper) may be processed as background, and black pels (lines) may be processed as foreground.

**NOTE:** The preceding definition of the convention for coding background and foreground has been provided because a choice of convention has not been defined in MIL-PRF-28002C or CCITT Recommendation T.6. This convention is needed to support processing of drawing images without human interpretation.

**FORMAT:** Delivery to NASA of drawings and associated lists will be made electronically. All drawings and associated lists, except for "A" size book form drawings shall be delivered bundled into .zip or .tar files. "A" size book form drawings may be delivered in an electronic format other than raster image as mutually agreed to by the NASA and Contractor organizations involved in the interchange. Drawings and associated lists shall be delivered in ASCII, HPGL, MS Excel or Raster Image format, provided the following criteria are met:

- a. Engineering flight drawings shall be in accordance with the intent of ASME Y14.100-2000. For inseparable, integral items, which require no intermediate maintenance activities upon installation and operation, specification of part marking and identification requirements in all applicable product drawings may be considered optional.
- b. Drawings for Ground Support Equipment (GSE), Functionally Equivalent Units, and Facility Outfitting shall be in accordance with the intent of ASME Y14.100-2000 and the specific tailoring shall be as defined by a Product Group-prepared and Contractor-approved GSE/TSE Tailoring Document submitted and maintained under the associated SDRL. Regardless of tailoring, the following requirements shall be met:

Drawings will be provided to the lowest level of assembly subject to replacement during maintenance. Existing drawing or catalog data may be provided for items incorporated without alteration into GSE design.

Processes shall be referenced to military specifications, described in the drawings, or when referenced to company standards, the standards shall be provided as part of the drawing package delivered per this DR.

ANSI standards shall be used for dimensions and tolerance.

- c. All design activities shall use the methods designated in ASTM-E380 to convert dimensional units from one system (SI or English) to another, where required for interfaces with International Partners.

- d. All design activities shall use the U.S. convention on third-angle projection in depicting views on drawings.
- e. Where design activity material or process specification numbers are called out, the equivalent Government or industry specification numbers shall accompany them wherever a Government or industry specification is applicable.
- f. Engineering parts list, bill of materials, and note format shall be consistent with ASME Y14.100-2000 and delivered in ASCII format, Raster Image or MS Excel with each drawing.
- g. Electronic formats shall provide for magnetic, optical media, or electronic transmission exchanges between the GFE/IP drawing systems.
- h. Delivery of drawings, and associated list files will be electronic bundled into .zip or .tar files.
- i. Drawing deliveries will be in one of the following formats: Raster image format, or HPGL plot files.
- j. Other associated lists shall be delivered in one of the following formats: ASCII text files, HPGL plot files, MS Excel files, or Raster Image format.

**9. OPR:** OM5, Assembly & Configuration Team

**10. FIRST SUBMISSION DATE:**

**Frequency Of Submission:** As drawings are released to manufacturing and whenever modified.

**Additional Submissions:** Additional submissions for any new hardware.

**11. MAINTENANCE:** (The document shall be maintained electronically.

Changes and/or updating of drawings and list shall be accomplished in accordance with the Contractor's engineering system and the provisions of the cited applicable documents. Drawings shall be maintained electronically.

**12. COPIES/DISTRIBUTION:**

**1 record (hard copy):** OH/Data Management

**1 copy (electronic):** Program authorized electronic library (VMDB or equivalent)

**13. REMARKS:** None

**DATA REQUIREMENTS DESCRIPTION**

<b>1a. DRD Title: Launch Configuration Drawings or Models</b>  <b>1b. Data Type: 3</b>	<b>2. Date of Current Version</b>  10/01/10	<b>3a. DRD No.</b>  F-VE-14	<b>3b. RFP/Contract No.</b>  NAS 15-10000
<b>4. Use:</b> <b>Launch Configuration Drawings or Models:</b> Provide the engineering requirements as a means to ensure that manifested flight hardware is correctly configured for launch.			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical <input type="checkbox"/> Administrative <input type="checkbox"/> SR&QA
<b>10. References</b> (a) Statement of Work (SOW); paragraph 3.3.2.9.3 ASME Y14.24-1999, Types and Applications of Engineering Drawings ASME Y14.35M-1997, Revisions of Engineering Drawings and Associated Documents ASME Y14.100-2000, Engineering Drawing Practices ASME Y14.34M-1996, Associated Lists ASME Y14.41-2003, Standard on Digital Production Definition Data Practices IEEE/ASTM SI 10-2002, SI 10, American National Standard for Use of the International System of Units (SI): The Modern Metric System MIL-PRF-28002C-1997, Requirements for Raster Graphics Representation in Binary Format			<b>7. Interrelationships</b>  F-VE-09, Sustaining Engineering, New Development, and Mod kit Drawings and Associated Lists  VE32, Vehicle Engineering Data

**8. PREPARATION INFORMATION:** The contractor shall prepare the drawings and associated lists delivered per this DRD as follows:

**SCOPE:** This DRD establishes the content, format, control, and maintenance of Launch Configuration Drawings or Models and Associated Lists prepared by the contractor for manifested flight hardware items. These drawings or models are required for management control and are not part of the flight hardware's product structure. Per reference (d), these drawings or models are prepared to supplement the end product drawings or models. These drawings or models are also required for management control, logistics purposes, configuration management, and other similar functions as authorized by NASA. These drawings or models do not establish item identification accomplished by the applicable product structure drawings or models, prepared under F-VE-09, as applicable.

Specifically, Launch Configuration Drawings or Models shall provide the engineering requirements to:

- i. Ensure that manifested flight hardware is configured correctly for launch.
- ii. Provide approximate label locations.
- iii. Provide reference notes, including overall dimensions.

**CONTENT:** Raster images: Raster images are to be Group 4 raster images, prepared per MIL-PRF-28002C and applicable documents. The format and quality verification requirements for Raster images of engineering drawings and related documents shall be in conformance with MIL-PRF-28002C, section 6.4.5 (Ordering data). Ordering data to be used for the interchange of engineering drawing and associated document images are as follows:

- a. The basic requirements for interchange of Raster image of engineering drawings and related documents shall be in accordance with Military Specification MIL-PRF-28002C, Requirements for Raster Graphics Representation in Binary Format.
- b. The type of raster graphics being procured is Type 1 (untiled).
- c. The delivery medium to be used shall be either by magnetic or an electronic transmission.
- d. Proper viewing orientation shall be based on a pel path direction of 0 degrees and a line progression direction of 270 degrees, as defined in section 6.4.6, and shown in Figures 1 and 2 of MIL-PRF-28002C.
- e. Raster image pixel element (pel) spacing shall be a minimum of 200 dots per inch (dpi).
- f. No over scanning is required beyond the drawing sizes listed in section 6.4.2; however, over scanning is encouraged to capture ancillary information that is placed outside the border, such as CAD file name or plot date.
- g. Bit ordering shall be most significant big (MSB) to least significant bit (LSB).
- h. Coding of background and foreground information. To the extent that a drawing represents lines on paper, the pels representing lines shall be coded as "black" and those pels representing the paper background shall be coded as "white". This coding convention shall hold, regardless of the colors used for display on any particular device, and regardless of the coding as "0" or "1" on any particular system. In this way, white pels (paper) may be processed as background, and black pels (lines) may be processed as foreground.

**NOTE:** The preceding definition of the convention for coding background and foreground has been provided because a choice of convention has not been defined in MIL-PRF-28002C or CCITT Recommendation T.6. This convention is needed to support processing of drawing images without human interpretation.

**FORMAT:** Delivery to NASA of drawings or models and associated lists will be made electronically, to the NASA server bundled into a ". zip" or a ". tar" file, as mutually agreed to by the NASA and Contractor organizations involved in the interchange and consistent with the specific requirements discussed below. The file formats and structures of drawing and model delivery packages are defined in the attachment to F-VE-09.

Drawing deliveries will be in one of the following formats as mutually agreed to between the Contractor and NASA: Raster image format files, HPGL plot files, or Portable Document Format (PDF) files. Model deliveries will be in PDF files.

Other associated lists, including engineering Parts List (PL), Engineering Order (EO), Engineering Change Notice (ECN), Advanced Design Change Notice (ADCN), shall be delivered in one of the following formats as mutually agreed to between the Contractor and NASA: ASCII text files, MS Excel files, HPGL plot files, PDF files, or Raster image format files.

- a. Launch Configuration Drawings shall be Level 3 Production drawings and prepared in accordance with the intent of ASME Y14.100-2000. Models shall be Level 3 Production Models and prepared in accordance with the intent of ASME Y14.41-2003. For inseparable, integral items, which require no intermediate maintenance activities upon installation and operation, specification of part marking and identification requirements in all applicable product drawings may be considered optional.
- b. All design activities shall use the methods designated in IEEE/ASTM SI 10-2002 to convert dimensional units from one system (SI or English) to another, where required for interfaces with IPs.
- c. All design activities shall use the U.S. convention on third-angle projection in depicting views on drawings.
- d. Where design activity material or process specification numbers are called out on a drawing or associated list the call-out shall be in accordance with ASME Y14.100-2000 section 4.30 with the equivalent Government or industry specification numbers accompany them wherever a Government or industry specification is applicable.
- e. Engineering parts list, bill of materials, and note format shall be consistent with ASME Y14.34M-1996 and delivered in ASCII format, Raster Image, PDF or MS Excel format with each drawing.
- f. Electronic formats shall provide for magnetic, optical media, or electronic transmission exchanges between the NASA and Contractor computer systems.

**9. OPR:** OM5, Assembly and Configuration Team

**10. FIRST SUBMISSION DATE:**

**Frequency Of Submission:** Delivered for each flight upon an approved Manifest Request (MR) plus twelve (12) weeks unless an LCD was previously delivered. Drawings shall be delivered in electronic format to the VMDB.

**Additional Submissions:** After manifest reconciliation and before launch, if the hardware is modified or the launch configuration changes, then drawings or models will be revised and resubmitted to the VMDB.

**11. MAINTENANCE:** Changes and/or updating of drawings or models and associated lists shall be accomplished in accordance with the Contractor's engineering system and the provisions of the cited applicable documents through Sustaining Engineering. Drawings and models shall be maintained electronically. Changes and/or updating shall be accomplished by Contractor defined process.

**12. COPIES/DISTRIBUTION:**

1 electronic copy: to a Program authorized repository (VMDB or equivalent)

**13. REMARKS:** None

### DATA REQUIREMENTS DESCRIPTION

1. DR Title: F-VE-15, ISS CoFR Validation Matrix
2. DRD Extension Number(s): None
3. TPR Code: Vehicle Integration, Integrated Test and Verification /OB
4. Data Type: 2
5. Frequency of Submission: CoFR Validation Planning Matrix delivered approximately 4 months before the first flight of a six month increment. CoFR Validation Matrix with attached reports delivered for all flights starting with first flight in FY'11 (40P+) as evidence for CoFR.
6. First Submission Date: June, 2010 (Planning matrix for flights occurring in FY'11 Q1 and Q2.
7. As-of-Date: N/A
8. Copies and Distribution: 1 copy distributed to each of the following:
  - (c) Team of Primary Responsibility (TPR)
  - (b) OH/Data Management
  - (c) Program-authorized electronic repository (EDMS or equivalent)
9. Remarks: NONE
10. Use:
  - (a) Provide NASA with a matrix of applicable requirements for each visiting vehicle flight to be implemented in order to satisfy CoFR objectives.
  - (b) Provide NASA with the results of integrated analyses and assessments to ensure ISS readiness to accept visiting vehicle flights and planned operations for the time period between visiting vehicle flights per the applicable requirements.
  - (b) Maintain analytical models to ensure proper structure and content.
11. References:
  - (a) Statement of Work (SOW); paragraphs 3.2.1.10, 3.2.1.11.1, 3.2.1.11.3.2, 3.4, 3.4.3
  - (b) Other: N/A
12. Inter-relationships:
13. Preparation Information:
- 13.1 Scope:
  - (a) The ISS CoFR Validation Matrix shall be a table of all ISS System Requirements that can be selected as applicable by the subsystems dependent upon the specific visiting vehicle and planned operations.

- (b) Analysis reports shall document all input data, assumptions and boundary conditions, analysis methodology, and analysis results for analyses intended to:
  - (1) Demonstrate vehicle performance and the performance of integrated subsystems with or without the effects of the visiting vehicles.
  - (2) Demonstrate that the planned ISS operations are within the capability ISS vehicle or subsystem per the requirements and/or actual on-orbit capability.
- (b) Analysis models that are developed for vehicle or subsystem end-to-end performance analysis shall be documented and submitted in accordance with this DR.

13.2 Format: The ISS CoFR Validation Matrix and analysis results and models shall be delivered in accordance with the following:

- (a) Results of analyses shall be documented in two data items:
  - (1) A completed ISS CoFR Validation Matrix for each visiting vehicle that indicates the applicability of specific requirements shall be submitted in electronic format. This completed matrix will be a preliminary submittal of VExx and electronically configuration controlled.
  - (2) A one- to two-page abstract/report of the analysis shall be added to the ISS CoFR Validation Matrix and be submitted in electronic format. This abstract/report shall be published in the formal submittal of VExx and electronically configuration controlled. This common abstract/report shall include the analysis title, author, and date as well as a description of the analysis including background, assumptions, analysis discussion, analytical models, operational constraints, issues, summary, and closure recommendations.
- (b) Models shall be documented with two data items.
  - (1) An informal copy of the team's internal memorandum or report documenting the models shall be submitted to the Boeing Systems Integration Team (VIPER) and should include the following information:
    - Inputs
    - Methodology
    - Results
    - Validation

This document will be retained by the Systems Integration team.

- (2) A separate report or a paragraph included in the abstract of the analysis per the content in 13.2.(2). This report shall be published in the formal submittal of VExx and electronically configured. This paragraph should name the analytical models used in the analysis and, if specifically developed for the analysis, the inputs, outputs, and limitations should be described. Evidence of model certification should be included and a description of the model and data configuration control and location.

13.3 Content: This DR includes:

- (a) The ISS CoFR Validation Matrix shall contain the following for the ISS System Specification, and other source documents as required, to be used to indicate applicability for the specific visiting vehicle flight and planned activities.
  - (1) Specification Title
  - (2) Section 3 paragraph #
  - (3) Section 3 requirement title
  - (4) Section 3 requirement text
  - (5) Initialization data needs
  - (6) Facilities/Tools/Models
  - (7) Success criteria
  - (8) Delivery schedule (L-minus)
  - (9) Closure report number and title
  - (10) Closure documentation
  
- (b) Analyses for ISS vehicle and subsystem functional performance under specified natural and induced environment conditions and operational conditions.
  
- (c) The Master Analysis Plan and Schedule (MAPS) documenting the end-to-end analysis assumptions. This plan will include (as a minimum):
  - Vehicle configuration and groundrules to be used in the analyses and assessments.
  - Identification and control of data to be used in the assessments.
  - Coverage matrix showing assessments conducted.

13.4 Maintenance: Deliverables shall be maintained electronically.