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**I.A. CONTINUATION OF STANDARD FORM 1449****I.A.1 SCHEDULE OF SUPPLIES AND/OR SERVICES TO BE PROVIDED**

The Contractor shall provide all services, facilities, and resources (except as may be expressly stated in this contract as furnished by National Aeronautics and Space Administration [NASA]) necessary to furnish all Contract Line Item Numbers (CLINs) below in accordance with the Terms and Conditions, [Statement of Work](#) (SOW), Exhibits, and Documents attached hereto.

**I.A.2 INDEFINITE DELIVERY INDEFINITE QUANTITY (IDIQ), FIRM FIXED PRICE CONTRACT**

In accordance with Provision VI.A.5, Single or Multiple Awards (FAR 52.216-27) (Oct 1995), NASA may elect to award multiple contracts. The guaranteed minimum value for any awarded contract is six (6) cargo resupply service missions with the capabilities defined for the awarded mission in Table I.A.3-1, Mission Capabilities for the Standard Resupply Services Missions. The total maximum value of any contract awarded will be \$14 billion. The total amount of all task orders under all contracts awarded shall not exceed \$14 billion.

**I.A.3 CONTRACT LINE ITEM NUMBERS (CLINS)****CLIN 0001 Standard Resupply Services Missions****Sub-CLIN 0001A Standard Mission A (\$)**

# of Missions	CY 2019	CY 2020	CY 2021	CY 2022	CY 2023	CY 2024
1	(b) (4)					
2						
3						
4						
5						

(b) (4)

**Sub-CLIN 0001B Standard Mission B (\$)**

# of Missions	CY 2019	CY 2020	CY 2021	CY 2022	CY 2023	CY 2024
1	(b) (4)					
2						
3						
4						

(b) (4)

**Sub-CLIN 0001C Standard Mission C (\$)**

<b>CY 2018</b>	<b>CY 2019</b>	<b>CY 2020</b>	<b>CY 2021</b>	<b>CY 2022</b>	<b>CY 2023</b>	<b>CY 2024</b>
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

**Sub-CLIN 0001D Standard Mission D (\$)**

<b>CY 2018</b>	<b>CY 2019</b>	<b>CY 2020</b>	<b>CY 2021</b>	<b>CY 2022</b>	<b>CY 2023</b>	<b>CY 2024</b>
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A

**Table I.A.3-1 Mission Capabilities for the Standard Resupply Services Missions A-D**

Capability	Per Flight Range	Standard Mission A	Standard Mission B	Standard Mission C	Standard Mission D
<b>REQUIRED CAPABILITY: Pressurized Delivery Upmass (kg)</b>		<b>(b) (4)</b>			
Consisting of:	2500-5000			N/A	N/A
M01 bag complement (#)	0-10			N/A	N/A
M02 bag complement (#)	10-TBP			N/A	N/A
M03 bag complement (#)	0-6			N/A	N/A
Double powered lockers with L-24 hour late load and scrub turnaround capability (# lockers)	1-3			N/A	N/A
Conditioned stowage with L-24 hour late load and scrub turn around capability (# bags)	2-8			N/A	N/A
Passive CTBEs with L-24 hour late load and scrub turnaround capability (# CTBEs):	6-10			N/A	N/A
Including a Triple CTB with L-24 hour late load (# triple CTB)	0-1			N/A	N/A
Total CTBEs accommodated				N/A	N/A
<b>REQUIRED CAPABILITY: Pressurized Downmass (kg)</b>					
Consisting of either Return or Disposal Capability or both	2500-5000			N/A	N/A
Disposal				N/A	N/A
Downmass (kg) – If pressurized downmass is split between Disposal and Return, the minimum Return downmass is listed below and the balance shall be Disposal or Return. If pressurized downmass is all Disposal, the minimum disposal downmass must be 2500 kg.	2500-5000			N/A	N/A
M01 bag complement (#)	0-10			N/A	N/A
M02 bag complement (#)	10-TBP			N/A	N/A
M03 bag complement (#)	0-6			N/A	N/A
Total CTBEs accommodated				N/A	N/A
Return					
Downmass (kg) – If pressurized downmass is split between Disposal and Return, the minimum Return downmass is to be 1500 kg. If pressurized downmass is all Return, the minimum return downmass must be 2500 kg.	1500/2500-5000			N/A	N/A
M01 bag complement (#)	0-10			N/A	N/A

M02 bag complement (#)	10-TBP	<div></div>	N/A	N/A
M03 bag complement (#)	0-6		N/A	N/A
Total CTBEs accommodated			N/A	N/A
Double powered lockers with R+24 hour hand over (# lockers)	1-3		N/A	N/A
Conditioned stowage with R+24 hour hand over (# bags)	2-8		N/A	N/A
Passive CTBEs with R+24 hour hand over (# CTBEs)	6-10		N/A	N/A
OPTIONAL CAPABILITY: Accelerated Pressurized Return Downmass (kg) Consisting of the same requirements as Pressurized Downmass with the following modifications:			N/A	N/A
Double powered lockers with R+6 hour in lieu of R+24 hour hand over (# lockers)	1-3		N/A	N/A
Conditioned stowage with R+6 hour in lieu of R+24 hour hand over (# bags)	2-8		N/A	N/A
Passive CTBEs with R+6 hour in lieu of R+24 hour hand over (# CTBEs)	6-10		N/A	N/A
Single powered lockers with R+3 hour in lieu of R+6 hour hand over (# lockers)	1-2		N/A	N/A
REQUIRED CAPABILITY: Unpressurized Upmass and Disposal (kg) Consisting of:			N/A	N/A
Unpressurized upmass items (# items)	1-3		N/A	N/A
Unpressurized disposal items (# items)	1-3		N/A	N/A
DEFINE: Operational Capabilities			N/A	N/A
Docking or Berthing	D or B		N/A	N/A
Mated Duration (days)	45-TBP		N/A	N/A

(b) (4)

Offerors are required to provide 1) pressurized upmass, 2) pressurized return or pressurized disposal or both, 3) unpressurized upmass and disposal. Offerors have the option to provide accelerated pressurized return as part of any standard mission(s). Offerors can meet the required and optional capabilities by mixing them in any manner they choose within their 4 standard missions.

(b) (4)

**Sub-CLIN 0001E Provision of Flight Support Equipment Hardware (\$)**

FRAM(s) Provided	CY 2016	CY 2017	CY 2018	CY 2019	CY 2020	CY 2021	CY 2022	CY 2023	CY 2024
1	(b) (4)								
2									
3									
4									
5									
6									

JEM-EF P/L FSE PROVIDED	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019	CY 2020	CY 2021	CY 2022	CY 2023	CY 2024
1	Proprietary data on JEM-EF P/L FSE will be provided post-award to allow completion of this pricing table.									
2										
3										

**CLIN 0002 Special Task Assignments and Studies**

**Sub-CLIN 0002A Initial ISS Integration Certification (\$)**

(b) (4)

**Sub-CLIN 0002B NASA Requirements Change Evaluation (\$)**

CATEGORY	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019	CY 2020	CY 2021	CY 2022	CY 2023	CY 2024
A (no impact/admin)	(b) (4)									
B (technical impact)										

**Sub-CLIN 0002C Special Tasks and Studies (\$/HR)**

COMPOSITE LABOR RATES (% TECHNICAL / % ADMINISTRATIVE)	CY 2015	CY 2016	CY 2017	CY 2018	CY 2019	CY 2020	CY 2021	CY 2022	CY 2023	CY 2024
1 (90/10)	(b) (4)									
2 (50/50)										
3 (10/90)										

(End of Section)

## **II. CONTRACT TERMS AND CONDITIONS—COMMERCIAL ITEMS (FAR 52.212-4) (MAY 2014)**

(a) Inspection/Acceptance. This contract incorporates Inspection of Services—Fixed Price (FAR 52.246-4) (August 1996) at Clause II.A.31, Clauses Incorporated by Reference (FAR 52.252-2) (Feb 1998).

(b) Assignment. The Contractor or its assignee may assign its rights to receive payment due as a result of performance of this contract to a bank, trust company, or other financing institution, including any Federal lending agency in accordance with the Assignment of Claims Act (31 U.S.C. 3727). However, when a third party makes payment (e.g., use of the Government-wide commercial purchase card), the Contractor may not assign its rights to receive payment under this contract.

(c) Changes. This contract incorporates Changes – Fixed Price (FAR 52.243-1) (Aug 1987) Alternate II clause incorporated by reference in Clause II.A.31.

(d) Disputes. This contract is subject to 41 U.S.C. Chapter 71, Contract Disputes. Failure of the parties to this contract to reach agreement on any request for equitable adjustment, claim, appeal or action arising under or relating to this contract shall be a dispute to be resolved in accordance with the clause at FAR 52.233-1, Disputes, which is incorporated herein by reference. The Contractor shall proceed diligently with performance of this contract, pending final resolution of any dispute arising under the contract.

(e) Definitions. The clause at FAR 52.202-1 (NOV 2013), Definitions, is incorporated herein by reference.

(f) Excusable delays. The Contractor shall be liable for default unless nonperformance is caused by an occurrence beyond the reasonable control of the Contractor and without its fault or negligence such as, acts of God or the public enemy, acts of the Government in either its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes, unusually severe weather, and delays of common carriers. The Contractor shall notify the Contracting Officer in writing as soon as it is reasonably possible after the commencement of any excusable delay, setting forth the full particulars in connection therewith, shall remedy such occurrence with all reasonable dispatch, and shall promptly give written notice to the Contracting Officer of the cessation of such occurrence.

(g) Invoice.

(1) The Contractor shall submit an original invoice and three copies (or electronic invoice, if authorized) to the address designated in the contract to receive invoices. An invoice must include—

(i) Name and address of the Contractor;

- (ii) Invoice date and number;
  - (iii) Contract number, contract line item number and, if applicable, the order number;
  - (iv) Description, quantity, unit of measure, unit price and extended price of the items delivered;
  - (v) Shipping number and date of shipment, including the bill of lading number and weight of shipment if shipped on Government bill of lading;
  - (vi) Terms of any discount for prompt payment offered;
  - (vii) Name and address of official to whom payment is to be sent;
  - (viii) Name, title, and phone number of person to notify in event of defective invoice;
- and

(ix) Taxpayer Identification Number (TIN). The Contractor shall include its TIN on the invoice only if required elsewhere in this contract.

(x) Electronic funds transfer (EFT) banking information.

(A) The Contractor shall include EFT banking information on the invoice only if required elsewhere in this contract.

(B) If EFT banking information is not required to be on the invoice, in order for the invoice to be a proper invoice, the Contractor shall have submitted correct EFT banking information in accordance with the applicable solicitation provision, contract clause (e.g., 52.232-33, Payment by Electronic Funds Transfer—System for Award Management, or 52.232-34, Payment by Electronic Funds Transfer—Other Than System for Award Management), or applicable agency procedures.

(C) EFT banking information is not required if the Government waived the requirement to pay by EFT.

(2) Invoices will be handled in accordance with the Prompt Payment Act (31 U.S.C. 3903) and Office of Management and Budget (OMB) prompt payment regulations at 5 CFR Part 1315.

(h) Patent indemnity. The Contractor shall indemnify the Government and its officers, employees and agents against liability, including costs, for actual or alleged direct or contributory infringement of, or inducement to infringe, any United States or foreign patent, trademark or copyright, arising out of the performance of this contract, provided the Contractor is reasonably notified of such claims and proceedings.

(i) Payment.—

(1) Items accepted. Payment shall be made for items accepted by the Government that have been delivered to the delivery destinations set forth in this contract.

(2) Prompt payment. The Government will make payment in accordance with the Prompt Payment Act (31 U.S.C. 3903) and prompt payment regulations at 5 CFR Part 1315.

(3) Electronic Funds Transfer (EFT). If the Government makes payment by EFT, see 52.212-5(b) for the appropriate EFT clause.

(4) Discount. In connection with any discount offered for early payment, time shall be computed from the date of the invoice. For the purpose of computing the discount earned, payment shall be considered to have been made on the date which appears on the payment check or the specified payment date if an electronic funds transfer payment is made.

(5) Overpayments. If the Contractor becomes aware of a duplicate contract financing or invoice payment or that the Government has otherwise overpaid on a contract financing or invoice payment, the Contractor shall—

(i) Remit the overpayment amount to the payment office cited in the contract along with a description of the overpayment including the—

(A) Circumstances of the overpayment (e.g., duplicate payment, erroneous payment, liquidation errors, date(s) of overpayment);

(B) Affected contract number and delivery order number, if applicable;

(C) Affected contract line item or subline item, if applicable; and

(D) Contractor point of contact.

(ii) Provide a copy of the remittance and supporting documentation to the Contracting Officer.

(6) Interest.

(i) All amounts that become payable by the Contractor to the Government under this contract shall bear simple interest from the date due until paid unless paid within 30 days of becoming due. The interest rate shall be the interest rate established by the Secretary of the Treasury as provided in 41 U.S.C. 7109 , which is applicable to the period in which the amount becomes due, as provided in (i)(6)(v) of this clause, and then at the rate applicable for each six-month period as fixed by the Secretary until the amount is paid.

(ii) The Government may issue a demand for payment to the Contractor upon finding a debt is due under the contract.

(iii) Final decisions. The Contracting Officer will issue a final decision as required by 33.211 if—

(A) The Contracting Officer and the Contractor are unable to reach agreement on the existence or amount of a debt within 30 days;

(B) The Contractor fails to liquidate a debt previously demanded by the Contracting Officer within the timeline specified in the demand for payment unless the amounts were not repaid because the Contractor has requested an installment payment agreement; or

(C) The Contractor requests a deferment of collection on a debt previously demanded by the Contracting Officer (see 32.607-2).

(iv) If a demand for payment was previously issued for the debt, the demand for payment included in the final decision shall identify the same due date as the original demand for payment.

(v) Amounts shall be due at the earliest of the following dates:

(A) The date fixed under this contract.

(B) The date of the first written demand for payment, including any demand for payment resulting from a default termination.

(vi) The interest charge shall be computed for the actual number of calendar days involved beginning on the due date and ending on—

(A) The date on which the designated office receives payment from the Contractor;

(B) The date of issuance of a Government check to the Contractor from which an amount otherwise payable has been withheld as a credit against the contract debt; or

(C) The date on which an amount withheld and applied to the contract debt would otherwise have become payable to the Contractor.

(vii) The interest charge made under this clause may be reduced under the procedures prescribed in 32.608-2 of the Federal Acquisition Regulation in effect on the date of this contract.

(j) Risk of loss. Unless the contract specifically provides otherwise, risk of loss or damage to the supplies provided under this contract shall remain with the Contractor until, and shall pass to the Government upon:

(1) Delivery of the supplies to a carrier, if transportation is f.o.b. origin; or

(2) Delivery of the supplies to the Government at the destination specified in the contract, if transportation is f.o.b. destination.

(k) Taxes. The contract price includes all applicable Federal, State, and local taxes and duties.

(l) Termination for the Government's convenience. The Government reserves the right to terminate this contract, or any part hereof, for its sole convenience. In the event of such termination, the Contractor shall immediately stop all work hereunder and shall immediately

cause any and all of its suppliers and subcontractors to cease work. Subject to the terms of this contract, the Contractor shall be paid a percentage of the contract price reflecting the percentage of the work performed prior to the notice of termination, plus reasonable charges the Contractor can demonstrate to the satisfaction of the Government using its standard record keeping system, have resulted from the termination. The Contractor shall not be required to comply with the cost accounting standards or contract cost principles for this purpose. This paragraph does not give the Government any right to audit the Contractor's records. The Contractor shall not be paid for any work performed or costs incurred which reasonably could have been avoided.

(m) Termination for cause. The Government may terminate this contract, or any part hereof, for cause in the event of any default by the Contractor, or if the Contractor fails to comply with any contract terms and conditions, or fails to provide the Government, upon request, with adequate assurances of future performance. In the event of termination for cause, the Government shall not be liable to the Contractor for any amount for supplies or services not accepted. If the Government terminates this contract in whole or in part, it may acquire, under the terms and manner the Contracting Officer considers appropriate, supplies or services similar to those terminated, and the Contractor shall be liable to the Government for any excess costs for those supplies or services limited to \$200 million. The \$200 million is a cumulative total to include any excess re-procurement costs assessed by the Government. However, the Contractor shall continue the work not terminated. If it is determined that the Government improperly terminated this contract for default, such termination shall be deemed a termination for convenience.

(n) Deleted.

(o) Deleted.

(p) Deleted.

(q) Other compliances. The Contractor shall comply with all applicable Federal, State and local laws, executive orders, rules and regulations applicable to its performance under this contract.

(r) Compliance with laws unique to Government contracts. The Contractor agrees to comply with 31 U.S.C. 1352 relating to limitations on the use of appropriated funds to influence certain Federal contracts; 18 U.S.C. 431 relating to officials not to benefit; 40 U.S.C. chapter 37, Contract Work Hours and Safety Standards; 41 U.S.C. chapter 87, Kickbacks; 41 U.S.C. 4712 and 10 U.S.C. 2409 relating to whistleblower protections; 49 U.S.C. 40118, Fly American; and 41 U.S.C. chapter 21 relating to procurement integrity.

(s) Order of precedence. Any inconsistencies in this solicitation or contract shall be resolved by giving precedence in the following order:

(1) The schedule of supplies/services.

(2) The Assignments, Disputes, Payments, Invoice, Other Compliances, Compliance with Laws Unique to Government Contracts, and Unauthorized Obligations paragraphs of this clause;

(3) The clause at 52.212-5.

(4) Addenda to this solicitation or contract, including any license agreements for computer software.

(5) Solicitation provisions if this is a solicitation.

(6) Other paragraphs of this clause.

(7) The Standard Form 1449.

(8) Other documents, exhibits, and attachments.

(9) The specification.

(t) System for Award Management (SAM).

(1) Unless exempted by an addendum to this contract, the Contractor is responsible during performance and through final payment of any contract for the accuracy and completeness of the data within the SAM database, and for any liability resulting from the Government's reliance on inaccurate or incomplete data. To remain registered in the SAM database after the initial registration, the Contractor is required to review and update on an annual basis from the date of initial registration or subsequent updates its information in the SAM database to ensure it is current, accurate and complete. Updating information in the SAM does not alter the terms and conditions of this contract and is not a substitute for a properly executed contractual document.

(2)(i) If a Contractor has legally changed its business name, "doing business as" name, or division name (whichever is shown on the contract), or has transferred the assets used in performing the contract, but has not completed the necessary requirements regarding novation and change-of-name agreements in FAR Subpart 42.12, the Contractor shall provide the responsible Contracting Officer a minimum of one business day's written notification of its intention to (A) change the name in the SAM database; (B) comply with the requirements of Subpart 42.12; and (C) agree in writing to the timeline and procedures specified by the responsible Contracting Officer. The Contractor must provide with the notification sufficient documentation to support the legally changed name.

(ii) If the Contractor fails to comply with the requirements of paragraph (t)(2)(i) of this clause, or fails to perform the agreement at paragraph (t)(2)(i)(C) of this clause, and, in the absence of a properly executed novation or change-of-name agreement, the SAM information that shows the Contractor to be other than the Contractor indicated in the contract will be considered to be incorrect information within the meaning of the "Suspension of Payment" paragraph of the electronic funds transfer (EFT) clause of this contract.

(3) The Contractor shall not change the name or address for EFT payments or manual payments, as appropriate, in the SAM record to reflect an assignee for the purpose of assignment of claims (see Subpart 32.8, Assignment of Claims). Assignees shall be separately registered in the SAM database. Information provided to the Contractor's SAM record that indicates payments, including those made by EFT, to an ultimate recipient other than that Contractor will be considered to be incorrect information within the meaning of the "Suspension of payment" paragraph of the EFT clause of this contract.

(4) Offerors and Contractors may obtain information on registration and annual confirmation requirements via SAM accessed through <https://www.acquisition.gov>.

(u) Unauthorized Obligations

(1) Except as stated in paragraph (u)(2) of this clause, when any supply or service acquired under this contract is subject to any End User License Agreement (EULA), Terms of Service (TOS), or similar legal instrument or agreement, that includes any clause requiring the Government to indemnify the Contractor or any person or entity for damages, costs, fees, or any other loss or liability that would create an Anti-Deficiency Act violation (31 U.S.C. 1341), the following shall govern:

(i) Any such clause is unenforceable against the Government.

(ii) Neither the Government nor any Government authorized end user shall be deemed to have agreed to such clause by virtue of it appearing in the EULA, TOS, or similar legal instrument or agreement. If the EULA, TOS, or similar legal instrument or agreement is invoked through an "I agree" click box or other comparable mechanism (e.g., "click-wrap" or "browse-wrap" agreements), execution does not bind the Government or any Government authorized end user to such clause.

(iii) Any such clause is deemed to be stricken from the EULA, TOS, or similar legal instrument or agreement.

(2) Paragraph (u)(1) of this clause does not apply to indemnification by the Government that is expressly authorized by statute and specifically authorized under applicable agency regulations and procedures.

(End of clause)

## **II.A.1 INITIAL ISS INTEGRATION CERTIFICATION, RESUPPLY SERVICES MISSION PAYMENTS, MILESTONE EVENTS AND COMPLETION CRITERIA**

1.1 Initial International Space Station (ISS) integration payments and resupply mission payments will be based upon successful completion of approved milestones according to the accomplishment criteria per the NASA-approved Data Requirements Description


(DRD) Commercial Resupply Services (CRS) 2-1, Work Plan. NASA has up to 30 working days to determine whether the accomplishment of the milestone satisfies the approved criteria. After written verification of the accomplishment of the milestone by NASA's Contracting Officer Representative (COR), and approval by the Contracting Officer, the Contractor may submit the invoice. The invoice will be forwarded to the payment office within fifteen (15) calendar days of receipt.

1.2 These interim payments are contract financing payments and are not payment for accepted items. Commercial interim payments are fully recoverable, in the same manner as progress payments, in the event of termination for cause, except for a mission that has been performed and determined successful per Clause II.A.2, Mission Success Determination, Investigation, and Corrective Actions. Commercial interim payments are contract financing payments and, therefore, are not subject to the interest-penalty provisions of prompt payment. However, these payments shall be made in accordance with the Agency's policy for prompt payment of contract financing payments. NASA will not take title to any hardware under this contract for resupply services.

**Table II.A.1-1: Mission Payment Schedule**

<b>Mission Level Milestone</b>	<b>Major Resupply Mission Milestone</b>	<b>Invoice Submission Date (ATP + or L- months)</b>	<b>Amount (% of Standard Mission Price)</b>	<b>Amount (% of Standard Mission Price) Mission Excluding UIR</b>
1	Authority To Proceed	(b)	(4)	(4)
2	Vehicle Baseline Review			
3	Mission Integration Review			
4	Unpressurized Integration Review (UIR)(if applicable)*			
5	Cargo Integration Review			
6	Cargo Delivery to ISS			
7	Mission Completion			
		(b)	(4)	

**Table II.A.1-2: Initial ISS Integration Payment Schedule**

<b>ISS Integration Milestone</b>	<b>Major ISS Integration Certification Milestone</b>	<b>Standard Mission A Invoice Submission Date (Contract ATP + months)</b>	<b>Standard Mission B Invoice Submission Date (Contract ATP + months)</b>	<b>Amount (% of ISS Integration Cost in CLIN0002A)</b>
1	Integration Review 1			
2	Integration Review 2			
3	Integration Review 3			
4	Integration Review 4			
5	Integration Review 5			
6	Integration Review 6			
7	Integration Review 7			

1.3 The following constraints apply:

(a) Mission payments made for resupply service missions prior to completion of ISS Integration Certification shall be subject to the following limitations.

(1) No mission milestone payments shall be made, nor missions Authorized to Proceed, until the ISS Integration Certification Milestone 1 has been successfully completed.

(2) Payments for any successfully completed Vehicle Baseline Review (VBR) shall not be made until ISS Integration Certification Milestone 4 has been successfully completed.

(3) Payments for any successfully completed Mission Integration Review (MIR) shall not be made until ISS Integration Certification Milestone 5 has been successfully completed.

(4) Payments for any successfully completed Cargo Integration Review (CIR) shall not be made until ISS Integration Certification Milestone 7, except SOW paragraph 4.1.3.7.2 (b, c, d and e) has been successfully completed.

(b) The sum of the Delivery and Mission Completion milestone payments for each mission must equal at least 20% of the total price of each mission.

(c) After successful completion of ISS integration, the total of milestone payments prior to and including the MIR for each flight shall not exceed 60% of the total price of the mission.

1.4 Payment schedules may be deferred by NASA if the Contractor fails to make substantial progress in accomplishing the major resupply service milestone events or ISS integration milestone events. The Contracting Officer will either approve or withhold the Cargo Delivery and Mission Completion payments within fifteen calendar days after NASA determines Mission Success in accordance with Clause II.A.2. The Cargo Delivery and Mission Completion payment amounts shall be determined in accordance with the criteria in Clause II.A.2.

1.5 This paragraph will apply to any postponement declared by NASA or the Contractor for any reason, including resupply schedule adjustments and Contractor failure to make substantial progress in accordance with resupply service milestone events (as determined by NASA under this clause). In the event of a resupply schedule adjustment by NASA or Contractor in accordance with Clause II.A.3, Adjustments to Mission Schedule, the payment schedule for the applicable resupply mission shall be postponed for the length of the delay, if necessary, to correspond with the new delivery date and the milestone events in the NASA-approved DRD CRS 2-1. The requirement to make substantial progress in general conformance with the Work Plan, however, is not waived for any postponed resupply mission.

(End of clause)

## **II.A.2 MISSION SUCCESS DETERMINATION, INVESTIGATION, AND CORRECTIVE ACTIONS**

### **2.1 Mission Success Criteria**

(a) The Mission Success criteria will be defined on a per mission basis and agreed to by NASA and the Contractor. The overall goal of NASA is to develop criteria that appropriately and fairly define the Contractor's performance.

(b) NASA will provide the set of initial success criteria and the specific breakdown of the payment percentages for both the Cargo Delivery and Mission Completion milestone payments earned for milestone success, two months before the Cargo Integration Review (CIR). The total percentage of the Cargo Delivery and Mission Completion milestone payments are defined in Table II.A.1-1, Mission Payment Schedule. The final criteria and specific breakdown of the payment percentages of these two payments will be agreed to at the CIR. If an agreement cannot be reached, the Contracting Officer will establish the criteria and specific breakdown of the payment percentages by the time of the Launch Readiness Assessment. The final criteria for these two milestones will be incorporated into a Task Order revision.

(c) Criteria will be established per the following guidelines:

(1) Criteria that reflects the Contractor's mission capabilities. An example is as follows: "Successful delivery of pressurized upmass to the ISS."

(2) Criteria will be established that only reflect the Contractor's performance, independent of NASA's.

(3) Damage to the ISS due to the Contractor's fault is a Failed Mission.

(4) If there is an ISS hardware failure post-launch that requires the berthing/docking to be aborted, the mission will be declared a Success and the Contractor shall receive payment for the Cargo Delivery and Mission Completion milestones.

## 2.2 Mission Success Determination

(a) Mission success determination will be made in two parts, the first being delivery and the second being mission completion. The mission success determination will be made using the defined mission success criteria (incorporated in the task order) and the corresponding data and parameters that are jointly agreed to by NASA and the Contractor.

(b) The Contractor shall submit the list of relevant data and parameters to be used for the evaluation of mission success one month prior to the CIR. The types of data NASA would consider as relevant information include:

- (1) Vehicle data that represents critical systems for approach, berthing/docking, and return.
- (2) Available launch and visiting vehicle sensor and analytical data verifying vehicle Interface Definition Document (IDD) environments.
- (3) Successful delivery of NASA cargo.
- (4) Successful return/disposal of NASA cargo (as applicable).
- (5) Closeout photos both on the ground and on orbit documenting cargo configuration at launch and prior to landing.
- (6) Any supplemental data that may support the Contractor's performance.

(c) The Contractor shall be responsible for providing the relevant data and parameters required for NASA to make the mission success determination. If there is data that NASA is required to provide (on orbit attached telemetry, on orbit photos, etc.), the Contractor shall identify that prior to the CIR.

## 2.3 Procedures

(a) The Contracting Officer determines whether the Cargo Delivery milestone has been met in full, in part or not at all, based on the defined success criteria and corresponding data. Within fifteen (15) calendar days from receipt of the DRD CRS 5-1, Post Delivery Assessment, the Contracting Officer either determine the cargo delivery a success or will inform the Contractor of NASA's intent to withhold the Cargo Delivery milestone payment or any portion thereof. In the event of a failure to deliver cargo, the delivery payment and the mission completion payment shall be forfeited by the Contractor and are not recoupable.

(b) The Contracting Officer determines whether the Mission Completion milestone is considered a Mission Success, Partial Mission Success, or a Failed Mission, based on the defined success criteria and corresponding data. Within fifteen (15) calendar days from receipt of the DRD CRS 5-2, Post Mission Assessment, the Contracting Officer will either determine the mission a success or inform the Contractor of NASA's intent to withhold the final Mission Completion milestone payment or any portion thereof. In the event the Contractor fails to

complete the mission in accordance with the success criteria, the Mission Completion milestone payment shall be forfeited by the Contractor and is not recoupable.

This clause will take precedence over paragraph (e) of FAR 52.246-4, in that NASA will not require re-performance of the flight. The Contractor is limited to forfeiture of the last two payment milestones only as detailed in this clause.

(c) If NASA informs the Contractor it will withhold the payment for either the Cargo Delivery or Mission Completion milestones, NASA will utilize the submittal of DRD CRS 5-3, Post Flight Report, findings from the Contractor's investigation board, and, if activated, findings from the Contractor-chaired Failure Review Board (FRB) to complete its assessment. The Contracting Officer shall submit an initial determination of either Partial Mission Success or Failed Mission within fifteen (15) calendar days from the receipt of DRD CRS 5-3. The Contracting Officer shall submit a final determination within ninety (90) calendar days from the receipt of DRD CRS 5-3.

#### 2.4 Investigation and Corrective Action

In the event of an anomaly or failed mission, a Contractor-chaired FRB, if activated, will determine the cause of anomaly or failure. The FRB will evaluate all available data from the launch vehicle, visiting vehicle, Range, and other sources in order to determine if the mission failure was attributable to the vehicle or conditions which the Contractor is expected to control or avoid. Based on the findings and recommendations of the FRB, NASA shall make the final determination as to Partial Mission Success or Failed Mission.

#### 2.5 Acceptance

Final acceptance of the resupply service will be accomplished following the Contracting Officer's mission success determination. The Contracting Officer will notify the Contractor in writing of both Mission Success Determination and Acceptance.

(End of clause)

### II.A.3 ADJUSTMENTS TO MISSION SCHEDULE

3.1 This clause covers launch delays at the convenience of NASA and the Contractor.

3.2 Task orders issued to Contractors are intended to fulfill demand amounts by specific delivery dates. To provide flexibility to both the Contractor and NASA, a standard delivery window will be established for each planned resupply mission. Authorization to Proceed (ATP) is formal written direction from the Contracting Officer that authorizes the Contractor to proceed with the work detailed within a NASA-approved, mission-specific DRD CRS 2-1, Work Plan.

ATP will occur within seven (7) days of NASA-approved, Contractor-identified mission initiation milestone and work plan. The standard delivery window will be created by establishing a 30 day window for each mission at ATP. Thereafter, with mutual agreement between the Contractor and NASA, the delivery window will reduce from 30 days to one (1) day according to the table below.

**Table II.A.3-1: Cargo Delivery Windows**

<b>Months/Weeks Prior to Delivery Date – First Day to Last Day</b>	<b>Standard Delivery Window (Days)</b>
ATP through L-7 months	30
L-7 months through L-1 month	5
L-1 month through Launch	Launch date plus backup launch date(s)

3.3 At the VBR (No Later Than [NLT] Launch minus [L-18] months), NASA and Contractor shall review the 30 day window established at ATP and mutually agree on whether delivery should remain scheduled during that period or needs to be modified. At the NLT L-7 months, NASA and Contractor shall jointly agree on a reduced delivery window of 5 days (within the previous 30 day window). Not later than one (1) month prior to launch, NASA and Contractor shall jointly agree to a launch date with a backup date.

3.4 For a maximum cumulative period of 30 calendar days per mission, and regardless of fault, either NASA or Contractor may request a delay in the standard delivery window without a change in price. Each party may independently request a maximum of 30 calendar days delay per mission, not including beta cut-outs. If either NASA or Contractor desires a change to the delivery window, NASA or Contractor will give written notice of the desired change in the delivery schedule. The newly requested delivery window shall be commensurate with the length of the current delivery window. Any requests for changes to the delivery window submitted between L-1 month and launch day shall be submitted within 24 hours of identifying the need to request a change in the delivery window. In the case of a request for a change of delivery window by NASA or Contractor, NASA and Contractor shall reach mutual agreement on a new delivery window within 30 calendar days (excluding requests made after L-30 days). If mutual agreement on the revised delivery window cannot be reached, the Contracting Officer shall have the right to unilaterally establish a new schedule.

3.5 In the event of a NASA- or Contractor-requested delay of the delivery window beyond 30 days, the Contracting Officer shall direct the Contractor, in writing, of the revised delivery window, and allow the Contractor to submit a proposal for the effect of any delay beyond 30 days on the task order price of all affected CLINs, delivery schedule, or other terms of the contract. In the event the delay beyond 30 days is requested by the Contractor, NASA is entitled to a contract adjustment or other consideration. This may result in any of the following: an

equitable adjustment to the price of all affected CLINs in the task order (if any), or a change in the delivery schedule or other consideration. Upon failure to agree to an adjustment, the Contracting Officer may unilaterally adjust the task order, or decline to adjust the task order. However, nothing in this clause shall excuse the Contractor from proceeding with the contract

(End of clause)

#### **II.A.4 LICENSES, PERMITS, AND OTHER AUTHORIZATIONS FOR A LAUNCH OR REENTRY SERVICE OPERATOR**

4.1 The Contractor shall obtain and maintain the necessary licenses, permits and clearances that may be required by the Department of Transportation, Department of Commerce, Department of Defense, NASA, or other Governmental agencies in order to provide launch and re-entry services under this contract.

4.2 The Contractor shall operate its vehicles in accordance with NPR 8715.6, NASA Procedural Requirements for Limiting Orbital Debris.

4.3 The Contractor shall obtain a Federal Aviation Administration (FAA) license or permit, in accordance with 51 U.S.C. Subtitle V, Chapter 509, Commercial Space Launch Activities, Title 51, National and Commercial Space Programs, Subtitle V, Programs Targeting Commercial Opportunities, for operations under this contract.

All costs and fees associated with obtaining licenses, permits and clearances shall be included in the standard resupply service price.

(End of clause)

#### **II.A.5 CONTRACTOR OBJECTIVES ON ISS RESUPPLY SERVICE MISSIONS**

In the event that NASA does not utilize the entire capability of the service mission, the Contractor may request to use the service mission to meet Contractor objectives or fly non-NASA cargo per the requirements below. NASA may require a price adjustment or other consideration. If the Contractor has a proposed commercial use for the service, it should be discussed with NASA per the requirements below. In the event of a conflict between the Contractor objectives and NASA's ISS requirements for use of the service, NASA ISS shall have priority for the use of the service.

5.1 If approved in advance by NASA, the Contractor may use an ISS Resupply Service Mission to deliver non-NASA cargo. The non-NASA cargo shall not limit or interfere with the capabilities that NASA is ordering. Notification of non-NASA cargo shall be made at the VBR for the mission on which the cargo would fly. Non-NASA cargo shall be reviewed as part of the NASA safety review process and shall not increase risk to the resupply service mission, take

away from acceptable margins available to provide the ISS service, or decrease likelihood of mission success. If NASA determines that the addition of non-NASA cargo to the mission causes unacceptable risk, NASA reserves the right to refuse to allow flying the non-NASA cargo on its resupply mission. If notification of the non-NASA cargo is made post-VBR, NASA reserves the right to refuse to perform the additional analysis required to evaluate the impacts of the non-NASA cargo, which would prevent flying the non-NASA cargo on the NASA resupply mission. Resources required from NASA to evaluate the impacts of co-manifesting of non-NASA cargo or to ensure safety may be charged to the Contractor through an equitable adjustment.

5.2 If approved in advance by NASA, the Contractor may use an ISS Resupply Service Mission to meet Contractor objectives that are unrelated to the ISS resupply mission. These objectives shall not limit or interfere with the capabilities that NASA is ordering. Notification of Contractor objectives shall be made at the VBR for the mission on which the objectives would occur. These objectives shall be reviewed as part of the NASA safety review process and shall not increase risk to the resupply service mission, take away from acceptable margins available to provide the ISS service, or decrease likelihood of mission success. If NASA determines that the addition of Contractor objectives to the mission causes unacceptable risk, NASA reserves the right to refuse to allow the Contractor objectives on NASA's resupply mission. If notification of the Contractor objectives is made post-VBR, NASA reserves the right to refuse to perform the additional analysis required to evaluate the impacts of the Contractor objectives, which would prevent execution of the Contractor objectives on the NASA resupply mission. Resources required from NASA to evaluate the impacts of Contractor objectives or to ensure safety may be charged to the Contractor through an equitable adjustment.

5.3 Launch and mission schedules shall not be changed to accommodate non-NASA cargo or Contractor objectives, except with NASA's approval. If the Contractor is unable to provide and integrate the non-NASA cargo, or complete work necessary for performing Contractor objectives, in time to meet the established launch schedule for the resupply mission, the Contractor shall be responsible for any resulting impacts or delays to the resupply mission. NASA reserves the right to revoke its approval without cost to NASAS, or to agree to a Contractor-caused delay.

5.4 The Contractor and its customers shall waive all claims for any damage or loss caused by NASA to non-NASA cargo or Contractor objectives. NASA shall not be responsible for any costs, liabilities, or obligations incurred by the Contractor or its customers to manifest non-NASA cargo or perform a Contractor objective, or resulting from NASA's refusal to approve manifesting non-NASA cargo or performing Contractor objectives.

(End of clause)

## II.A.6 ON-RAMP

6.1 The purpose of the Indefinite Delivery Indefinite Quantity (IDIQ) on-ramp is (1) to ensure competition exists for deliveries which have not previously been awarded throughout the life of the contract, (2) to allow qualified service providers the opportunity to provide services and (3) for providers to introduce new capabilities not available or identified at the time of the award of the initial contract.

The minimum IDIQ On-Ramp qualification criteria are:

The Cargo Resupply Service provider shall have a plan to demonstrate ISS integration as defined in Statement of Work paragraph 3.1 of this Request for Proposal (RFP).

6.2 The parties mutually agree that the original solicitation, as revised, shall remain open during the life of this contract and that at any time NASA may award additional contracts for IDIQ requirements. As deemed necessary during the life of this contract, NASA will allow submission of proposals from service providers for IDIQ contracts. The requirement for submission of on-ramp proposals will be established via solicitation notice. The decision to request proposals under the clause will be solely at NASA's discretion and will only occur after this requirement has been synopsisized. Price, Mission Suitability, and Past Performance will remain factors in determining awards.

If NASA issues a solicitation notice, new and incumbent providers will be allowed to submit proposals within the notice's stated response time. Upon award of each additional contract, NASA shall notify all present Contractors of the award, and the new Contractor shall thenceforth be eligible to compete with all present Contractors for the award of IDIQ task orders.

6.3 Contracts with existing Contractor(s) will be unaffected by the use of this On-Ramp provision and current contracts will remain active. Existing Contractor(s) may propose services consistent with the Instruction to Offerors of the "On-Ramp" Request for Proposal, as revised. If the existing Contractor(s) chooses not to respond to the "On-Ramp" RFP, they remain as a candidate for competition of future orders under the terms of the existing contract. If the existing Contractor chooses to respond to the "On-Ramp" RFP but is not awarded a new contract in that competition, they remain as a candidate for competition of future orders under the terms of the existing contract. If the existing Contractor(s) chooses to respond to the "On-Ramp" RFP and are awarded additional service capabilities in that competition, their existing contract will be modified to incorporate the additional capabilities.

6.4 NASA reserves the right to expand the performance capabilities covered by the CRS2 contract, by properly soliciting offers from all interested sources.

6.5 The guaranteed minimum order amount for IDIQ contracts awarded in accordance with the On-Ramp Clause will be two cargo resupply service missions with the capabilities defined for the awarded mission in Table I.A.3-1, Mission Capabilities for the Standard Resupply

Services Missions. The maximum value of IDIQ contracts awarded in accordance with the On-Ramp Clause are subject to the limitations defined in Clause I.A.2, Indefinite Delivery Indefinite Quantity (IDIQ), Firm Fixed Price Contract.

(End of clause)

#### **II.A.7 CROSS-WAIVER OF LIABILITY FOR SPACE STATION ACTIVITIES (NFS 1852.228-76) (OCT 2012) (DEVIATION)**

(a) The Intergovernmental Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America concerning Cooperation on the Civil International Space Station (IGA) for the International Space Station (ISS) contains a cross-waiver of liability provision to encourage participation in the exploration, exploitation, and use of outer space through the ISS. The objective of this clause is to extend this cross-waiver of liability to NASA contracts in the interest of encouraging participation in the exploration, exploitation, and use of outer space through the International Space Station (ISS). This cross-waiver of liability is intended to be broadly construed to achieve this objective.

(b) As used in this clause, the term:

(1) “Agreement” refers to any NASA Space Act agreement or contract that contains the cross-waiver of liability provision authorized by 14 CFR Part 1266.102.

(2) “Damage” means:

- (i) Bodily injury to, or other impairment of health of, or death of, any person;
- (ii) Damage to, loss of, or loss of use of any property;
- (iii) Loss of revenue or profits; or
- (iv) Other direct, indirect, or consequential Damage.

(3) “Launch” means the intentional ignition of the first-stage motor(s) of the Launch Vehicle intended to place or try to place a Launch Vehicle (which may or may not include any Transfer Vehicle or Payload) from Earth:

- (i) in a suborbital trajectory;
- (ii) in Earth orbit in outer space; or
- (iii) otherwise in outer space,

including activities involved in the preparation of a Launch Vehicle, Transfer Vehicle, or Payload for launch.

(4) “Launch Services” means:

(i) Activities involved in the preparation of a Launch Vehicle, Transfer Vehicle, or Payload for launch; and

(ii) The conduct of a Launch.

(5) “Launch Vehicle” means an object, or any part thereof, intended for launch, launched from Earth, or returning to Earth which carries Payloads or persons, or both.

(6) “Partner State” includes each Contracting Party for which the IGA has entered into force, pursuant to Article 25 of the IGA or pursuant to any successor agreement. A Partner State includes its Cooperating Agency. It also includes any entity specified in the Memorandum of Understanding (MOU) between NASA and the Government of Japan to assist the Government of Japan's Cooperating Agency in the implementation of that MOU.

(7) “Party” means a party to an Agreement involving activities in connection with the ISS, including this contract.

(8) “Payload” means all property to be flown or used on or in a Launch Vehicle or the ISS.

(9) “Protected Space Operations” means all Launch or Transfer Vehicle activities, ISS activities, and Payload activities on Earth, in outer space, or in transit between Earth and outer space in implementation of the IGA, MOUs concluded pursuant to the IGA, implementing arrangements, and contracts to perform work in support of NASA’s obligations under these agreements. It includes, but is not limited to:

(i) Research, design, development, test, manufacture, assembly, integration, operation, or use of Launch or Transfer Vehicles, the ISS, Payloads, or instruments, as well as related support equipment and facilities and services; and

(ii) All activities related to ground support, test, training, simulation, or guidance and control equipment, and related facilities or services. “Protected Space Operations” also includes all activities related to evolution of the ISS, as provided for in Article 14 of the IGA. “Protected Space Operations” excludes activities on Earth which are conducted on return from the ISS to develop further a Payload's product or process for use other than for ISS-related activities in implementation of the IGA.

(10) “Reentry” means to return or attempt to return, purposefully, a Transfer Vehicle or Payload from the ISS, Earth orbit, or outer space to Earth.

(11) “Reentry Services” means:

Activities involved in the preparation of a Transfer Vehicle or Payload for Reentry; and  
The conduct of a Reentry.

(12) “Related Entity” means:

- (i) A contractor or subcontractor of a Party or a Partner State at any tier;
- (ii) A user or customer of a Party or a Partner State at any tier; or
- (iii) A contractor or subcontractor of a user or customer of a Party or a Partner State at any tier.

The terms “contractor” and “subcontractor” include suppliers of any kind.

(13) “Transfer Vehicle” means any vehicle that operates in space and transfers Payloads or persons or both between two different space objects, between two different locations on the same space object, or between a space object and the surface of a celestial body. A Transfer Vehicle also includes a vehicle that departs from and returns to the same location on a space object.

(c) Cross-waiver of liability:

(1) The contractor agrees to a cross-waiver of liability pursuant to which it waives all claims against any of the entities or persons listed in paragraphs (c)(1)(i) through (c)(1)(iv) of this clause based on Damage arising out of Protected Space Operations. This cross-waiver shall apply only if the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The cross-waiver shall apply to any claims for Damage, whatever the legal basis for such claims, against:

- (i) A Party as defined in (b)(7) of this clause;
- (ii) A Partner State including the United States of America;
- (iii) A Related Entity of any entity identified in paragraph (c)(1)(i) or (c)(1)(ii) of this clause; or
- (iv) The employees of any of the entities identified in paragraphs (c)(1)(i) through (c)(1)(iii) of this clause.

(2) In addition, the contractor shall, by contract or otherwise, extend the cross-waiver of liability set forth in paragraph (c)(1) of this clause to its subcontractors at any tier by requiring them, by contract or otherwise, to:

- (i) Waive all claims against the entities or persons identified in paragraphs (c)(1)(i) through (c)(1)(iv) of this clause; and
- (ii) Require that their subcontractors waive all claims against the entities or persons identified in paragraphs (c)(1)(i) through (c)(1)(iv) of this clause.

(3) For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of claims arising from the Convention on International Liability for Damage Caused by Space Objects, which entered into force on September 1, 1972, where the person, entity, or property

causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations.

(4) Notwithstanding the other provisions of this clause, this cross-waiver of liability shall not be applicable to:

(i) Claims between the contractor and its own Related Entities or between its Related Entities;

(ii) Claims made by a natural person (with the exception of providers of non-NASA cargo as outlined in clause II.A.5 of this contract), his/her estate, survivors or subrogees (except when a subrogee is a Party to an Agreement or is otherwise bound by the terms of this cross-waiver) for bodily injury to, or other impairment of health of, or death of, such person;

(iii) Claims for Damage caused by willful misconduct;

(iv) Intellectual property claims;

(v) Claims for Damage resulting from a failure of the contractor to extend the cross-waiver of liability to its subcontractors and related entities, pursuant to paragraph (c)(2) of this clause;

(vi) Claims by the Government arising out of or relating to the contractor's failure to perform its obligations under this contract.

(vii) Claims against providers of non-NASA cargo as outlined in clause II.A.5 of this contract.

(5) Nothing in this clause shall be construed to create the basis for a claim or suit where none would otherwise exist.

(6) This clause provides for a reciprocal waiver of claims between the Government and the contractor and their Related Entities as described in paragraph (c) above, except that the Government shall waive such claims only to the extent such claims exceed the maximum amount of the contractor's insurance or financial capability required under paragraph (e) below. This reciprocal waiver of claims shall not apply to rights and obligations arising from the application of any of the other clauses in the contract or to rights and obligations arising from activities that are not within the scope of this contract.

(7) Pursuant to paragraph (c)(2), the contractor shall extend this waiver of claims to its Related Entities by requiring them, by contract or otherwise, to waive all claims against the Government and its Related Entities. For avoidance of doubt, the contractor shall require its providers of non-NASA cargo, as outlined in clause II.A.5 of this contract, to waive claims

against the Government and the Government's Related Entities; however, the Government does not waive such claims against providers of non-NASA cargo.

(d) Clause II.A.4 of this contract requires the contractor to obtain a Federal Aviation Administration (FAA) license, in accordance with 51 U.S.C. 50901 et seq., for Launch and Reentry Services. The waivers of claims in this clause shall apply to activities under this contract, except that the waiver of claims between the Government and the contractor under paragraphs (6) and (7) shall not be applicable for phases of Launch Services and Reentry Services that are subject to the FAA license.

(e) The contractor shall maintain insurance, or demonstrate financial capability to compensate, for damages (as defined in paragraph (b)(2)(ii)) to U.S. Government property, except for damage to all on orbit ISS structures, modules, and systems required for functionality of the ISS, during Launch Services, Reentry Services, or transportation to, from, in proximity of, or docking with the ISS under this contract. For purposes of this paragraph (e), "preparation" of a Launch Vehicle or Transfer Vehicle includes test, assembly, integration, or operations of the Launch Vehicle, Transfer Vehicle, or their Payloads on a Government installation. Such insurance shall be an amount up to \$100 million, or the maximum amount available in the market at reasonable cost, subject to approval by the Contracting Officer. Financial capability, if authorized by the Contracting Officer, shall be in the amount of \$100 million. The contractor shall provide acceptable evidence of the insurance or financial capability to the Contracting Officer, subject to Contracting Officer approval. Insurance policies shall name the United States Government as an additional insured party. Once approved by the Contracting Officer, insurance policies may not be modified or canceled without the prior, written approval of the Contracting Officer.

(End of clause)

#### **II.A.8 LIMITATION OF FUNDS (FIXED-PRICE CONTRACT) (NFS 1852.232-77) (MAR 1989)**

(a) Of the total price of CLINs 0001 through 0002, the sum of **\$100,000** is presently available for payment and allotted to this contract. It is anticipated that from time to time additional funds will be allocated to the contract as required by the payment schedule in Clause II.A.1 for mission payments and ISS integration payments or as required by the payment schedules defined in special task orders until the total price of all CLINs is allotted.

(b) The Contractor agrees to perform or have performed work on the items specified in paragraph (a) of this clause up to the point at which, if this contract is terminated pursuant to Section II, Clause [52.212-4\(l\)](#), Termination for the Government's Convenience, of this contract,

the total amount payable by the Government pursuant to contract Section II, Clause 52.212-4(l) would equal the amount retained by the Contractor pursuant to Clause II.A.1, Initial ISS Integration Certification, Resupply Services Mission Payments, Milestone Events, and Completion Criteria, Table II.A.1-1, Mission Payment Schedule, and Table II.A.1-2, Initial ISS Integration Payment Schedule. The Contractor is not obligated to continue performance of the work beyond that point. The Government is not obligated in any event to pay or reimburse the Contractor more than the amount from time to time allotted to the contract, anything to the contrary in contract Section II, Clause 52.212-4(l) notwithstanding.

(c)

(1) It is contemplated that funds presently allotted to this contract will cover the work to be performed until (b) (4)

(2) If funds allotted are considered by the Contractor to be inadequate to cover the work to be performed until that date, or an agreed date substituted for it, the Contractor shall notify the Contracting Officer in writing when within the next sixty (60) days the work will reach a point at which, if the contract is terminated pursuant to contract Section II, Clause 52.212-4(l) of this contract, the total amount payable by the Government pursuant to contract Section II, Clause 52.212-4(l) would equal the amount retained by the Contractor pursuant to Clause II.A.1 and Table II.A.1-1 and Table II.A.1-2.

(3)

(i) The notice shall state the estimate when the point referred to in paragraph c(2) of this clause will be reached and the estimated amount of additional funds required to continue performance to the date specified in paragraph c(1) of this clause, or an agreed date substituted for it.

(ii) The Contractor shall, sixty (60) days in advance of the date specified in paragraph c(1) of this clause, or an agreed date substituted for it, advise the Contracting Officer in writing as to the estimated amount of additional funds required for the timely performance of the contract for a further period as may be specified in the contract or otherwise agreed to by the parties.

(4) If, after the notification referred to in paragraph c(3)(ii) of this clause, additional funds are not allotted by the date specified in paragraph c(1) of this clause, or an agreed date substituted for it, the Contracting Officer shall, upon the Contractor's written request, terminate this contract on that date or on the date set forth in the request, whichever is later, pursuant to contract Section II, Clause 52.212-4(l).

(d) When additional funds are allotted from time to time for continued performance of the work under this contract, the parties shall agree on the applicable period of contract performance to be covered by these funds. The provisions of paragraphs (b) and (c) of this clause shall apply

to these additional allotted funds and the substituted date pertaining to them, and the contract shall be modified accordingly.

(e) If, solely by reason of the Government's failure to allot additional funds in amounts sufficient for the timely performance of this contract, the Contractor incurs additional costs or is delayed in the performance of the work under this contract, and if additional funds are allotted, an equitable adjustment shall be made in the price(s) (including appropriate target, billing, and ceiling prices where applicable) of the items to be delivered, or in the time of delivery, or both.

(f) The Government may at any time before termination, and, with the consent of the Contractor, after notice of termination, allot additional funds for this contract.

(g) The provisions of this clause with respect to termination shall in no way be deemed to limit the rights of the Government under the Termination for Cause clause of this contract. The provisions of this Limitation of Funds clause are limited to the work on and allotment of funds for the items set forth in paragraph (a) of this clause. This clause shall become inoperative upon the allotment of funds for the total price of said work except for rights and obligations then existing under this clause.

(h) Nothing in this clause shall affect the right of the Government to terminate this contract pursuant to contract Section II, Clause [52.212-4\(l\)](#).

(End of clause)

## **II.A.9 SECURITY FOR RESUPPLY SERVICE PAYMENT FINANCING**

### **9.1 Requirements for payment (applicable to all CLINs).**

Payments will be made under this contract upon submission of properly certified invoices by the Contractor, and approval by the administering office, NASA Johnson Space Center (JSC). The amount of all invoices submitted shall not exceed the total contract price for all Resupply Task Orders.

### **9.2 Security (applicable to CLIN 0001).**

Pursuant to FAR Subpart 32.202-4 Security for Government Financing and 10 U.S.C. 2307(f) and 41 U.S.C. 4505, the Government is required to obtain adequate security for Government financing. The Contracting Officer may determine the Contractor's financial condition to be adequate security, provided the Contractor agrees to provide additional security should that financial condition become inadequate as security. This determination will be provided in writing from the Contracting Officer. Adequate security for payments made under this contract may be required in the form of a preferred creditor's lien. If required, the Contractor shall grant the Government a preferred creditor's lien i.e., a first lien paramount to all other liens against all

work in process sufficient to recompense the Government for all monies advanced under this contract should the Contractor's performance prove to be materially unsatisfactory.

9.3 Insurance (applicable to CLIN 0001).

The Contractor represents and warrants that it maintains with responsible insurance carriers (1) insurance on plant and equipment against fire and other hazards to the extent similar properties are usually insured by others operating plants and properties of similar character in the same general locality; (2) adequate insurance against liability on account of damage to persons or property; and (3) adequate insurance under all applicable workers' compensation laws. The Contractor agrees that, until work under this contract has been completed and all payments made under this contract have been liquidated, it will maintain this insurance and furnish any certificates with respect to its insurance that the administering office may require.

(End of clause)

**II.A.10 ORDERING (FAR 52.216-18) (OCT 1995)**

(a) Any supplies and services to be furnished under this contract shall be ordered by issuance of delivery orders or task orders by the individuals or activities designated in the Schedule. Such orders may be issued from January 14, 2016 through December 31, 2024.

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

(c) If mailed, a delivery order or task order is considered "issued" when the Government deposits the order in the mail. Orders may be issued orally, by facsimile, or by electronic commerce methods only if authorized in the Schedule.

(End of clause)

**II.A.11 ORDER LIMITATIONS (FAR 52.216-19) (OCT 1995)**

(a) *Minimum order.* When the Government requires supplies or services covered by this contract in an amount of less than:

- (1) A single resupply services mission pursuant to CLIN 0001,
- (2) Special Task Assignments valued at \$5000 pursuant to CLIN 0002,

The Government is not obligated to purchase, nor is the Contractor obligated to furnish those supplies or services under the contract.

(b) *Maximum order.* The Contractor is not obligated to honor—

(1) During any calendar year, any order for a single item in excess of (b) (4)

(2) Any order for a combination of items in excess of (b) (4)

(b) (4) or

(3) A series of orders from the same ordering office within thirty (30) days that together call for quantities exceeding the limitation in paragraph (b) (1) or (2) of this clause.

(c) If this is a requirements contract (i.e., includes the Requirements clause at FAR 52.216-21), the Government is not required to order a part of any one requirement from the Contractor if that requirement exceeds the maximum-order limitations in paragraph (b) of this section.

(d) Notwithstanding paragraphs (b) and (c) of this clause, the Contractor shall honor any order exceeding the maximum order limitations in paragraph (b), unless that order(s) is returned to the ordering office within thirty (30) days after issuance, with written notice stating the Contractor's intent not to ship the item(s) called for and the reasons. Upon receiving this notice, the Government may acquire the supplies or services from another source.

(End of clause)

## **II.A.12 INDEFINITE QUANTITY (FAR 52.216-22) (OCT 1995)**

(a) This is an indefinite-quantity contract for the supplies or services specified and effective for the period stated in Clause II.A.10, Ordering, (FAR 52.216-18) (Oct 1995). The quantities of supplies and services specified in the Schedule are estimates only and are not purchased by this contract.

(b) Delivery or performance shall be made only as authorized by orders issued in accordance with Clause II.A.10. The Contractor shall furnish to the Government, when and if ordered, the supplies or services specified in the Schedule up to and including the quantity designated in the Schedule as the "maximum." The Government shall order at least the quantity of supplies or services designated in the Schedule as the "minimum."

(c) Except for any limitations on quantities in Clause II.A.11, Order Limitations (FAR 52.216-19) (Oct 1995), or in the Schedule, there is no limit on the number of orders that may be issued. The Government may issue orders requiring delivery to multiple destinations or performance at multiple locations.

(d) Any order issued during the effective period of this contract and not completed within that period shall be completed by the Contractor within the time specified in the order. The contract shall govern the Contractor's and Government's rights and obligations with respect to

that order to the same extent as if the order were completed during the contract's effective period; provided, the Contractor shall not be required to make any deliveries under this contract after December 31, 2024.

(End of clause)

## **II.A.13 TASK ORDERING PROCEDURES**

### **13.1 Requirements for Competition.**

In the event there are multiple Contractors, NASA will provide all Contractors a fair opportunity to be considered for task orders issued under this contract based upon the specific task order requirements, unless the Contracting Officer determines that one of the following apply:

- (a) The Agency need is of such urgency that competing the requirements among Contractors would result in unacceptable delays;
- (b) Only one Contractor is capable of providing the service requested at the level of quality required because the service ordered is unique or highly specialized;
- (c) The order should be issued on a sole-source basis in the interest of economy and efficiency as a logical follow-on to an order issued under the contract, provided that all Contractors were given a fair opportunity to be considered for the original order; or
- (d) It is necessary to place an order to satisfy the minimum guarantee.

### **13.2 Types of Task Orders.**

There are two types of task orders that may be issued under this contract. The task order types are defined by the two CLINs in Clause I.A.3, Contract Line Item Numbers (CLINs). CLIN 0001 is the Resupply Services task order to procure mission services. CLIN 0002 task orders include Special Task Assignments and Studies.

### **13.3 Task Ordering Information Applicable to Resupply Service Task Orders and Special Task Assignment Task Orders.**

- (a) Prior to the issuance of a request for proposal applicable to a Task Order, exchanges and fact-finding may take place with Contractor(s). The request for a task order proposal will provide any special instructions regarding the level of detail required in the proposal. The request will include a date and time for submission of the proposal. Proposals will be due within thirty (30) calendar days from the date of the proposal request unless stated otherwise. The Contractor shall submit one electronic copy of the Task Order Proposal to the Contracting Officer.

(b) The Contractor, when submitting a Task Order Proposal, shall indicate that the proposal is compliant with the contract terms, statement of work, and the specific requirements contained in the request for the proposal.

(c) Mandatory Proposal Submission.

Unless otherwise agreed to by the Contracting Officer, it is mandatory for all Contractors to respond to each Request for Task Order Proposal provided these requirements are identified in the schedule and do not conflict with the contract ordering limitations. In the event there arises legitimate reasons for an awardee not to submit a Task Order Proposal (e.g., limited capacity to perform, excessive performance capability) the Contracting Officer may waive the requirement for proposal submission.

(d) All competitive Task Order Proposals shall be submitted by the date and time specified in the request, or it will be treated as a late proposal in accordance with FAR 52.212-1, Instructions to Offerors – Commercial Offerors, paragraph F. If this requirement is met, the Contracting Officer will consider the following three factors prior to award of a Task Order:

(1) Technical capability/risk- Demonstration of understanding and feasibility to meet the requirement.

(2) Price.

(3) Past performance, with emphasis given to the most recent and more relevant experience, including small business achievements.

(e) In the event that one Contractor is issued a Request for Task Order Proposal, NASA shall review and will hold discussions as necessary with the Contractor on their proposal prior to issuing a Task Order.

(f) Award of Task Orders.

Each of the Contractors will be notified of NASA's award of a Task Order. Except as listed in FAR 16.505(a)(10)(i), issuance or proposed issuance of a task order is not subject to protest. The debriefing requirements of FAR 15.5 are not applicable to orders issued under this contract less than \$5 million. However, NASA intends to provide feedback to the other Contractors regarding any significant issues resulting in their non-selection.

(g) Task Order Authorization and Content.

The only person authorized to issue task orders under this contract is the Contracting Officer. Task orders will be issued via electronic format directly to the Contractor's point of contact. The Contractor will acknowledge receipt and acceptance of the task order by signing the task order and returning an electronic copy directly to the Contracting Officer. Each task order will include the following information:

- (1) Date of the task order and signature of the Contracting Officer,
- (2) Contract number and task order number,
- (3) Statement of Work and any other documentation on which the price is based,
- (4) Product or service to be delivered,
- (5) Task order price,
- (6) Completion, Delivery date, or Delivery window, as applicable,
- (7) Accounting and appropriation data,
- (8) Any other necessary information.

#### 13.4 Unique Instructions For Resupply Service Task Orders.

Pricing for all Resupply Service Task Order Proposals shall not exceed the prices contained in the Schedule for the specific quantities being requested. Any Contractor proposed reduction will only be applicable to the Resupply Service Task Order addressed in the proposal and will not be deemed as a permanent reduction of the prices contained in the Schedule.

(End of clause)

### **II.A.14 PLACE OF PERFORMANCE**

The place of performance and launch site will be identified in each task order by the Contractor. The delivery schedule and/or period of performance of this contract are based upon the dates specified in the schedule or each individual task order.

(End of clause)

### **II.A.15 KEY POSITIONS AND FACILITIES**

(a) The key positions and/or facilities listed below are considered essential to the work being performed under this contract. Before changing any of the listed positions specified or facilities, the Contractor shall (1) notify the Contracting Officer reasonably in advance and (2) submit justification (including proposed changes/substitutions) in sufficient detail to permit evaluation of the impact on this contract.

(b) The list of positions and/or facilities may, with the consent of the contracting parties, be amended from time to time during the course of the contract to add or delete positions and/or facilities.

(c) The list of personnel who are assigned to the key positions and the organizational structure shall be kept up to date with the Contracting Officer and COR at program reviews. The key personnel are not required to be listed in the contract.

Key Positions

(b) (4)

(b) (4)

(End of clause)

#### II.A.16 PUBLIC AFFAIRS

(a) It is anticipated that the Contractor will execute media events to cover major contract activities. The Contractor may, consistent with Federal law and this Contract, release general information regarding its activities conducted within the scope of the Contract:

(1) The Contractor will coordinate with the NASA designated Public Affairs Office (PAO) regarding major media releases, media interviews, news conferences, contingency statements, media scouts, photo opportunities and film crew activities regarding NASA CRS-related efforts.

(2) The use of any direct quote by a NASA official shall be submitted for NASA concurrence to ensure accuracy prior to its release.

(3) The NASA logo may not be used without NASA's prior approval.

(End of Clause)

#### II.A.17 SMALL BUSINESS SUBCONTRACTING GOALS (JSC 52.219-90) (OCT 2006)

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

The total small business goal, expressed as a percent of total contract value including options, is (b) (4) %. The small business percentage goal, includes the following goals expressed as a percent of total contract value:

Small Businesses	(b) (4)
Small Disadvantaged Business Concerns	
Women-Owned Small Business Concerns	
HUBZone Small Business Concerns	
Veteran-Owned Small Business Concerns	

Service-Disabled Veteran-Owned Small Business Concerns
Historically Black Colleges and Universities (includes other minority institutions)

(b) (4)

(b) (4)

(End of clause)

**II.A.18 NASA RESUPPLY READINESS ASSESSMENT**

18.1 NASA reserves the right to utilize Government-performed technical assessments of launch and cargo vehicles/configurations to evaluate the readiness of the Contractor to deliver NASA cargo to the ISS. In the event NASA determines that the Contractor cannot provide adequate assurances that the cargo will be safely delivered to the ISS, NASA reserves the right to terminate all or part of this contract under Section II, [FAR 52.212-4\(m\)](#), Termination for Cause, or delay delivery.

18.2 In the event NASA decides to exercise its rights under this clause, NASA has the right to have its cargo removed from the cargo vehicle and returned to NASA. This removal and return is the Contractor's responsibility at the Contractor's expense, without adjustment to contract price.

18.3 In the event NASA decides to exercise its rights under this clause after the delivery vehicle has launched, NASA has the right to deny entry of the visiting vehicle into the Approach Ellipsoid which constitutes a delay in delivery.

18.4 In the event NASA delays the delivery, as a result of exercising its rights in this clause, and the causes of the delay were within the control of or due to the fault or negligence of the Contractor or its Subcontractors at any tier, then the provisions of Clause II.A.3, Adjustments to Mission Schedule, shall govern and the Contractor shall be deemed to have caused the delay. For the purpose of this clause, the burden of proof for showing that the causes of delay were within the control or fault and/or negligence on the part of the Contractor or its Subcontractors at any tier rests with NASA. If NASA delays the delivery and the causes of the delay were not within the control or due to the fault or negligence of the Contractor or its Subcontractors at any tier, then the provisions of Clause II.A.3 shall apply.

(End of clause)

**II.A.19 NASA INSIGHT AND APPROVAL**

19.1 NASA insight and approval includes insight into any corporation, corporate divisions, subsidiaries, joint ventures, partner(s) and any other business entity actually performing launch

vehicle or visiting vehicle manufacturing, management, orbital-to-launch vehicle integration, testing, and launch. Fulfillment of this clause could require the Contractor to execute third-party data rights agreements with its suppliers, as well as rights to information developed under other programs, to provide adequate NASA insight on parts and services procured by the Contractor.

19.2 NASA will retain approval authority over portions of the resupply service that interface with ISS hardware, cargo and operations. NASA approval is defined as providing authority to proceed and/or formal acceptance of requirements, plans, tests, or success criteria. Specific areas requiring NASA approval are related to compliance with SSP 50808, International Space Station (ISS) to Commercial Orbital Transportation Services (COTS) Interface Requirements Document (IRD), SSP 50833, International Space Station Cargo Transport Interface Requirements Document, and Clause II.A.5, Contractor Objectives on ISS Resupply Service Missions.

19.3 NASA will retain insight into other components of the resupply service in order to assess the risk to the cargo itself and to its safe and timely delivery. NASA insight is defined as gaining an understanding necessary to knowledgeably assess the risk of Contractor actions or lack thereof through the following: observation of manufacturing, processing, and tests; review of documentation and flight performance; and attendance at meetings and during launch .

While NASA insight will inform risk assessments pursuant to Clause II.A.18, NASA Resupply Readiness Assessment, on both the Baseline vehicle and changes to the Baseline, the focus of NASA insight will be changes to the Baseline as covered in the reviews of Statement of Work (SOW) paragraph 4.1, Formal Reviews.

Where NASA insight is required as defined in (a) through (c) below, the Contractor shall notify the COR and the NASA Resident Office of meetings, reviews, or tests in sufficient time to permit NASA participation through the entire event. If the Contractor believes that NASA has a subject matter expert with insight on this contract, the Contractor may request that the COR notify the relevant individual and ensure appropriate NASA participation. While insight into the visiting vehicle is largely achieved through the processes of ISS integration, other specific areas to be open to NASA insight are:

- (a) Attachment V.E., Safety and Health Plan, DRD CRS 1-5, Safety and Health Plan, and DRD CRS 1-1, Mishap Preparedness and Contingency Plan, Reliability Program and Quality Assurance Program.

- (b) Launch Vehicle Design Insight – non-recurring except for design changes

- (1) Baseline, changes from the Baseline and Mission Unique vehicle design, analyses, and configuration management, principally, through design and qualification/acceptance reviews.

- (i) A planned evolution of a Launch Vehicle’s architecture is considered a change from the Baseline and must be presented to NASA at a Program Review no later than VBR.

(ii) A switch to a different Launch Vehicle family is considered a change from the Baseline, regardless of whether it is intended to apply for one or multiple flights, and must be presented to NASA at a Program Review no later than VBR.

(c) Narrowly focused reviews of the Contractor's Test Like You Fly and Qualification and Acceptance rationale of the Propulsion Avionics, Flight Controls, Software, Separation systems, and integrated function at the Vehicle system level. If a system or component of a system is found to have caused a mission failure, the system shall be added to the areas of focused insight.

(d) Launch Vehicle Production Insight – recurring

(1) Flight vehicle production through narrowly focused reviews of the Contractor's Test Like You Fly and acceptance rationale of the Propulsion, Avionics, Flight Controls, Software, Separation systems, and integrated function at the Vehicle system level. If a system or component of a system is found to have caused a mission anomaly, the system shall be added to the areas of focused insight.

(2) Preflight predictions of flight performance and margin.

(3) Vehicle, system, subsystem, software and component performance from flight vehicle, tracking and range data, post flight data review, and flight anomaly resolutions.

(4) Specific production progress through production program reviews, plans, and schedules, including schedules and schedule risk resulting from non-CRS missions.

(5) Problems and deviations to the design through production and test, Material Review Boards, major or critical problems, anomaly resolutions, non-conformances, failure analysis, post test results, and acceptance and pre-ship reviews.

(b) (4)

19.4 Safety and Mission Assurance compliance evaluations until AS9100-certified (prime and subcontractors); updates to Attachment V.E., DRD CRS 1-5, and DRD CRS 1-1. Should approval or insight identify non-compliance with the terms and conditions of the contract, a difference in interpretation of test results, or disagreement with the Contractor technical directions, NASA will take appropriate action within the terms of the contract to ensure compliance via written direction to the Contractor.

19.5 Notwithstanding the insight and approvals set forth in Clause II.A.19, NASA Insight and Approval, herein, the Contractor assumes full performance responsibility as set forth in this contract, and neither NASA's insight nor its approval under this clause shall be construed as a defense to any finding of mission success or failure or final acceptance or rejection of the resupply service.

(End of clause)

## **II.A.20 RIGHTS IN DATA – GENERAL (FAR 52.227-14)(MAY 2014)(ALTERNATE II)(DEC 2007)(ALTERNATE III)(DEC 2007)**

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

“Computer database” or “database means” a collection of recorded information in a form capable of, and for the purpose of, being stored in, processed, and operated on by a computer. The term does not include computer software.

“Computer software”—

### **(1) Means**

(i) Computer programs that comprise a series of instructions, rules, routines, or statements, regardless of the media in which recorded, that allow or cause a computer to perform a specific operation or series of operations; and

(ii) Recorded information comprising source code listings, design details, algorithms, processes, flow charts, formulas, and related material that would enable the computer program to be produced, created, or compiled.

### **(2) Does not include computer databases or computer software documentation.**

“Computer software documentation” means owner’s manuals, user’s manuals, installation instructions, operating instructions, and other similar items, regardless of storage medium, that explain the capabilities of the computer software or provide instructions for using the software.

“Data” means recorded information, regardless of form or the media on which it may be recorded. The term includes technical data and computer software. The term does not include information incidental to contract administration, such as financial, administrative, cost or pricing, or management information.

“Form, fit, and function data” means data relating to items, components, or processes that are sufficient to enable physical and functional interchangeability, and data identifying source, size, configuration, mating and attachment characteristics, functional characteristics, and performance requirements. For computer software it means data identifying source, functional characteristics, and performance requirements but specifically excludes the source code, algorithms, processes, formulas, and flow charts of the software.

“Limited rights” means the rights of the Government in limited rights data as set forth in the Limited Rights Notice of paragraph (g)(3) if included in this clause.

“Limited rights data” means data, other than computer software, that embody trade secrets or are commercial or financial and confidential or privileged, to the extent that such data pertain to items, components, or processes developed at private expense, including minor modifications.

“Restricted computer software” means computer software developed at private expense and that is a trade secret, is commercial or financial and confidential or privileged, or is copyrighted computer software, including minor modifications of the computer software.

“Restricted rights,” as used in this clause, means the rights of the Government in restricted computer software, as set forth in a Restricted Rights Notice of paragraph (g) if included in this clause, or as otherwise may be provided in a collateral agreement incorporated in and made part of this contract, including minor modifications of such computer software.

“Technical data” means recorded information (regardless of the form or method of the recording) of a scientific or technical nature (including computer databases and computer software documentation). This term does not include computer software or financial, administrative, cost or pricing, or management data or other information incidental to contract administration. The term includes recorded information of a scientific or technical nature that is included in computer databases (See [41 U.S.C. 116](#)).

“Unlimited rights” means the rights of the Government to use, disclose, reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, in any manner and for any purpose, and to have or permit others to do so.

(b) Allocation of rights.

(1) Except as provided in paragraph (c) of this clause, the Government shall have unlimited rights in—

(i) Data first produced in the performance of this contract;

(ii) Form, fit, and function data delivered under this contract;

(iii) Data delivered under this contract (except for restricted computer software) that constitute manuals or instructional and training material for installation, operation, or routine maintenance and repair of items, components, or processes delivered or furnished for use under this contract; and

(iv) All other data delivered under this contract unless provided otherwise for limited rights data or restricted computer software in accordance with paragraph (g) of this clause.

(2) The Contractor shall have the right to—

(i) Assert copyright in data first produced in the performance of this contract to the extent provided in paragraph (c)(1) of this clause;

(ii) Use, release to others, reproduce, distribute, or publish any data first produced or specifically used by the Contractor in the performance of this contract, unless provided otherwise in paragraph (d) of this clause;

(iii) Substantiate the use of, add, or correct limited rights, restricted rights, or copyright notices and to take other appropriate action, in accordance with paragraphs (e) and (f) of this clause; and

(iv) Protect from unauthorized disclosure and use those data that are limited rights data or restricted computer software to the extent provided in paragraph (g) of this clause.

(c) Copyright—

(1) Data first produced in the performance of this contract.

(i) Unless provided otherwise in paragraph (d) of this clause, the Contractor may, without prior approval of the Contracting Officer, assert copyright in scientific and technical articles based on or containing data first produced in the performance of this contract and published in academic, technical or professional journals, symposia proceedings, or similar works. The prior, express written permission of the Contracting Officer is required to assert copyright in all other data first produced in the performance of this contract.

(ii) When authorized to assert copyright to the data, the Contractor shall affix the applicable copyright notices of [17 U.S.C. 401 or 402](#), and an acknowledgment of Government sponsorship (including contract number).

(iii) For data other than computer software, the Contractor grants to the Government, and others acting on its behalf, a paid-up, nonexclusive, irrevocable, worldwide license in such copyrighted data to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly by or on behalf of the Government. For computer software, the Contractor grants to the Government, and others acting on its behalf, a paid-up, nonexclusive, irrevocable, worldwide license in such copyrighted computer software to reproduce, prepare derivative works, and perform publicly and display publicly (but not to distribute copies to the public) by or on behalf of the Government.

(2) *Data not first produced in the performance of this contract.* The Contractor shall not, without the prior written permission of the Contracting Officer, incorporate in data delivered under this contract any data not first produced in the performance of this contract unless the Contractor—

(i) Identifies the data; and

(ii) Grants to the Government, or acquires on its behalf, a license of the same scope as set forth in paragraph (c)(1) of this clause or, if such data are restricted computer software, the Government shall acquire a copyright license as set forth in paragraph (g)(4) of this clause (if included in this contract) or as otherwise provided in a collateral agreement incorporated in or made part of this contract.

(3) *Removal of copyright notices.* The Government will not remove any authorized copyright notices placed on data pursuant to this paragraph (c), and will include such notices on all reproductions of the data.

(d) *Release, publication, and use of data.* The Contractor shall have the right to use, release to others, reproduce, distribute, or publish any data first produced or specifically used by the Contractor in the performance of this contract, except—

(1) As prohibited by Federal law or regulation (*e.g.*, export control or national security laws or regulations);

(2) As expressly set forth in this contract; or

(3) If the Contractor receives or is given access to data necessary for the performance of this contract that contain restrictive markings, the Contractor shall treat the data in accordance with such markings unless specifically authorized otherwise in writing by the Contracting Officer.

(e) Unauthorized marking of data.

(1) Notwithstanding any other provisions of this contract concerning inspection or acceptance, if any data delivered under this contract are marked with the notices specified in paragraph (g)(3) or (g) (4) if included in this clause, and use of the notices is not authorized by this clause, or if the data bears any other restrictive or limiting markings not authorized by this contract, the Contracting Officer may at any time either return the data to the Contractor, or cancel or ignore the markings. However, pursuant to [41 U.S.C. 4703](#), the following procedures shall apply prior to canceling or ignoring the markings.

(i) The Contracting Officer will make written inquiry to the Contractor affording the Contractor 60 days from receipt of the inquiry to provide written justification to substantiate the propriety of the markings;

(ii) If the Contractor fails to respond or fails to provide written justification to substantiate the propriety of the markings within the 60-day period (or a longer time approved in writing by the Contracting Officer for good cause shown), the Government shall have the right to cancel or ignore the markings at any time after said period and the data will no longer be made subject to any disclosure prohibitions.

(iii) If the Contractor provides written justification to substantiate the propriety of the markings within the period set in paragraph (e)(1)(i) of this clause, the Contracting Officer will consider such written justification and determine whether or not the markings are to be cancelled or ignored. If the Contracting Officer determines that the markings are authorized, the Contractor will be so notified in writing. If the Contracting Officer determines, with concurrence of the head of the contracting activity, that the markings are not authorized, the Contracting Officer will furnish the Contractor a written determination, which determination will become the final agency decision regarding the appropriateness of the markings unless the Contractor files suit in a court

of competent jurisdiction within 90 days of receipt of the Contracting Officer's decision. The Government will continue to abide by the markings under this paragraph (e)(1)(iii) until final resolution of the matter either by the Contracting Officer's determination becoming final (in which instance the Government will thereafter have the right to cancel or ignore the markings at any time and the data will no longer be made subject to any disclosure prohibitions), or by final disposition of the matter by court decision if suit is filed.

(2) The time limits in the procedures set forth in paragraph (e)(1) of this clause may be modified in accordance with agency regulations implementing the Freedom of Information Act ([5 U.S.C. 552](#)) if necessary to respond to a request thereunder.

(3) Except to the extent the Government's action occurs as the result of final disposition of the matter by a court of competent jurisdiction, the Contractor is not precluded by paragraph (e) of the clause from bringing a claim, in accordance with the Disputes clause of this contract, that may arise as the result of the Government removing or ignoring authorized markings on data delivered under this contract.

(f) Omitted or incorrect markings.

(1) Data delivered to the Government without any restrictive markings shall be deemed to have been furnished with unlimited rights. The Government is not liable for the disclosure, use, or reproduction of such data.

(2) If the unmarked data has not been disclosed without restriction outside the Government, the Contractor may request, within 6 months (or a longer time approved by the Contracting Officer in writing for good cause shown) after delivery of the data, permission to have authorized notices placed on the data at the Contractor's expense. The Contracting Officer may agree to do so if the Contractor—

(i) Identifies the data to which the omitted notice is to be applied;

(ii) Demonstrates that the omission of the notice was inadvertent;

(iii) Establishes that the proposed notice is authorized; and

(iv) Acknowledges that the Government has no liability for the disclosure, use, or reproduction of any data made prior to the addition of the notice or resulting from the omission of the notice.

(3) If data has been marked with an incorrect notice, the Contracting Officer may—

(i) Permit correction of the notice at the Contractor's expense if the Contractor identifies the data and demonstrates that the correct notice is authorized; or

(ii) Correct any incorrect notices.

(g) Protection of limited rights data and restricted computer software.

(1) The Contractor may withhold from delivery qualifying limited rights data or restricted computer software that are not data identified in paragraphs (b)(1)(i), (ii), and (iii) of this clause. As a condition to this withholding, the Contractor shall—

- (i) Identify the data being withheld; and
- (ii) Furnish form, fit, and function data instead.

(2) Limited rights data that are formatted as a computer database for delivery to the Government shall be treated as limited rights data and not restricted computer software.

(3) Notwithstanding paragraph (g)(1) of this clause, the contract may identify and specify the delivery of limited rights data, or the Contracting Officer may require by written request the delivery of limited rights data that has been withheld or would otherwise be entitled to be withheld. If delivery of that data is required, the Contractor shall affix the following “Limited Rights Notice” to the data and the Government will treat the data, subject to the provisions of paragraphs (e) and (f) of this clause, in accordance with the notice:

Limited Rights Notice (Dec 2007)

(a) These data are submitted with limited rights under Government Contract No. NNJ16GX08B (and subcontract \_\_\_\_\_, if appropriate). These data may be reproduced and used by the Government with the express limitation that they will not, without written permission of the Contractor, be used for purposes of manufacture nor disclosed outside the Government; except that the Government may disclose these data outside the Government for the following purposes, if any; provided that the Government makes such disclosure subject to prohibition against further use and disclosure: Release to a foreign government, or its instrumentalities, if required to serve the interests of the U.S. Government, for information or evaluation, or for emergency repair or overhaul work by the foreign government.

(b) This notice shall be marked on any reproduction of these data, in whole or in part.

(End of notice)

(4)(i) Notwithstanding paragraph (g)(1) of this clause, the contract may identify and specify the delivery of restricted computer software, or the Contracting Officer may require by written request the delivery of restricted computer software that has been withheld or would otherwise be entitled to be withheld. If delivery of that computer software is required, the Contractor shall affix the following “Restricted Rights Notice” to the computer software and the Government will treat the computer software, subject to paragraphs (e) and (f) of this clause, in accordance with the notice:

Restricted Rights Notice (Dec 2007)

(a) This computer software is submitted with restricted rights under Government Contract No. NNJ16GX08B (and subcontract \_\_\_\_\_, if appropriate). It may not be used, reproduced,

or disclosed by the Government except as provided in paragraph (b) of this notice or as otherwise expressly stated in the contract.

(b) This computer software may be—

(1) Used or copied for use with the computer(s) for which it was acquired, including use at any Government installation to which the computer(s) may be transferred;

(2) Used or copied for use with a backup computer if any computer for which it was acquired is inoperative;

(3) Reproduced for safekeeping (archives) or backup purposes;

(4) Modified, adapted, or combined with other computer software, provided that the modified, adapted, or combined portions of the derivative software incorporating any of the delivered, restricted computer software shall be subject to the same restricted rights;

(5) Disclosed to and reproduced for use by support service Contractors or their subcontractors in accordance with paragraphs (b)(1) through (4) of this notice; and

(6) Used or copied for use with a replacement computer.

(c) Notwithstanding the foregoing, if this computer software is copyrighted computer software, it is licensed to the Government with the minimum rights set forth in paragraph (b) of this notice.

(d) Any other rights or limitations regarding the use, duplication, or disclosure of this computer software are to be expressly stated in, or incorporated in, the contract.

(e) This notice shall be marked on any reproduction of this computer software, in whole or in part.

(End of notice)

(ii) Where it is impractical to include the Restricted Rights Notice on restricted computer software, the following short-form notice may be used instead:

Restricted Rights Notice Short Form (Jun 1987)

Use, reproduction, or disclosure is subject to restrictions set forth in Contract No. \_\_\_\_\_ (and subcontract, if appropriate) with \_\_\_\_\_ (name of Contractor and subcontractor).

(End of notice)

(iii) If restricted computer software is delivered with the copyright notice of 17 U.S.C. 401, it will be presumed to be licensed to the Government without disclosure prohibitions, with the minimum rights set forth in paragraph (b) of this clause.

(h) *Subcontracting*. The Contractor shall obtain from its subcontractors all data and rights therein necessary to fulfill the Contractor's obligations to the Government under this contract. If a subcontractor refuses to accept terms affording the Government those rights, the Contractor shall promptly notify the Contracting Officer of the refusal and shall not proceed with the subcontract award without authorization in writing from the Contracting Officer.

(i) *Relationship to patents or other rights*. Nothing contained in this clause shall imply a license to the Government under any patent or be construed as affecting the scope of any license or other right otherwise granted to the Government.

(End of clause)

## **II.A.21 GOVERNMENT'S RIGHT TO REMOTELY SENSED DATA**

The Contractor consents to the U.S. Government collecting remotely sensed data on a no interference basis related to its CRS vehicles and to use such data for U.S. Government's purposes.

(End of Clause)

## **II.A.22 FINANCIAL REPORTING OF NASA PROPERTY IN THE CUSTODY OF CONTRACTORS (NFS 1852.245-73)(JAN 2011)**

(a) The Contractor shall submit annually a NASA Form (NF) 1018, NASA Property in the Custody of Contractors, in accordance this clause, the instructions on the form and NFS subpart 1845.71, and any supplemental instructions for the current reporting period issued by NASA.

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

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

(3) One copy shall be submitted to the following address: *NASA/Johnson Space Center, Industrial Property Officer/JB3, 2101 NASA Parkway, Houston, TX 77058*, unless the Contractor uses the NF 1018 Electronic Submission System (NESS) for report preparation and submission.

(c)(1) The annual reporting period shall be from October 1 of each year through September 30 of the following year. The report shall be submitted in time to be received by October 15. The information contained in these reports is entered into the NASA accounting system to reflect

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

(2) The Contracting Officer may, in NASA's interest, withhold payment until a reserve not exceeding \$25,000 or 5 percent of the amount of the contract, whichever is less, has been set aside, if the Contractor fails to submit annual NF 1018 reports in accordance with NFS subpart 1845.71 and any supplemental instructions for the current reporting period issued by NASA. Such reserve shall be withheld until the Contracting Officer has determined that NASA has received the required reports. The withholding of any amount or the subsequent payment thereof shall not be construed as a waiver of any Government right.

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

(End of clause)

## **II.A.23 IDENTIFICATION AND MARKING OF GOVERNMENT EQUIPMENT (NFS 1852.245-74)(JAN 2011)**

(a) The Contractor shall identify all equipment to be delivered to the Government using NASA Technical Handbook (NASA-HDBK) 6003, Application of Data Matrix Identification Symbols to Aerospace Parts Using Direct Part Marking Methods/Techniques, and NASA Standard (NASA-STD) 6002, Applying Data Matrix Identification Symbols on Aerospace Parts, or through the use of commercial marking techniques that: (1) are sufficiently durable to remain intact through the typical lifespan of the property: and, (2) contain the data and data format required by the standards. This requirement includes deliverable equipment listed in the schedule

and other equipment when no longer required for contract performance and NASA directs physical transfer to NASA or a third party. The Contractor shall identify property in both machine and human readable form unless the use of a machine readable-only format is approved by the NASA Industrial Property Officer.

(b) Equipment shall be marked in a location that will be human readable, without disassembly or movement of the equipment, when the items are placed in service unless such placement would have a deleterious effect on safety or on the item's operation.

(c) Concurrent with equipment delivery or transfer, the Contractor shall provide the following data in an electronic spreadsheet format:

- (1) Item Description.
- (2) Unique Identification Number (License Tag).
- (3) Unit Price.
- (4) An explanation of the data used to make the unique identification number.

(d) For equipment no longer needed for contract performance and physically transferred under paragraph (a) of this clause, the following additional data is required:

- (1) Date originally placed in service.
- (2) Item condition.

(e) The data required in paragraphs (c) and (d) of this clause shall be delivered to the NASA center receiving activity listed below:

NASA/Johnson Space Center  
Central Receiving/Bldg 420  
2101 NASA Parkway  
Houston, TX 77058

(f) The Contractor shall include the substance of this clause, including this paragraph (f), in all subcontracts that require delivery of equipment.

(End of clause)

## **II.A.24 LIST OF GOVERNMENT-FURNISHED PROPERTY PURSUANT TO FAR 52.245-1 (NFS 1852.245-76)(JAN 2011)**

For performance of work under this contract, the Government will make available Government property listed in Attachment V.J, Government Furnished Property, of this contract on a no charge-for-use basis pursuant to the clause at FAR 52.245-1, Government Property, as incorporated in this contract. The Contractor shall use this property in the performance of this contract at SpaceX Headquarters in Hawthorne, California,] and at other location(s) as may be

approved by the Contracting Officer. Under FAR 52.245–1, the Contractor is accountable for the identified property.

(End of clause)

## **II.A.25 GOVERNMENT FURNISHED SERVICES AND DATA**

The Government will make available the following services and data to the Contractor on a no-charge-for-use basis to the extent reasonably necessary for the Contractor to fulfill its contractual obligations:

(a) The Government will make available Tracking and Data Relay Satellite System (TDRSS) and NASA Integrated Services Network (NISN) support over existing assets for tracking during all spacecraft mission phases. The Contractor shall optimize the use of TDRSS. If Single Access (SA) is used for the spacecraft, it shall be limited to use for critical operations such as system check-out, critical maneuvers, and proximity rendezvous operations. The Contractor shall identify, with reasonable notice, their request for this service with rationale describing the required usage within their mission profile. Standard routing of data will be at NASA's discretion depending on the location of the customer control center in order to achieve the most efficient and cost effective routing.

(b) The Government will make available the NASA Docking System (NDS) data. This data is intended to be provided per the schedule below:

- (1) The preliminary build-to-print package available by November 2014.
- (2) The final build-to-print package available by June 2016.
- (3) The Mass Simulator build-to-print package will be available by August 2014.

(c) The Government will make available the design data, acceptance test requirements, and test procedures, when required, for the systems below. This data is currently available.

- (1) Flight Releasable Attachment Mechanism (FRAM), including the multiple adapter plate assembly designs mentioned in Attachment V.F, Typical Unpressurized Cargo Complements,
- (2) Common Berthing Mechanism (CBM).

(End of Clause)

## **II.A.26 USE OF GOVERNMENT PROPERTY, FACILITIES, ASSETS, OR SERVICES**

This clause applies to any Government support, including property, facilities, assets, or services, not otherwise provided for under this contract whether obtained from NASA or another Government Agency.

(a) Support obtained from a Government Agency other than NASA.

(1) The Contractor shall obtain and maintain any necessary contracts or agreements between the Contractor and any Government Agency authorizing the use of Government property, facilities, assets or services in performance of this contract (except as may be expressly stated in this contract as furnished by the Government). The Contractor shall be responsible to arrange any contracts or agreements outside of this contract as it deems appropriate. The terms and conditions of such contracts or agreements will govern the use of those Government resources. Any costs associated with such contracts or agreements shall result in no increase in the price of this contract. All remedies to disputes or performance issues shall be resolved in accordance with the terms and conditions of those contracts or agreements. The Contractor shall notify the Contracting Officer Representative (COR), or designee, of any contracts or agreements between the Contractor and any Government Agency under this paragraph (a).

(2) NASA makes no warranty whatsoever as to the availability or suitability for use of Government property, facilities, assets, or services made available by another Government Agency under the terms and conditions of other contracts or agreements. The Contractor assumes all responsibility for determining the suitability for use of all property, facilities, assets, or services acquired or made available to the Contractor by a Government Agency under other contracts or agreements. The Contractor further acknowledges and agrees that any use of such Government property, facilities, assets, or services shall not relieve the Contractor of full performance responsibility under the contract.

(b) Support obtained from a NASA Center or Component Facility.

(1) Except as may be expressly stated in this contract as furnished by the Government, the Contractor shall obtain use of any Government property, facilities, assets or services available from a NASA Center or Component Facility (a "Performing Organization") for performance of this contract through the use of an appropriate Task Plan. For Task Plan reference instructions, the Contractor shall contact the Performing Organization Point of Contact (POC). The Contractor shall be responsible for obtaining, negotiating and documenting all Task Plans with the Performing Organization. The Contractor shall be responsible for any costs associated with property, facilities, assets, or services provided by a Performing Organization under a Task Plan and such costs shall result in no increase in the price of this contract. The Contractor shall notify the Contracting Officer Representative (COR), or designee, of any Task Plans between the Contractor and a Performing Organization under this paragraph (b).

(2) NASA makes no warranty whatsoever as to the availability or suitability for use of property, facilities, assets, or services made available by a Performing Organization under a Task Plan. The Contractor assumes all responsibility for determining the suitability for use of all such property, facilities, assets, or services, including technical suitability, schedule availability and cost. The Contractor further acknowledges and agrees that any use of Government property,

facilities, assets, or services under a Task Plan shall not relieve the Contractor of full performance responsibility under the contract.

(3) Any implementation issues or disputes arising under a Task Plan shall be referred for resolution to the Points of Contact, or if necessary the signatories, identified in the Task Plan.

(c) The Contractor is responsible for determining the suitability for use of all materials, property, and facilities acquired or made available to the Contractor by NASA or other Government agencies under any contract or agreement. Any use of Government-Furnished Property (GFP), materials, or facilities and services shall not relieve the Contractor of full performance responsibility under the contract.

(End of clause)

#### **II.A.27 HIGHER LEVEL CONTRACT QUALITY REQUIREMENT (FAR 52.246-11) (FEB 1999)**

The Contractor shall comply with the higher-level quality standard selected below.

<i>Number</i>	<i>Title</i>	<i>Revision</i>	<i>Applicability</i>
<b>X</b> AS9100	SAE Aerospace Quality Management System	Latest	Compliance Required

(End of clause)

#### **II.A.28 EXPORT LICENSES (NFS 1852.225-70) (FEB 2000)**

(a) The Contractor shall comply with all United States (U.S.) export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this contract. In the absence of available license exemptions/exceptions, the Contractor shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of hardware, technical data, and software, or for the provision of technical assistance.

(b) The Contractor shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of this contract, including instances where the work is to be performed on-site at any NASA Center, where the foreign person will have access to export-controlled technical data or software.

(c) The Contractor shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

(d) The Contractor shall be responsible for ensuring that the provisions of this clause apply to its subcontractors.

(End of clause)

#### **II.A.29 OMBUDSMAN (NFS 1852.215-84) (NOV 2011)(ALTERNATE I)(JUN 2000)**

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

(b) If resolution cannot be made by the contracting officer, interested parties may contact the installation ombudsman, whose name, address, telephone number, facsimile number, and e-mail address may be found at: [http://prod.nais.nasa.gov/pub/pub\\_library/Omb.html](http://prod.nais.nasa.gov/pub/pub_library/Omb.html). Concerns, issues, disagreements, and recommendations which cannot be resolved at the installation may be referred to the Agency ombudsman identified at the above URL. Please do not contact the ombudsman to request copies of the solicitation, verify offer due date, or clarify technical requirements. Such inquiries shall be directed to the Contracting Officer or as specified elsewhere in this document.

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

(End of Clause)

#### **II.A.30 SUBCONTRACTING WITH RUSSIAN ENTITIES FOR GOODS OR SERVICES**

(a) Definitions: In this clause:

(1) The term “Russian entities” means:

(i) Russian persons, or

(ii) Entities created under Russian law or owned, in whole or in part, by Russian persons or companies including, but not limited to, the following:

- (A) The Russian Federal Space Agency (Roscosmos),
- (B) Any organization or entity under the jurisdiction or control of Roscosmos, or
- (C) Any other organization, entity or element of the Government of the Russian Federation.

(2) The term “extraordinary payments” means payments in cash or in kind made or to be made by the United States Government prior to December 31, 2020, for work to be performed or services to be rendered prior to that date necessary to meet United States obligations under the Agreement Concerning Cooperation on the Civil International Space Station, with annex, signed at Washington January 29, 1998, and entered into force March 27, 2001, or any protocol, agreement, memorandum of understanding, or contract related thereto.

(b) This clause implements the reporting requirement in section 6(i) of the Iran, North Korea, and Syria Nonproliferation Act, as amended (INKSNA). This clause also implements section 6(a) and the exception in section 7(1)(B) of INKSNA that is applicable through December 31, 2020. NASA has applied the restrictions in INKSNA to include funding of Russian entities via U.S. Contractors.

(c) (1) The Contractor shall not subcontract with Russian entities without first receiving written approval from the Contracting Officer. In order to obtain this written approval to subcontract with any Russian entity as defined in paragraphs (a), the Contractor shall provide the Contracting Officer with the following information related to each planned new subcontract and any change to an existing subcontract with entities that fit the description in paragraph (a):

(i) A detailed description of the subcontracting entity, including its name, address, and a point of contact, as well as a detailed description of the proposed subcontract including the specific purpose of payments that will be made under the subcontract.

(ii) The Contractor shall provide certification that the subcontracting entity is not, at the date of the subcontract approval request, on any of the lists of proscribed denied parties, specially designated nationals and entities of concern found at:

BIS's Listing of Entities of Concern (see <http://www.access.gpo.gov/bis/ear/pdf/744spir.pdf>)

BIS's List of Denied Parties (see <http://www.bis.doc.gov/index.php/policy-guidance/lists-of-parties-of-concern/denied-persons-list>)

OFAC's List of Specially Designated Nationals (Adobe® PDF format) (see <http://www.bis.doc.gov/index.php/policy-guidance/lists-of-parties-of-concern/unverified-list>)

List of Unverified Persons in Foreign Countries (see <http://www.bis.doc.gov/index.php/policy-guidance/lists-of-parties-of-concern/unverified-list>)

State Department's List of Parties Statutorily Debarred for Arms Export Control Act Convictions (see <http://pmddtc.state.gov/compliance/debar.html>)

State Department's Lists of Proliferating Entities (see <http://www.state.gov/t/isn/c15231.htm>)

(2) Unless relief is granted by the Contracting Officer, the information necessary to obtain approval to subcontract shall be provided to the Contracting Officer thirty (30) business days prior to executing any planned subcontract with entities defined in paragraph (a).

(d) After receiving approval to subcontract, the Contractor shall provide the Contracting Officer with a report every six (6) months that documents the individual payments made to an entity in paragraph (a). The reports are due on July 15th and January 15th. The July 15th report shall document all of the individual payments made from the previous January through June. The January 15th report shall document all of the individual payments made from the previous July through December. The content of the report shall provide the following information for each time a payment is made to an entity in paragraph (a):

- (1) The name of the entity,
- (2) The subcontract number,
- (3) The amount of the payment,
- (4) The date of the payment.

(e) The Contracting Officer may direct the Contractor to provide additional information for any other prospective or existing subcontract at any tier. The Contracting Officer may direct the Contractor to terminate for the convenience of the Government any subcontract at any tier with an entity defined in paragraph (a), subject to an equitable adjustment.

(f) All work subcontracted to the Russian Federal Space Agency, any organization or entity under the jurisdiction or control of the Russian Federal Space Agency, or any other organization, entity or element of the Government of the Russian Federation must be completed on or before December 31, 2020. No payments for such work may be made by the Contractor to the subcontractor, or by NASA to the Contractor, after December 31, 2020. The Contractor is responsible for ensuring the completion of and payment for such subcontracted work in sufficient time to enable payment by NASA to the Contractor on or before December 31, 2020.

(g) The Contractor shall include the substance of this clause in all its subcontracts, and shall require such inclusion in all other subcontracts of any tier. The Contractor shall be responsible to obtain written approval from the Contracting Officer to enter into any tier subcontract that involves entities defined in paragraph (a).

(h) Performance of this contract after December 31, 2020 may be subject to prohibitions on payments to Russian entities under INKSNA.

(End of Clause)

## **II.A.31 CLAUSES INCORPORATED BY REFERENCE (FAR 52.252-2) (FEB 1998)**

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at these addresses:

<http://www.acquisition.gov/far>

<http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm>

### **Federal Acquisition Regulation (48 CFR Chapter 1)**

<i>Clause Number</i>	<i>Date</i>	<i>Title</i>
52.203-17	APR 2014	CONTRACTOR EMPLOYEE WHISTLEBLOWER RIGHTS AND REQUIREMENT TO INFORM EMPLOYEES OF WHISTLEBLOWER RIGHTS
52.204-4	MAY 2011	PRINTED OR COPIED DOUBLE-SIDED ON POSTCONSUMER FIBER CONTENT PAPER
52.204-9	JAN 2011	PERSONAL IDENTITY VERIFICATION OF CONTRACTOR PERSONNEL
52.204-13	JUL 2013	SYSTEM FOR AWARD MANAGEMENT MAINTENANCE
52.222-24	FEB 1999	PREAWARD ON-SITE COMPLIANCE EVALUATION
52.232-39	JUN 2013	UNENFORCEABILITY OF UNAUTHORIZED OBLIGATIONS
52.232-40	DEC 2013	PROVIDING ACCELERATED PAYMENTS TO SMALL BUSINESS SUBCONTRACTORS
52.243-1	AUG 1987	CHANGES—FIXED PRICE, ALTERNATE II (APR 1984)
52.245-1	APR 2012	GOVERNMENT PROPERTY ALTERNATE I
52.245-9	APR 2012	USE AND CHARGES
52.246-4	AUG 1996	INSPECTION OF SERVICES—FIXED PRICE

### **NASA FAR Supplement (48 CFR Chapter 18) Clauses**

<i>Clause Number</i>	<i>Date</i>	<i>Title</i>
1852.204-76	JAN 2011	SECURITY REQUIREMENTS FOR UNCLASSIFIED INFORMATION TECHNOLOGY RESOURCES

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1852.223-70	APR 2002	SAFETY AND HEALTH
1852.223-75	FEB 2002	MAJOR BREACH OF SAFETY OR SECURITY, ALTERNATE I (FEB 2006)
1852.237-72	JUN 2005	ACCESS TO SENSITIVE INFORMATION
1852.237-73	JUN 2005	RELEASE OF SENSITIVE INFORMATION
1852.245-75	JAN 2011	PROPERTY MANAGEMENT CHANGES
1852.245-78	JAN 2011	PHYSICAL INVENTORY OF CAPITAL PERSONAL PROPERTY

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(End of clause)

(End of Section)

### III. CONTRACT TERMS AND CONDITIONS REQUIRED TO IMPLEMENT STATUTES OR EXECUTIVE ORDERS—COMMERCIAL ITEMS (FAR 52.212-5) (JULY 2014)

(a) The Contractor shall comply with the following Federal Acquisition Regulation (FAR) clauses, which are incorporated in this contract by reference, to implement provisions of law or Executive orders applicable to acquisitions of commercial items:

(1) [52.222-50](#), Combating Trafficking in Persons (Feb 2009) ([22 U.S.C. 7104\(g\)](#)).

\_\_\_ Alternate I (Aug 2007) of [52.222-50](#) ([22 U.S.C. 7104\(g\)](#)).

(2) [52.233-3](#), Protest After Award (AUG 1996) ([31 U.S.C. 3553](#)).

(3) [52.233-4](#), Applicable Law for Breach of Contract Claim (OCT 2004)"(Public Laws 108-77 and 108-78 ([19 U.S.C. 3805 note](#))).

(b) The Contractor shall comply with the FAR clauses in this paragraph (b) that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial items:

*[Contracting Officer check as appropriate.]*

\_X\_ (1) [52.203-6](#), Restrictions on Subcontractor Sales to the Government (Sept 2006), with Alternate I (Oct 1995) ([41 U.S.C. 4704](#) and [10 U.S.C. 2402](#)).

\_X\_ (2) [52.203-13](#), Contractor Code of Business Ethics and Conduct (Apr 2010) ([41 U.S.C. 3509](#))).

\_\_\_ (3) [52.203-15](#), Whistleblower Protections under the American Recovery and Reinvestment Act of 2009 (June 2010) (Section 1553 of Pub. L. 111-5). (Applies to contracts funded by the American Recovery and Reinvestment Act of 2009.)

\_X\_ (4) [52.204-10](#), Reporting Executive Compensation and First-Tier Subcontract Awards (Jul 2013) (Pub. L. 109-282) ([31 U.S.C. 6101 note](#)).

\_\_\_ (5) [Reserved].

\_\_\_ (6) [52.204-14](#), Service Contract Reporting Requirements (Jan 2014) (Pub. L. 111-117, section 743 of Div. C).

\_X\_ (7) [52.204-15](#), Service Contract Reporting Requirements for Indefinite-Delivery Contracts (Jan 2014) (Pub. L. 111-117, section 743 of Div. C).

\_X\_ (8) [52.209-6](#), Protecting the Government's Interest When Subcontracting with Contractors Debarred, Suspended, or Proposed for Debarment. (Aug 2013) ([31 U.S.C. 6101 note](#)).

\_X\_ (9) [52.209-9](#), Updates of Publicly Available Information Regarding Responsibility Matters (Jul 2013) ([41 U.S.C. 2313](#)).

\_X\_ (10) [52.209-10](#), Prohibition on Contracting with Inverted Domestic Corporations (May 2012) (section 738 of Division C of Pub. L. 112-74, section 740 of Division C of Pub. L. 111-117, section 743 of Division D of Pub. L. 111-8, and section 745 of Division D of Pub. L. 110-161).

\_\_\_ (11) [52.219-3](#), Notice of HUBZone Set-Aside or Sole-Source Award (Nov 2011) ([15 U.S.C. 657a](#)).

- \_\_\_ (12) [52.219-4](#), Notice of Price Evaluation Preference for HUBZone Small Business Concerns (JAN 2011) (if the Offeror elects to waive the preference, it shall so indicate in its offer) ([15 U.S.C. 657a](#)).
- \_\_\_ (13) [Reserved]
- \_\_\_ (14)(i) [52.219-6](#), Notice of Total Small Business Set-Aside (Nov 2011) ([15 U.S.C. 644](#)).
- \_\_\_ (ii) Alternate I (Nov 2011).
- \_\_\_ (iii) Alternate II (Nov 2011).
- \_\_\_ (15)(i) [52.219-7](#), Notice of Partial Small Business Set-Aside (June 2003) ([15 U.S.C. 644](#)).
- \_\_\_ (ii) Alternate I (Oct 1995) of [52.219-7](#).
- \_\_\_ (iii) Alternate II (Mar 2004) of [52.219-7](#).
- \_X\_ (16) [52.219-8](#), Utilization of Small Business Concerns (May 2014) ([15 U.S.C. 637\(d\)\(2\)](#) and (3)).
- \_X\_ (17)(i) [52.219-9](#), Small Business Subcontracting Plan (Jul 2013) ([15 U.S.C. 637\(d\)\(4\)](#)).
- \_\_\_ (ii) Alternate I (Oct 2001) of [52.219-9](#).
- \_X\_ (iii) Alternate II (Oct 2001) of [52.219-9](#).
- \_\_\_ (iv) Alternate III (Jul 2010) of [52.219-9](#).
- \_\_\_ (18) [52.219-13](#), Notice of Set-Aside of Orders (Nov 2011)([15 U.S.C. 644\(r\)](#)).
- \_\_\_ (19) [52.219-14](#), Limitations on Subcontracting (Nov 2011) ([15 U.S.C. 637\(a\)\(14\)](#)).
- \_X\_ (20) [52.219-16](#), Liquidated Damages—Subcontracting Plan (Jan 1999) ([15 U.S.C. 637\(d\)\(4\)\(F\)\(i\)](#)).
- \_\_\_ (21)(i) [52.219-23](#), Notice of Price Evaluation Adjustment for Small Disadvantaged Business Concerns (OCT 2008) ([10 U.S.C. 2323](#)) (if the Offeror elects to waive the adjustment, it shall so indicate in its offer).
- \_\_\_ (ii) Alternate I (June 2003) of [52.219-23](#).
- \_\_\_ (22) [52.219-25](#), Small Disadvantaged Business Participation Program—Disadvantaged Status and Reporting (Jul 2013) (Pub. L. 103-355, section 7102, and [10 U.S.C. 2323](#)).
- \_\_\_ (23) [52.219-26](#), Small Disadvantaged Business Participation Program— Incentive Subcontracting (Oct 2000) (Pub. L. 103-355, section 7102, and [10 U.S.C. 2323](#)).
- \_\_\_ (24) [52.219-27](#), Notice of Service-Disabled Veteran-Owned Small Business Set-Aside (Nov 2011) ([15 U.S.C. 657 f](#)).
- \_X\_ (25) [52.219-28](#), Post Award Small Business Program Rerepresentation (Jul 2013) ([15 U.S.C. 632\(a\)\(2\)](#)).
- \_\_\_ (26) [52.219-29](#), Notice of Set-Aside for Economically Disadvantaged Women-Owned Small Business (EDWOSB) Concerns (Jul 2013) ([15 U.S.C. 637\(m\)](#)).
- \_\_\_ (27) [52.219-30](#), Notice of Set-Aside for Women-Owned Small Business (WOSB) Concerns Eligible Under the WOSB Program (Jul 2013) ([15 U.S.C. 637\(m\)](#)).
- \_X\_ (28) [52.222-3](#), Convict Labor (June 2003) (E.O. 11755).

\_X\_ (29) [52.222-19](#), Child Labor—Cooperation with Authorities and Remedies (Jan 2014) (E.O. 13126).

\_X\_ (30) [52.222-21](#), Prohibition of Segregated Facilities (Feb 1999).

\_X\_ (31) [52.222-26](#), Equal Opportunity (Mar 2007) (E.O. 11246).

\_X\_ (32) [52.222-35](#), Equal Opportunity for Veterans (Jul 2014)([38 U.S.C. 4212](#)).

\_X\_ (33) [52.222-36](#), Equal Opportunity for Workers with Disabilities (Jul 2014) ([29 U.S.C. 793](#)).

\_X\_ (34) [52.222-37](#), Employment Reports on Veterans (JUL 2014) (38 U.S.C. 4212).

\_X\_ (35) [52.222-40](#), Notification of Employee Rights Under the National Labor Relations Act (Dec 2010) (E.O. 13496).

\_\_ (36) [52.222-54](#), Employment Eligibility Verification (AUG 2013). (Executive Order 12989). (Not applicable to the acquisition of commercially available off-the-shelf items or certain other types of commercial items as prescribed in [22.1803](#).)

\_\_ (37)(i) [52.223-9](#), Estimate of Percentage of Recovered Material Content for EPA–Designated Items (May 2008) ([42 U.S.C. 6962\(c\)\(3\)\(A\)\(ii\)](#)). (Not applicable to the acquisition of commercially available off-the-shelf items.)

\_\_ (ii) Alternate I (May 2008) of [52.223-9](#) ([42 U.S.C. 6962\(i\)\(2\)\(C\)](#)). (Not applicable to the acquisition of commercially available off-the-shelf items.)

\_\_ (38)(i) [52.223-13](#), Acquisition of EPEAT®-Registered Imaging Equipment (JUN 2014) (E.O. 13423 and 13514).

\_\_ (ii) Alternate I (Jun 2014) of [52.223-13](#).

\_\_ (39)(i) [52.223-14](#), Acquisition of EPEAT®-Registered Televisions (E.O. 13423 and 13514).

\_\_ (ii) Alternate I (Jun 2014) of [52.223-14](#).

\_\_ (40) [52.223-15](#), Energy Efficiency in Energy-Consuming Products (DEC 2007) ([42 U.S.C. 8259b](#)).

\_\_ (41)(i) [52.223-16](#), Acquisition of EPEAT®-Registered Personal Computer Products (JUN 2014) (E.O. 13423 and 13514).

\_\_ (ii) Alternate I (Jun 2014) of [52.223-16](#).

\_X\_ (42) [52.223-18](#), Encouraging Contractor Policies to Ban Text Messaging While Driving (AUG 2011) (E.O. 13513).

\_\_ (43) [52.225-1](#), Buy American—Supplies (May 2014) ([41 U.S.C. chapter 83](#)).

\_\_ (44)(i) [52.225-3](#), Buy American—Free Trade Agreements—Israeli Trade Act (May 2014) ([41 U.S.C. chapter 83](#), [19 U.S.C. 3301](#) note, [19 U.S.C. 2112](#) note, [19 U.S.C. 3805](#) note, [19 U.S.C. 4001](#) note, Pub. L. 103-182, 108-77, 108-78, 108-286, 108-302, 109-53, 109-169, 109-283, 110-138, 112-41, 112-42, and 112-43).

\_\_ (ii) Alternate I (May 2014) of [52.225-3](#).

\_\_ (iii) Alternate II (May 2014) of [52.225-3](#).

\_\_ (iv) Alternate III (May 2014) of [52.225-3](#).

\_\_\_ (45) [52.225-5](#), Trade Agreements (Nov 2013) ([19 U.S.C. 2501](#), *et seq.*, [19 U.S.C. 3301](#) note).

\_X\_ (46) [52.225-13](#), Restrictions on Certain Foreign Purchases (June 2008) (E.O.'s, proclamations, and statutes administered by the Office of Foreign Assets Control of the Department of the Treasury).

\_\_\_ (47) [52.225-26](#), Contractors Performing Private Security Functions Outside the United States (Jul 2013) (Section 862, as amended, of the National Defense Authorization Act for Fiscal Year 2008; [10 U.S.C. 2302 Note](#)).

\_\_\_ (48) [52.226-4](#), Notice of Disaster or Emergency Area Set-Aside (Nov 2007) ([42 U.S.C. 5150](#)).

\_\_\_ (49) [52.226-5](#), Restrictions on Subcontracting Outside Disaster or Emergency Area (Nov 2007) ([42 U.S.C. 5150](#)).

\_X\_ (50) [52.232-29](#), Terms for Financing of Purchases of Commercial Items (Feb 2002) ([41 U.S.C. 4505](#), [10 U.S.C. 2307\(f\)](#)).

\_\_\_ (51) [52.232-30](#), Installment Payments for Commercial Items (Oct 1995) ([41 U.S.C. 4505](#), [10 U.S.C. 2307\(f\)](#)).

\_X\_ (52) [52.232-33](#), Payment by Electronic Funds Transfer—System for Award Management (Jul 2013) ([31 U.S.C. 3332](#)).

\_\_\_ (53) [52.232-34](#), Payment by Electronic Funds Transfer—Other than System for Award Management (Jul 2013) ([31 U.S.C. 3332](#)).

\_\_\_ (54) [52.232-36](#), Payment by Third Party (May 2014) ([31 U.S.C. 3332](#)).

\_\_\_ (55) [52.239-1](#), Privacy or Security Safeguards (Aug 1996) ([5 U.S.C. 552a](#)).

\_X\_ (56)(i) [52.247-64](#), Preference for Privately Owned U.S.-Flag Commercial Vessels (Feb 2006) ([46 U.S.C. Appx. 1241\(b\)](#) and [10 U.S.C. 2631](#)).

\_\_\_ (ii) Alternate I (Apr 2003) of [52.247-64](#).

(c) The Contractor shall comply with the FAR clauses in this paragraph (c), applicable to commercial services, that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial items:

[Contracting Officer check as appropriate.]

\_\_\_ (1) [52.222-41](#), Service Contract Labor Standards (May 2014) ([41 U.S.C. chapter 67](#)).

\_\_\_ (2) [52.222-42](#), Statement of Equivalent Rates for Federal Hires (May 2014) ([29 U.S.C. 206](#) and [41 U.S.C. chapter 67](#)).

\_\_\_ (3) [52.222-43](#), Fair Labor Standards Act and Service Contract Labor Standards-Price Adjustment (Multiple Year and Option Contracts) (May 2014) ([29 U.S.C. 206](#) and [41 U.S.C. chapter 67](#)).

\_\_\_ (4) [52.222-44](#), Fair Labor Standards Act and Service Contract Labor Standards—Price Adjustment (May 2014) ([29 U.S.C. 206](#) and [41 U.S.C. chapter 67](#)).

— (5) [52.222-51](#), Exemption from Application of the Service Contract Labor Standards to Contracts for Maintenance, Calibration, or Repair of Certain Equipment—Requirements (May 2014) ([41 U.S.C. chapter 67](#)).

— (6) [52.222-53](#), Exemption from Application of the Service Contract Labor Standards to Contracts for Certain Services—Requirements (May 2014) ([41 U.S.C. chapter 67](#)).

\_X\_ (7) [52.222-17](#), Nondisplacement of Qualified Workers (May 2014) (E.O.13495).

— (8) [52.226-6](#), Promoting Excess Food Donation to Nonprofit Organizations (May 2014) ([42 U.S.C. 1792](#)).

— (9) [52.237-11](#), Accepting and Dispensing of \$1 Coin (Sept 2008) ([31 U.S.C. 5112\(p\)\(1\)](#)).

(d) *Comptroller General Examination of Record*. The Contractor shall comply with the provisions of this paragraph (d) if this contract was awarded using other than sealed bid, is in excess of the simplified acquisition threshold, and does not contain the clause at [52.215-2](#), Audit and Records—Negotiation.

(1) The Comptroller General of the United States, or an authorized representative of the Comptroller General, shall have access to and right to examine any of the Contractor's directly pertinent records involving transactions related to this contract.

(2) The Contractor shall make available at its offices at all reasonable times the records, materials, and other evidence for examination, audit, or reproduction, until 3 years after final payment under this contract or for any shorter period specified in FAR [Subpart 4.7](#), Contractor Records Retention, of the other clauses of this contract. If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement. Records relating to appeals under the disputes clause or to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are finally resolved.

(3) As used in this clause, records include books, documents, accounting procedures and practices, and other data, regardless of type and regardless of form. This does not require the Contractor to create or maintain any record that the Contractor does not maintain in the ordinary course of business or pursuant to a provision of law.

(e)(1) Notwithstanding the requirements of the clauses in paragraphs (a), (b), (c), and (d) of this clause, the Contractor is not required to flow down any FAR clause, other than those in this paragraph (e)(1) in a subcontract for commercial items. Unless otherwise indicated below, the extent of the flow down shall be as required by the clause—

(i) [52.203-13](#), Contractor Code of Business Ethics and Conduct (Apr 2010) ([41 U.S.C. 3509](#)).

(ii) [52.219-8](#), Utilization of Small Business Concerns (May 2014) ([15 U.S.C. 637\(d\)\(2\)](#) and (3)), in all subcontracts that offer further subcontracting opportunities. If the subcontract (except subcontracts to small business concerns) exceeds \$650,000 (\$1.5 million for construction of any public facility), the subcontractor must include [52.219-8](#) in lower tier subcontracts that offer subcontracting opportunities.

(iii) [52.222-17](#), Nondisplacement of Qualified Workers (May 2014) (E.O. 13495). Flow down required in accordance with paragraph (l) of FAR clause [52.222-17](#).

(iv) [52.222-26](#), Equal Opportunity (Mar 2007) (E.O. 11246).

- (v) [52.222-35](#), Equal Opportunity for Veterans (Jul 2014) ([38 U.S.C. 4212](#)).
  - (vi) [52.222-36](#), Equal Opportunity for Workers with Disabilities (Jul 2014) ([29 U.S.C. 793](#)).
  - (vii) [52.222-37](#), Employment Reports on Veterans (Jul 2014) ([38 U.S.C. 4212](#))
  - (viii) [52.222-40](#), Notification of Employee Rights Under the National Labor Relations Act (Dec 2010) (E.O. 13496). Flow down required in accordance with paragraph (f) of FAR clause [52.222-40](#).
  - (ix) [52.222-41](#), Service Contract Labor Standards (May 2014) ([41 U.S.C. chapter 67](#)).
  - (x) [52.222-50](#), Combating Trafficking in Persons (Feb 2009) ([22 U.S.C. 7104\(g\)](#)).  
\_\_\_\_ Alternate I (Aug 2007) of [52.222-50](#) ([22 U.S.C. 7104\(g\)](#)).
  - (xi) [52.222-51](#), Exemption from Application of the Service Contract Labor Standards to Contracts for Maintenance, Calibration, or Repair of Certain Equipment-Requirements (May 2014) ([41 U.S.C. chapter 67](#)).
  - (xii) [52.222-53](#), Exemption from Application of the Service Contract Labor Standards to Contracts for Certain Services-Requirements (May 2014) ([41 U.S.C. chapter 67](#)).
  - (xiii) [52.222-54](#), Employment Eligibility Verification (AUG 2013).
  - (xiv) [52.225-26](#), Contractors Performing Private Security Functions Outside the United States (Jul 2013) (Section 862, as amended, of the National Defense Authorization Act for Fiscal Year 2008; [10 U.S.C. 2302](#) Note).
  - (xv) [52.226-6](#), Promoting Excess Food Donation to Nonprofit Organizations (May 2014) ([42 U.S.C. 1792](#)). Flow down required in accordance with paragraph (e) of FAR clause [52.226-6](#).
  - (xvi) [52.247-64](#), Preference for Privately Owned U.S.-Flag Commercial Vessels (Feb 2006) ([46 U.S.C. Appx. 1241\(b\)](#) and [10 U.S.C. 2631](#)). Flow down required in accordance with paragraph (d) of FAR clause [52.247-64](#).
- (2) While not required, the Contractor may include in its subcontracts for commercial items a minimal number of additional clauses necessary to satisfy its contractual obligations.

(End of clause)

(End of Section)

#### **IV. OFFEROR REPRESENTATIONS AND CERTIFICATIONS—COMMERCIAL ITEMS (FAR 52.212-3) (MAY 2014)**

Note: The Buy American Act is not applicable in this solicitation or contract.

An Offeror shall complete only paragraph (b) of this provision if the Offeror has completed the annual representations and certifications electronically via <http://www.acquisition.gov>. If an Offeror has not completed the annual representations and certifications electronically at the System for Award Management (SAM) website, the Offeror shall complete only paragraphs (c) through (o) of this provision.

(a) *Definitions.* As used in this provision—

“Economically disadvantaged women-owned small business (EDWOSB) concern” means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States and who are economically disadvantaged in accordance with 13 CFR part 127. It automatically qualifies as a women-owned small business eligible under the WOSB Program.

“Forced or indentured child labor” means all work or service—

(1) Exacted from any person under the age of 18 under the menace of any penalty for its nonperformance and for which the worker does not offer himself voluntarily; or

(2) Performed by any person under the age of 18 pursuant to a contract the enforcement of which can be accomplished by process or penalties.

“Inverted domestic corporation”, as used in this section, means a foreign incorporated entity which is treated as an inverted domestic corporation under 6 U.S.C. 395(b), *i.e.*, a corporation that used to be incorporated in the United States, or used to be a partnership in the United States, but now is incorporated in a foreign country, or is a subsidiary whose parent corporation is incorporated in a foreign country, that meets the criteria specified in 6 U.S.C. 395(b), applied in accordance with the rules and definitions of 6 U.S.C. 395(c). An inverted domestic corporation as herein defined does not meet the definition of an inverted domestic corporation as defined by the Internal Revenue Code at 26 U.S.C. 7874.

“Manufactured end product” means any end product in Federal Supply Classes (FSC) 1000-9999, except—

- (1) FSC 5510, Lumber and Related Basic Wood Materials;
- (2) Federal Supply Group (FSG) 87, Agricultural Supplies;
- (3) FSG 88, Live Animals;
- (4) FSG 89, Food and Related Consumables;

- (5) FSC 9410, Crude Grades of Plant Materials;
- (6) FSC 9430, Miscellaneous Crude Animal Products, Inedible;
- (7) FSC 9440, Miscellaneous Crude Agricultural and Forestry Products;
- (8) FSC 9610, Ores;
- (9) FSC 9620, Minerals, Natural and Synthetic; and
- (10) FSC 9630, Additive Metal Materials.

“Place of manufacture” means the place where an end product is assembled out of components, or otherwise made or processed from raw materials into the finished product that is to be provided to the Government. If a product is disassembled and reassembled, the place of reassembly is not the place of manufacture.

“Restricted business operations” means business operations in Sudan that include power production activities, mineral extraction activities, oil-related activities, or the production of military equipment, as those terms are defined in the Sudan Accountability and Divestment Act of 2007 (Pub. L. 110-174). Restricted business operations do not include business operations that the person (as that term is defined in Section 2 of the Sudan Accountability and Divestment Act of 2007) conducting the business can demonstrate—

- (1) Are conducted under contract directly and exclusively with the regional government of southern Sudan;
- (2) Are conducted pursuant to specific authorization from the Office of Foreign Assets Control in the Department of the Treasury, or are expressly exempted under Federal law from the requirement to be conducted under such authorization;
- (3) Consist of providing goods or services to marginalized populations of Sudan;
- (4) Consist of providing goods or services to an internationally recognized peacekeeping force or humanitarian organization;
- (5) Consist of providing goods or services that are used only to promote health or education; or
- (6) Have been voluntarily suspended.

“Sensitive technology”—

(1) Means hardware, software, telecommunications equipment, or any other technology that is to be used specifically—

- (i) To restrict the free flow of unbiased information in Iran; or
- (ii) To disrupt, monitor, or otherwise restrict speech of the people of Iran; and

(2) Does not include information or informational materials the export of which the President does not have the authority to regulate or prohibit pursuant to section 203(b)(3) of the International Emergency Economic Powers Act (50 U.S.C. 1702(b)(3)).

“Service-disabled veteran-owned small business concern”—

(1) Means a small business concern—

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a service-disabled veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

“Small business concern” means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR Part 121 and size standards in this solicitation.

“Subsidiary” means an entity in which more than 50 percent of the entity is owned—

(1) Directly by a parent corporation; or

(2) Through another subsidiary of a parent corporation.

“Veteran-owned small business concern” means a small business concern—

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

“Women-owned business concern” means a concern which is at least 51 percent owned by one or more women; or in the case of any publicly owned business, at least 51 percent of its stock is owned by one or more women; and whose management and daily business operations are controlled by one or more women.

“Women-owned small business concern” means a small business concern—

(1) That is at least 51 percent owned by one or more women; or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

“Women-owned small business (WOSB) concern eligible under the WOSB Program” (in accordance with 13 CFR part 127), means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States.

(b)

(1) *Annual Representations and Certifications.* Any changes provided by the Offeror in paragraph (b)(2) of this provision do not automatically change the representations and certifications posted on the SAM website.

(2) The Offeror has completed the annual representations and certifications electronically via the SAM website accessed through <http://www.acquisition.gov>. After reviewing the SAM database information, the Offeror verifies by submission of this offer that the representations and certifications currently posted electronically at FAR 52.212-3, Offeror Representations and Certifications—Commercial Items, have been entered or updated in the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer and are incorporated in this offer by reference (see FAR 4.1201), except for paragraphs Not applicable.

*[Offeror to identify the applicable paragraphs at (c) through (o) of this provision that the Offeror has completed for the purposes of this solicitation only, if any.]*

*These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.*

*Any changes provided by the Offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications posted electronically on SAM.]*

(c) Offerors must complete the following representations when the resulting contract will be performed in the United States or its outlying areas. Check all that apply.

(1) *Small business concern.* The Offeror represents as part of its offer that it ☐ is, ☐ is not a small business concern.

(2) *Veteran-owned small business concern.* *[Complete only if the Offeror represented itself as a small business concern in paragraph (c)(1) of this provision.]* The Offeror represents as part of its offer that it ☐ is, ☐ is not a veteran-owned small business concern.

(3) *Service-disabled veteran-owned small business concern.* *[Complete only if the Offeror represented itself as a veteran-owned small business concern in paragraph (c)(2) of this*

*provision.*] The Offeror represents as part of its offer that it is, or is not a service-disabled veteran-owned small business concern.

(4) *Small disadvantaged business concern.* [Complete only if the Offeror represented itself as a small business concern in paragraph (c)(1) of this provision.] The Offeror represents, for general statistical purposes, that it ☐ is, ☐ is not a small disadvantaged business concern as defined in 13 CFR 124.1002.

(5) *Women-owned small business concern.* [Complete only if the Offeror represented itself as a small business concern in paragraph (c)(1) of this provision.] The Offeror represents that it ☐ is, ☐ is not a women-owned small business concern.

(6) WOSB concern eligible under the WOSB Program. [Complete only if the Offeror represented itself as a women-owned small business concern in paragraph (c)(5) of this provision.] The Offeror represents that—

(i) It ☐ is, ☐ is not a WOSB concern eligible under the WOSB Program, has provided all the required documents to the WOSB Repository, and no change in circumstances or adverse decisions have been issued that affects its eligibility; and

(ii) It ☐ is, ☐ is not a joint venture that complies with the requirements of 13 CFR part 127, and the representation in paragraph (c)(6)(i) of this provision is accurate for each WOSB concern eligible under the WOSB Program participating in the joint venture. [The Offeror shall enter the name or names of the WOSB concern eligible under the WOSB Program and other small businesses that are participating in the joint venture: \_\_\_\_\_.] Each WOSB concern eligible under the WOSB Program participating in the joint venture shall submit a separate signed copy of the WOSB representation.

(7) Economically disadvantaged women-owned small business (EDWOSB) concern. [Complete only if the Offeror represented itself as a WOSB concern eligible under the WOSB Program in (c)(6) of this provision.] The Offeror represents that—

(i) It ☐ is, ☐ is not an EDWOSB concern, has provided all the required documents to the WOSB Repository, and no change in circumstances or adverse decisions have been issued that affects its eligibility; and

(ii) It ☐ is, ☐ is not a joint venture that complies with the requirements of 13 CFR part 127, and the representation in paragraph (c)(7)(i) of this provision is accurate for each EDWOSB concern participating in the joint venture. [The Offeror shall enter the name or names of the EDWOSB concern and other small businesses that are participating in the joint venture: \_\_\_\_\_.] Each EDWOSB concern participating in the joint venture shall submit a separate signed copy of the EDWOSB representation.

Note: Complete paragraphs (c)(8) and (c)(9) only if this solicitation is expected to exceed the simplified acquisition threshold.

(8) *Women-owned business concern (other than small business concern).* [Complete only if the Offeror is a women-owned business concern and did not represent itself as a small business concern in paragraph (c)(1) of this provision.] The Offeror represents that it is a women-owned business concern.

(9) *Tie bid priority for labor surplus area concerns.* If this is an invitation for bid, small business Offerors may identify the labor surplus areas in which costs to be incurred on account of manufacturing or production (by Offeror or first-tier subcontractors) amount to more than 50 percent of the contract price: \_\_\_\_\_

(10) [Complete only if the solicitation contains the clause at FAR 52.219-23, *Notice of Price Evaluation Adjustment for Small Disadvantaged Business Concerns*, or FAR 52.219-25, *Small Disadvantaged Business Participation Program—Disadvantaged Status and Reporting*, and the Offeror desires a benefit based on its disadvantaged status.]

(i) *General.* The Offeror represents that either—

(A) It ☐ is, ☐ is not certified by the Small Business Administration as a small disadvantaged business concern and identified, on the date of this representation, as a certified small disadvantaged business concern in the SAM Dynamic Small Business Search database maintained by the Small Business Administration, and that no material change in disadvantaged ownership and control has occurred since its certification, and, where the concern is owned by one or more individuals claiming disadvantaged status, the net worth of each individual upon whom the certification is based does not exceed \$750,000 after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); or

(B) It ☐ has, ☐ has not submitted a completed application to the Small Business Administration or a Private Certifier to be certified as a small disadvantaged business concern in accordance with 13 CFR 124, Subpart B, and a decision on that application is pending, and that no material change in disadvantaged ownership and control has occurred since its application was submitted.

(ii) ☐ *Joint Ventures under the Price Evaluation Adjustment for Small Disadvantaged Business Concerns.* The Offeror represents, as part of its offer, that it is a joint venture that complies with the requirements in 13 CFR 124.1002(f) and that the representation in paragraph (c)(10)(i) of this provision is accurate for the small disadvantaged business concern that is participating in the joint venture. [The Offeror shall enter the name of the small disadvantaged business concern that is participating in the joint venture: \_\_\_\_\_.]

(11) *HUBZone small business concern.* [Complete only if the Offeror represented itself as a small business concern in paragraph (c)(1) of this provision.] The Offeror represents, as part of its offer, that—

(i) It ☐ is, ☐ is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material changes in ownership and control, principal office, or HUBZone employee percentage have occurred since it was certified in accordance with 13 CFR Part 126; and

(ii) It ☐ is, ☐ is not a HUBZone joint venture that complies with the requirements of 13 CFR Part 126, and the representation in paragraph (c)(11)(i) of this provision is accurate for each HUBZone small business concern participating in the HUBZone joint venture. [The Offeror shall enter the names of each of the HUBZone small business concerns participating in the HUBZone joint venture: \_\_\_\_\_.] Each HUBZone small business concern participating in the HUBZone joint venture shall submit a separate signed copy of the HUBZone representation.

(d) Representations required to implement provisions of Executive Order 11246—

(1) Previous contracts and compliance. The Offeror represents that—

(i) It ☐ has, ☐ has not participated in a previous contract or subcontract subject to the Equal Opportunity clause of this solicitation; and

(ii) It ☐ has, ☐ has not filed all required compliance reports.

(2) *Affirmative Action Compliance.* The Offeror represents that—

(i) It ☐ has developed and has on file, ☐ has not developed and does not have on file, at each establishment, affirmative action programs required by rules and regulations of the Secretary of Labor (41 cfr parts 60-1 and 60-2), or

(ii) It ☐ has not previously had contracts subject to the written affirmative action programs requirement of the rules and regulations of the Secretary of Labor.

(e) *Certification Regarding Payments to Influence Federal Transactions* (31 U.S.C. 1352). (Applies only if the contract is expected to exceed \$150,000.) By submission of its offer, the Offeror certifies to the best of its knowledge and belief that no Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress or an employee of a Member of Congress on his or her behalf in connection with the award of any resultant contract. If any registrants under the Lobbying Disclosure Act of 1995 have made a lobbying contact on behalf of the Offeror with respect to this contract, the Offeror shall complete and submit, with its offer, OMB Standard Form LLL, Disclosure of Lobbying Activities, to provide the name of the registrants. The Offeror need not report regularly employed officers or employees of the Offeror to whom payments of reasonable compensation were made.

(f) *Buy American Certificate.* (Applies only if the clause at Federal Acquisition Regulation (FAR) 52.225-1, Buy American—Supplies, is included in this solicitation.)

(1) The Offeror certifies that each end product, except those listed in paragraph (f)(2) of this provision, is a domestic end product and that for other than COTS items, the Offeror has considered components of unknown origin to have been mined, produced, or manufactured outside the United States. The Offeror shall list as foreign end products those end products manufactured in the United States that do not qualify as domestic end products, *i.e.*, an end product that is not a COTS item and does not meet the component test in paragraph (2) of the definition of “domestic end product.” The terms “commercially available off-the-shelf (COTS) item” “component,” “domestic end product,” “end product,” “foreign end product,” and “United States” are defined in the clause of this solicitation entitled “Buy American—Supplies.”

(2) Foreign End Products:

Line Item No.	Country of Origin
_____	_____
_____	_____
_____	_____

(h) Certification Regarding Responsibility Matters (Executive Order 12689). (Applies only if the contract value is expected to exceed the simplified acquisition threshold.) The Offeror certifies, to the best of its knowledge and belief, that the Offeror and/or any of its principals—

(1) ☐ Are, ☐ are not presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(2) ☐ Have, ☐ have not, within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a Federal, state or local government contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating Federal criminal tax laws, or receiving stolen property;

(3) ☐ Are, ☐ are not presently indicted for, or otherwise criminally or civilly charged by a Government entity with, commission of any of these offenses enumerated in paragraph (h)(2) of this clause; and

(4) ☐ Have, ☐ have not, within a three-year period preceding this offer, been notified of any delinquent Federal taxes in an amount that exceeds \$3,000 for which the liability remains unsatisfied.

(i) Taxes are considered delinquent if both of the following criteria apply:

(A) The tax liability is finally determined. The liability is finally determined if it has been assessed. A liability is not finally determined if there is a pending administrative or judicial challenge. In the case of a judicial challenge to the liability, the liability is not finally determined until all judicial appeal rights have been exhausted.

(B) The taxpayer is delinquent in making payment. A taxpayer is delinquent if the taxpayer has failed to pay the tax liability when full payment was due and required. A taxpayer is not delinquent in cases where enforced collection action is precluded.

(ii) Examples.

(A) The taxpayer has received a statutory notice of deficiency, under I.R.C. §6212, which entitles the taxpayer to seek Tax Court review of a proposed tax deficiency. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek Tax Court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.

(B) The IRS has filed a notice of Federal tax lien with respect to an assessed tax liability, and the taxpayer has been issued a notice under I.R.C. §6320 entitling the taxpayer to request a hearing with the IRS Office of Appeals contesting the lien filing, and to further appeal to the Tax Court if the IRS determines to sustain the lien filing. In the course of the hearing, the taxpayer is entitled to contest the underlying tax liability because the taxpayer has had no prior opportunity to contest the liability. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek tax court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.

(C) The taxpayer has entered into an installment agreement pursuant to I.R.C. §6159. The taxpayer is making timely payments and is in full compliance with the agreement terms. The taxpayer is not delinquent because the taxpayer is not currently required to make full payment.

(D) The taxpayer has filed for bankruptcy protection. The taxpayer is not delinquent because enforced collection action is stayed under 11 U.S.C. §362 (the Bankruptcy Code).

(k)

(m) Restricted business operations in Sudan. By submission of its offer, the Offeror certifies that the Offeror does not conduct any restricted business operations in Sudan.

(n) Prohibition on Contracting with Inverted Domestic Corporations.

(1) Relation to Internal Revenue Code. An inverted domestic corporation as herein defined does not meet the definition of an inverted domestic corporation as defined by the Internal Revenue Code 25 U.S.C. 7874.

(2) Representation. By submission of its offer, the Offeror represents that—

- (i) It is not an inverted domestic corporation; and
- (ii) It is not a subsidiary of an inverted domestic corporation.

(o) Prohibition on contracting with entities engaging in certain activities or transactions relating to Iran.

(1) The Offeror shall e-mail questions concerning sensitive technology to the Department of State at CISADA106@state.gov.

(2) Representation and Certifications. Unless a waiver is granted or an exception applies as provided in paragraph (o)(3) of this provision, by submission of its offer, the Offeror—

(i) Represents, to the best of its knowledge and belief, that the Offeror does not export any sensitive technology to the government of Iran or any entities or individuals owned or controlled by, or acting on behalf or at the direction of, the government of Iran;

(ii) Certifies that the Offeror, or any person owned or controlled by the Offeror, does not engage in any activities for which sanctions may be imposed under section 5 of the Iran Sanctions Act; and

(iii) Certifies that the Offeror, and any person owned or controlled by the Offeror, does not knowingly engage in any transaction that exceeds \$3,000 with Iran's Revolutionary Guard Corps or any of its officials, agents, or affiliates, the property and interests in property of which are blocked pursuant to the International Emergency Economic Powers Act (50 U.S.C. 1701 et seq.) (see OFAC's Specially Designated Nationals and Blocked Persons List at <http://www.treasury.gov/ofac/downloads/t11sdn.pdf>).

(3) The representation and certification requirements of paragraph (o)(2) of this provision do not apply if—

(i) This solicitation includes a trade agreements certification (e.g., 52.212-3(g) or a comparable agency provision); and

(ii) The Offeror has certified that all the offered products to be supplied are designated country end products.

(End of provision)

#### IV.A. ADDENDUM TO FAR 52.212-3

##### IV.A.1 MINIMUM REQUIREMENTS

1.1 Certification Regarding United States Commercial Provider of Space Transportation Services in accordance with the Commercial Space Act of 1998 (Public Law 105-303).

(a) The Offeror certifies, to the best of its knowledge and belief, that it ☒ is ☐ is not a United States commercial provider as defined below—

(1) “United States commercial provider” means a commercial provider, organized under the laws of the United States or of a State, which is—

(i) more than 50 percent owned by United States nationals; or

(ii) a subsidiary of a foreign company and the Secretary of Transportation finds that—

(A) such subsidiary has in the past evidenced a substantial commitment to the United States market through—

(I) investments in the United States in long-term research, development, and manufacturing (including the manufacture of major components and subassemblies); and

(II) significant contributions to employment in the United States;

and

(B) the country or countries in which such foreign company is incorporated or organized, and, if appropriate, in which it principally conducts its business, affords reciprocal treatments to companies described in subparagraph (B)(i)(a) comparable to that afforded to such foreign company’s subsidiary in the United States, as evidenced by—

(I) providing comparable opportunities for companies described in subparagraph (B)(i)(a) to participate in Government-sponsored research and development similar to that authorized under this Act;

(II) providing no barriers, to companies described in subparagraph (B)(i)(a) with respect to local investment opportunities, that are not provided to foreign companies in the United States; and

(III) providing adequate and effective protection for the intellectual property rights of companies described in subparagraph (B)(i)(a).

1.2 The Contractor shall produce in performance of this contract a Commercial Resupply Service (CRS) that is a domestic end product. The CRS intended for this contract, as carried through production for the provision of service missions, shall be a domestic end product only if the cost of its components, mined, produced or manufactured in the United States exceeds 50 percent of the cost of all its components. The cost of each component includes transportation

costs to the place of incorporation into the CRS and any applicable duty (whether or not a duty-free entry certificate is issued). “Components” as used in this clause, means those articles, materials and supplies directly incorporated into the design of the end product.

1.3 The Offeror certifies, to the best of its knowledge and belief, that it ☒ is ☐ is not using space vehicles manufactured in the United States in accordance with U.S. National Space Transportation Policy dated 21 November 2013.

1.4 The Offeror certifies, to the best of its knowledge and belief, that it ☒ is ☐ is not in compliance with the Iran, North Korea, and Syria Nonproliferation Act (P.L. 106-178, as amended by P.L. 107-228, P.L. 109-353, and P.L. 112-273 ) which prohibits NASA from making payments to the Russian Federal Space Agency, any organization or entity under the jurisdiction or control of the Russian Federal Space Agency, or any other organization, entity, or element of the Government of Russia in connection with the International Space Station after December 31, 2020.

The term “organization or entity under the jurisdiction or control of the Russian Federal Space Agency” means an organization or entity that—

(a) was made part of the Russian Space Agency upon its establishment on February 25, 1992;

(b) was transferred to the Russian Space Agency by decree of the Russian Government on July 25, 1994, or May 12, 1998;

(c) was or is transferred to the Russian Aviation and Space Agency or Russian Space Agency by decree of the Russian Government at any other time before, on, or after the date of the enactment of this Act; or

(d) is a joint stock company in which the Russian Aviation and Space Agency or Russian Space Agency has at any time held controlling interest.

Any organization or entity described as an “organization or entity under the jurisdiction or control of the Russian Aviation and Space Agency” shall be deemed to be under the jurisdiction or control of the Russian Federal Space Agency regardless of whether—

(a) such organization or entity, after being part of or transferred to the Russian Aviation and Space Agency or Russian Space Agency, is removed from or transferred out of the Russian Aviation and Space Agency or Russian Space Agency; or

(b) the Russian Aviation and Space Agency or Russian Space Agency, after holding a controlling interest in such organization entity, divests its controlling interest.

NASA has applied the restrictions in this act to include the funding of Russian entities via U.S. Contractors.

(End of provision)

(b) (4)

#### **IV.A.2 REPRESENTATIONS AND WARRANTIES**

The Contractor represents and warrants the following:

(a) The balance sheet, the profit and loss statement, and any other supporting financial statements furnished to the administering office fairly reflect the financial condition of the Contractor at the date shown or the period covered, and there has been no subsequent materially adverse change in the financial condition of the Contractor.

(b) No litigation or criminal or civil proceedings are presently pending or threatened against the Contractor, which would jeopardize performance under this contract, except as shown in the financial statements.

(c) The Contractor has disclosed all contingent liabilities in the financial statements furnished to the administering office.

(d) None of the terms in this clause conflict with the authority under which the Contractor is doing business or with the provision of any existing indenture or agreement of the Contractor.

(e) The Contractor has the power to enter into this contract and accept payments, and has taken all necessary actions to authorize the acceptance under the terms of this contract.

(f) The assets of the Contractor are not subject to any lien or encumbrance of any character, which would jeopardize performance under this contract, except for current taxes not delinquent and except as shown in the financial statements. There is no current assignment of claims under any contract affected by these payment provisions.

(g) These representations and warranties shall be continuing and shall be considered to have been repeated by the submission of each invoice for payments.

(End of provision)

(End of Section)

## **V. ATTACHMENTS**

The following twelve attachments are hereby incorporated into this contract in their entirety, made a part hereof, and shall apply in the performance of this contract.

Attachment V.A. Statement of Work

Attachment V.B. Data Requirements List (DRL)

Attachment V.C. Data Requirements Descriptions (DRDs)

Attachment V.D. Small Business Subcontracting Plan

Attachment V.E. Safety and Health Plan

Attachment V.F. Typical Unpressurized Cargo Complement

Attachment V.G. Reserved

Attachment V.H. Acronyms and Abbreviations

Attachment V.I. Glossary

Attachment V.J. Government Furnished Property

Attachment V.K. Applicable and Reference Documents

Attachment V.L. Waste Cargo

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## 1.0 SCOPE

This Statement of Work (SOW) and all exhibits and documents attached or referenced herein define NASA's requirements for the Contractor to provide the resupply services to the International Space Station (ISS), dispose of unneeded cargo, and to return cargo from the ISS back to NASA. The end-to-end service shall include all activities to provide the resupply services including launch and landing site and associated resources, launch vehicle, ISS visiting vehicle, reentry vehicle, and the manner in which these are architected and implemented by the Contractor in order to satisfy the requirements of this SOW.

NASA requires the service to provide the annual upmass required of the ISS in no fewer than four (4) flights per year with the cargo somewhat evenly distributed throughout the year. Cargo includes both NASA cargo and NASA-sponsored cargo (hereinafter referred to as "cargo" or "NASA cargo"). Contractor provided non-NASA cargo may also be included per Clause II.A.5, Contractor Objectives on ISS Resupply Service Missions. Cargo includes both pressurized and unpressurized cargo. Contracts must provide 1) pressurized upmass, 2) pressurized return or pressurized disposal or both, 3) unpressurized upmass and disposal. Contractors have the option to provide accelerated pressurized return as part of any standard mission(s). Contractors can meet the required and optional capabilities by mixing them in any manner they choose within their 4 standard missions. NASA will provide pressurized cargo to the Contractor including packing materials (bags, foam, flight support equipment). The pressurized upmass mass requirements defined in Table I.A.3-1, Mission Capabilities for the Standard Resupply Services Missions A-D, include the cargo and packing materials. NASA will provide unpressurized cargo to the Contractor without Flight Support Equipment (FSE). The Contractor is required to provide the unpressurized FSE as part of the resupply service. The unpressurized upmass mass requirements defined in Table I.A.3-1 includes the FSE that stays with the unpressurized item on ISS.

NASA will provide access to detailed design information, as required, for components associated with ISS and visiting vehicle interfaces necessary to fulfill this SOW as defined in Clause II.A.25, Government Furnished Services and Data. This includes hardware drawings, acceptance test procedures, test equipment designs and data for the contractor's use in procuring these items. The Contractor shall perform all tasks necessary to ensure safe and reliable cargo integration and transportation to and from the ISS.

The Contractor shall provide the necessary services, test hardware and software, and mission specific elements required to integrate the cargo to the orbital and launch vehicle systems. The Contractor shall provide the required cargo de-integration and return services, where applicable, to deliver cargo back to NASA.

The only Crew presence in the vehicle shall be during the period when the vehicle is mated to ISS.

For the initial mission of a contractor's vehicle and subsequent missions with vehicle modifications that affect ISS integration, additional orbital maneuvers may require demonstration while outside the ISS approach ellipsoid. The Contractor shall coordinate with NASA in accordance with JSC 35089, Visiting Vehicle Operations Document, to determine the initial flight characteristics which may include additional: on-orbit maneuvers, holds, durations, commands, and/or Visiting Vehicle health confirmations. For the initial mission only, cargo capabilities may be lower than those defined in SOW paragraph 2.1, Required Capability – Pressurized Delivery Upmass. The cargo capabilities for the initial mission shall be negotiated with NASA on a case-by-case basis.

The Government will maintain official property records in connection with Government property under this contract. The Government will deliver to the Contractor, for use in connection with and under the terms of this contract, the Government Furnished Property described in Attachment V.J, Government Furnished Property, together with such related data and information as the Contractor may request and as may be reasonably required for the intended use of the property (herein referred to as "Government Furnished Property").

## **2.0 STANDARD RESUPPLY SERVICES MISSION (CLIN 0001)**

### **2.0.1 STANDARD MISSION (SUB-CLIN 0001A-D)**

The Contractor shall perform the tasks necessary to execute all phases of the resupply mission per this SOW.

2.0.1 The Contractor's systems shall be in accordance with SSP 50808, International Space Station (ISS) Commercial Orbital Transportation Services (COTS) Interface Requirements Document (IRD).

2.0.2 The Contractor's systems shall satisfy cargo interface requirements in accordance with SSP 50833, International Space Station Cargo Transport Interface Requirements Document.

2.0.3 The Contractor shall perform activities, support reviews, follow processes, and provide products in accordance with the Visiting Vehicle responsibilities documented in SSP 50964, Visiting Vehicle ISS Integration Plan.

2.0.4 The Contractor shall perform activities, support reviews, and provide information in accordance with the Visiting Vehicle responsibilities documented in SSP 30599, Safety Review Process.

2.0.5 The Contractor's Vehicle shall be able to be captured, berthed and released at Node 2 Nadir and berthed and released at Node 1 Nadir or dock to Node 2 Forward and Node 2 Zenith

as defined in SSP 50808. All analysis shall consider that other vehicles may be docked or berthed to ISS concurrently with the Contractor's vehicle. Note that for Unpressurized Cargo Delivery/Disposal mission capability, the Space Station Remote Manipulator System (SSRMS) has limited reach access to Node 2 Forward.

2.0.6 The Contractor's ISS Visiting Vehicle shall use the Common Communications for Visiting Vehicles (C2V2) system in accordance with SSP 50934, Common Communications for Visiting Vehicles (C2V2) Radio Frequency (RF) Interface Control Document (ICD), Part 1, and SSP 41175-39, Software Interface Control Document Station Management and Control to International Space Station (ISS) Book 39, Commercial Orbital Transportation Services (COTS) Free Flyer Common Interface. This requirement supersedes SSP 50808 which does not require C2V2 for cargo vehicles.

2.0.7 The Contractor's ISS Visiting Vehicle shall be able to stay docked/berthed to ISS for a minimum of (b) (4). The capability to stay longer should be considered.

2.0.8 The Contractor's services shall provide launch attempts for 1 out of any 2 consecutive day period for the 30-day delivery window defined in Table II.A.3-1, Cargo Delivery Windows. Capability for launch attempts for 2 out of any 3 consecutive day period or greater for the 30-day delivery window is preferable in order to maximize the opportunities to deliver the services to the ISS in the time period requested.

2.0.9 The Contractor's services shall provide landing opportunities for 3 out of any 7 day period after the end of the defined mated duration of the mission.

2.0.10 The Contractor's services should consider the ISS Crew workday constraints and sleep cycle as referenced in SSP 50261-01, Generic Groundrules, Requirements, and Constraints Part 1: Strategic and Tactical Planning.

## **2.1 REQUIRED CAPABILITY - PRESSURIZED DELIVERY UPMASS**

Pressurized cargo shall be delivered ranging from 2500 to 5000 kg per flight which consists of the capabilities defined in subparagraph 2.1.1.

2.1.1 A minimum usable pressurized cargo density of 65 Cargo Transfer Bag Equivalents (CTBE) per 1000 kg of pressurized cargo shall be used. Useable pressurized cargo volume is defined as the volume which can accommodate ISS cargo and payloads types as defined in SSP 50833, paragraph 3.1, Pressurized Volume Area Cargo Requirements. The various cargo transfer bags equivalencies to be used for calculating cargo volume CTBE count are defined in Table 2.1.1-1 below.

**Table 2.1.1-1 – Cargo Transfer Bag Equivalents**

Cargo Bag Type	Equivalent Volume in CTBEs
Half Cargo Transfer Bag (CTB)	0.5
Single CTB	1
Double CTB	2
Triple CTB	3
M-01 bag	6
M-02 bag	4
M-03 bag	10
Single middeck locker	1
Double middeck locker	2
Double cold bag	1
Water/brine container	4

2.1.2 Contractor shall accommodate initial cargo turnover at L-30 days which shall include all of the cargo with the exception of 50 CTBE of passive cargo and the late load cargo defined in subparagraph 2.1.2.2. The 50 CTBE of passive cargo shall be accommodated at L-7 days and will be comprised of all cargo bag sizes. The late load cargo shall be accommodated as defined in subparagraph 2.1.2.2.

2.1.2.1 Within the pressurized cargo capability required in subparagraph 2.1.1, the service shall be able to accommodate the following large cargo bags.

2.1.2.1.1 At least zero and up to ten M-01s per flight.

2.1.2.1.2 At least ten and up to (b) (4) M-02s per flight for Standard Mission A (b) (4) at least 10 and up to (b) (4) M-02s per flight for Standard Mission B (b) (4)

2.1.2.1.3 At least zero and up to six M-03s per flight.

2.1.2.2 Within the pressurized cargo capability required in subparagraph 2.1.1, the service shall be able to accommodate the following late load cargo turned over from NASA at Launch Minus (L-) 24 hours. Late load cargo and on-orbit access to the late load cargo shall be as defined in SSP 50833, paragraphs 3.1.3.1, Late Access Pre-Launch, and 3.1.3.2, On-orbit Transfer of Time Critical Cargo, respectively.

2.1.2.2.1 At least one and up to three powered double lockers, which may be comprised of two to six powered single lockers. Up to two single powered lockers of live rodents, which require the support capabilities defined in SSP 50833, may be included in this complement of

powered lockers. The Contractor shall provide the capability to command powered payloads from the time period between launch and mating with ISS.

2.1.2.2.2 At least two and up to eight passive conditioned cargo bags, i.e., Double Cold Bags.

2.1.2.2.3 At least six and up to ten CTBE of passive cargo in standard ISS cargo bags. The capability to include a bag as large as one triple CTB in this complement should be considered.

2.1.2.3 Within the pressurized cargo capability required in subparagraph 2.1.1, the service shall be able to deliver at least 300 liters of potable water provided by NASA in water delivery containers. Each water delivery container will transport 75 liters of water having a total mass of 100 kg including packing material and be sized to fit in the volumetric footprint of an M-02 bag.

(b) (4)

## **2.2 REQUIRED CAPABILITY - PRESSURIZED DOWNMASS [PRESSURIZED DOWNMASS AS EITHER RETURN OR DISPOSAL OR BOTH IS REQUIRED]**

Pressurized cargo shall be removed from ISS ranging from 2500 to 5000 kg per flight which consists of the capabilities defined in subparagraph 2.2.1. If pressurized downmass is split between disposal and return on a single Standard Mission, the minimum downmass for disposal shall be 1000 kg and the minimum downmass for return shall be 1500 kg. If pressurized downmass on a single Standard Mission consists of all return or disposal, the minimum pressurized downmass shall be 2500 kg. Use of non-standard volumes that were not used for launch should be considered.

2.2.1 A minimum usable pressurized cargo downmass volume shall be equivalent or greater to that provided for pressurized upmass delivery.

2.2.1.1 Within the pressurized cargo downmass return or disposal capability required in subparagraph 2.2, the service shall be able to accommodate the same suite of large cargo bags required for delivery in subparagraph 2.1.2.1. If downmass is returned, this cargo shall be available for destow and handover to NASA at Return Plus (R+) (b) (4) at the (b) (4)

(b) (4)

2.2.1.2 Within the pressurized cargo return capability required in subparagraph 2.2, the service shall be able to accommodate the following cargo for late stow by ISS crew, return within on-orbit transfer time limit, and handover to NASA per SSP 50833, paragraphs 3.1.3.2 and 3.1.3.3.2, Return + 24 hour Cargo Handover. The cargo shall be maintained per NASA requirements, including that power must be maintained to the powered lockers and cold bags must be maintained at their cold bag temperatures until turnover to NASA.

2.2.1.2.1 At least one and up to three double powered lockers, which may be comprised of two to six single powered lockers. (b) (4)

2.2.1.2.2 At least two and up to eight passive conditioned cargo bags, i.e., Double Cold Bags.

2.2.1.2.3 At least six and up to ten CTBE of passive cargo in standard ISS cargo bags.

2.2.1.3 Within the pressurized cargo capability required in subparagraph 2.2, the service shall be able to return or dispose of at least 100 liters of brine provided by NASA in a brine delivery container. Each brine delivery container will transport 75 liters of brine having a total mass of 110 kg including packing material and be sized to fit in the volumetric footprint of an M-02 bag. Water and brine containers may be the same containers.

### **2.3 OPTIONAL CAPABILITY - ACCELERATED PRESSURIZED RETURN DOWNMASS**

2.3.1 The contractor may provide accelerated pressurized return capability. The requirements for this capability consist of the same required as paragraph 2.2, Pressurized Downmass, with the following modifications. Cargo defined in subparagraph 2.2.1.2 shall be available for handover to NASA within R+6 hours in lieu of R+24 hours.

2.3.2 Within the accelerated pressurized return, the contractor may provide up to two single powered lockers defined in subparagraph 2.2.1.2.1 to be available for handover to NASA within R+3 hours in lieu of R+24 hours. These two powered lockers may contain live rodents which require the support capabilities defined in SSP 50833. The remaining powered lockers shall be available for handover to NASA within R+6 hours in lieu of R+24 hours.

### **2.4 REQUIRED CAPABILITY - UNPRESSURIZED DELIVERY UPMASS AND DISPOSAL DOWNMASS**

2.4.1 The contractor shall provide delivery of unpressurized cargo upmass ranging from 500 to 1500 kg per flight.

2.4.2 The contractor shall provide disposal of unpressurized cargo downmass ranging from 0 to 1500 kg per flight.

2.4.3 The visiting vehicle shall accommodate ISS cargo as defined in SSP 50833, paragraph 3.2, Unpressurized Volume Area Cargo Requirements. Typical unpressurized cargo complements are identified in Attachment V.F., Typical Unpressurized Cargo Complements.

2.4.3.1 The Contractor shall provide a capability to maintain the thermal environment of unpressurized cargo per SSP 50833 during on-orbit free-flight and while attached to ISS. Methods to control environment may include attitude control during free-flight, enclosures or other active or passive means.

2.4.4 The Contractor shall provide the necessary services and hardware including Flight Support Equipment (FSE) to integrate the cargo to the unpressurized volume of the visiting vehicle. The FSE required for the unpressurized cargo is defined in CLIN 0001E below.

2.4.5 The vehicle design shall be such that unpressurized cargo can be robotically manipulated for transfer between the unpressurized volume and ISS while not requiring Extravehicular Activity (EVA).

2.4.6 Deleted

(b) (4)

## **2.5 PROVISION OF FLIGHT SUPPORT EQUIPMENT HARDWARE (SUB-CLIN 0001E)**

2.5.1 The Contractor shall provide certified, adapter plate assemblies (FRAM plus adapter plate, e.g., SAPA, ExPA, CEPA). The Contractor shall also build the corresponding passive FRAMs. The Contractor may also be asked to build unique FSE to attach ORU's to the FRAM adapter plates. The Contractor will be provided with a NASA data package consisting of drawings, test requirements and procedures.

2.5.2 For Direct Mount based cargo, either for JEM-EF Payloads or other Cargo, the Contractor shall design and build unique FSE. The Direct Mount FSE will typically have an active and passive component, with the passive component being installed on the cargo. The Contractor shall design and build interface FSE for disposal of cargo already on the ISS. NASA will provide unique FSE requirements for new designs. For existing on-orbit cargo/FSE that needs to be removed and for JEM-EF payloads, NASA will provide more data once on a case-case basis, post-contract award. The Contractor shall have design reviews with NASA participation.

2.5.3 FSE shall be provided such that the unpressurized cargo can be: a) released from the visiting vehicle unpressurized volume for transfer to ISS, and b) attached to the unpressurized volume for disposal.

2.5.4 Deleted

2.5.5 Deleted

## **2.6 LAUNCH ON NEED (LON)**

A Launch On Need (LON) capability (b) (4) in the event there is an interruption in the provision of cargo services from any of the providers through the life of the contract.

The Contractor shall meet the following technical capabilities to satisfy LON:

- (a) Able to be called up after the Contractor's initial CRS2 flight,
- (b) Able to launch within two months after launch of a planned CRS2 mission,
- (c) Accommodate up to the full complement of pressurized cargo that had been planned for the next mission, as applicable to the standard mission, including standard powered payloads and standard late load for launch and return,
- (d) The next planned launch following a LON can be as early as 2 months from completion of the LON mission,
- (e) In any 12 month period, accommodate one (1) LON mission in addition to the planned flight rate.

## **2.7 VEHICLE INTEGRATION**

The Contractor shall build, process, integrate and operate the launch and visiting vehicles necessary to provide resupply service to the ISS. The Contractor shall obtain the support services, permits and licenses necessary to complete the resupply service.

### **2.7.1 LAUNCH VEHICLE (LV) PREPARATION AND LAUNCH**

The Contractor shall:

- (a) Perform all launch service preparations and launch site operations necessary to safely and successfully deliver the cargo to the ISS.
- (b) Generate the required documents and obtain all required safety approvals for the launch service and integrated payload, visiting vehicle (VV) and launch vehicle system operations including payload-to-VV and VV-to-LV system integration and launch operations.
- (c) Provide access for at least two NASA personnel to consoles in the Contractor's launch control center that provide monitoring of vehicle telemetry and voice loops (including countdown and major systems).

### **2.7.2 TELEMETRY DATA**

The Contractor shall measure and provide vehicle telemetry, in electronic format, and upon request, hard copy format, according to DRD CRS 3-1, Vehicle Interface Definition Document (IDD), and DRD CRS 5-1, Post Delivery Assessment.

The Contractor shall receive and record the full-rate vehicle telemetry data from the initiation of launch countdown through all phases of powered flight, from two (2) minutes prior to stage ignition through (b) (4) after stage shutdown. For cargo return missions, the Contractor shall receive and record the full-rate vehicle telemetry from unberthing/undocking to

landing in accordance with DRD CRS 5-2, Post Mission Assessment, as finalized under Clause II.A.2, Mission Success Determination, Investigation, and Corrective Actions.

### **2.7.3 OPERATIONAL SUPPORT SERVICES**

The Contractor shall provide to NASA personnel safety training, instruction, and certification for all Contractor-operated or provided integration facilities and launch/landing sites to ensure users are aware of facility, launch/landing site, launch vehicle and cargo hazards and have adequate knowledge to carry out their tasks unescorted in a safe manner. The Contractor shall provide access for NASA personnel to the cargo, visiting vehicle, launch vehicle or storage facilities. The Contractor shall provide security for cargo and personnel as required in cargo-specific or facility-specific documents.

### **2.7.4 RANGE SUPPORT AND SERVICES**

The Contractor shall comply with all applicable Range constraints. The Contractor shall make all launch Range support arrangements for: scheduling Range for launch and integrated testing, Range Safety functions, communications and timing, metric coverage, telemetry coverage, camera coverage of launch, and tracking and telemetry station acquisition predictions. The Contractor shall include all tracking and data recovery support required for their mission requirements. NASA will be the single interface to US Strategic Command on behalf of the Contractor for all items not related to Range Safety.

If requested, NASA will provide Tracking and Data Relay Satellite System (TDRSS) and NASA Integrated Services Network (NISN) support over existing assets for tracking and data recovery as defined in Clause II.A.25, Government Furnished Services and Data.

The Contractor shall make arrangements for Range-provided services and commodities necessary to support the resupply service.

The Contractor shall make arrangements for landing site provided support, services and commodities necessary to support the resupply service. The Contractor shall comply with any applicable reentry and Range constraints.

### **2.7.5 LAUNCH READINESS ASSESSMENT**

For each mission to the ISS, the Contractor shall perform a launch readiness assessment approximately three (3) days prior to launch. The following items shall be included in this assessment:

- (a) All critical items required to proceed into final launch countdown are ready.

- (b) All vehicle systems have been verified for launch.
- (c) All previously held Contractor readiness review actions have been closed or resolved.
- (d) Launch Site and Range support organizations have committed to launch.
- (e) Tracking and data support resources have committed to launch.
- (f) Any open work or constraints to launch are identified and closeout plans and schedules are in place and supportable.
- (g) Mission risks are known and documented.

(b) (4)

## **2.8 MISSION INTEGRATION SERVICES**

The Contractor shall ensure the safe integration and transport of NASA-provided cargo, as well as Contractor-provided non-NASA cargo, as defined in Clause II.A.5, Contractor Objectives on ISS Resupply Service Missions, to and from the ISS. The Contractor shall put in place and support an Integration and Operations (I&O) process for all resupply missions. The Contractor shall integrate the NASA-provided cargo complement, and at the vehicle level, perform analysis and integration to safely rendezvous and berth/dock to ISS.

### **2.8.1 MISSION INTEGRATION MANAGEMENT**

The Contractor shall perform mission integration tasks in accordance with DRD CRS 1-4, Mission Integration and Operations Management Plan (MIOMP). The Contractor shall submit updates to the MIOMP prior to the Mission Integration Review (MIR) for those missions which the changes affect.

The Contractor shall develop and submit DRD CRS 2-1, Work Plan, for each mission and provide updates at the program reviews, if necessary, when mission schedules change. This work plan shall identify the Contractor's major milestone events applicable to each mission and provide a corresponding narrative of the work activity necessary to accomplish the major milestone events for each mission.

The Contractor shall perform the following:

- (a) Provide a single point of contact with overall mission responsibility for each mission. The single point of contact shall coordinate support from all technical disciplines and management during the integration process.

- (b) Provide a focal point to work technical details for unpressurized cargo for each flight (vehicle layout, FSE, ICDs, analytical products, schedules, etc.)
- (c) Provide a focal point to work technical details for pressurized cargo for each flight (cargo layout, powered lockers, ICDs, analytical products, schedules, etc.)
- (d) Conduct mission integration meetings as proposed in DRD CRS 1-4 to successfully plan, schedule, and manage mission analyses required to define and verify compatibility of the cargo with the interface requirements and environments.
- (e) Track development status of and resolve issues associated with mission specific hardware and software.
- (f) Manage the design, development, qualification, testing and integration of mission unique requirements.

## **2.8.2 ON-ORBIT ANALYSIS**

NASA will provide the Contractor with the preliminary unpressurized cargo complement No Later Than (NLT) L-24 months NASA will provide a preliminary pressurized cargo launch complement NLT L-13 months. The Contractor shall perform an assessment of the total cargo complement (NASA-sponsored and Contractor-provided) at the individual cargo item level, assessing resource requirements to validate that vehicle resources are adequate to ensure safe delivery of the cargo complement.

The Contractor shall perform the mission planning and analyses necessary to provide the data for visiting vehicle and ISS integrated performance. This planning and analysis shall encompass all phases of the mission. The Contractor shall develop and submit for each mission an Initial Mission Resource Allocation Document (MRAD) in accordance with DRD CRS 2-3, Mission Resource Allocation Document, at L-10 months. The Initial MRAD shall contain current analytical data related to: electrical power and energy, command and data requirements, visiting vehicle dynamics and mass properties, robotics and berthing requirements, visiting vehicle Computer-Aided Design (CAD) models, visiting vehicle structural math model, visiting vehicle thermal model, plume history, thruster firing history, propellant types, and mission specific analysis for unpressurized cargo. The Contractor shall also submit visiting vehicle CAD models for each mission per DRD CRS 4-1, Engineering Computer-Aided Design (CAD) Models, and Vehicle and Integrated Assembly mass properties for each mission per DRD CRS 4-4, Mass Properties Data.

## **2.8.3 MISSION OPERATIONS**

The Contractor shall perform all functions necessary to provide end-to-end flight control operations for the visiting vehicle including ground segment interfaces, cargo operating

procedures, malfunction procedures, timelines, simulation support, real-time support and crew training plans.

### **2.8.3.1 GROUND SEGMENT OPERATIONS**

The Contractor shall provide a control center to interface with the NASA ISS control center. As a part of this technical support, the Contractor shall support two Technical Interchange Meetings (TIMs) per year. The Contractor shall generate the required documentation per the required NASA ground system specifications and standards interfaces for the Mission Control Center (MCC).

The Contractor's control center shall provide the necessary interfaces to control and monitor the visiting vehicle during the free-flight, approach, attached and entry mission phases. Contractor ground segment operations shall comply with SSP 50808.

#### **2.8.3.1.1 SECURITY REQUIREMENTS**

The Contractor shall protect the integrity, availability, and where appropriate, confidentiality of the information resources transiting the interface between Contractor and NASA ground systems. The data security requirements of SSP 50525, ISS Ground Segment Security Analysis Response Team (SART) Security Management Plan (SSMP), apply to the security of Contractor information.

The Contractor shall provide a program level security risk analysis and risk mitigation recommendations for the shared and networked Contractor ground systems. The Contractor shall investigate Contractor ground system security incidents and provide rapid response to security incidents.

The Contractor shall provide for the development of security agreements, security requirements, architecture changes and security protective mechanisms applications for the Contractor interfaces with NASA.

### **2.8.3.2 IMAGERY**

The Contractor shall provide a preflight imagery plan and imagery in accordance with DRD CRS 4-2, Imagery Plan.

### **2.8.3.3 TRAINING AND OPERATIONAL PRODUCTS FOR INTEGRATED MISSION OPERATIONS**

The overall Mission Operations planning shall be as outlined in DRD CRS 1-4. The Contractor shall follow training and operational product details in JSC 35089, Visiting Vehicle Operations

Document, in accordance with SSP 50808, paragraph 3.4.5, Training and Operational Products for Integrated Operations. Key areas are defined below.

#### **2.8.3.3.1 MISSION FLIGHT PROCEDURES**

The Contractor specific mission products shall be documented in NASA maintained documentation such as Flight Rules, Operational Interface Procedures, vehicle and systems manuals, procedures and protocols. The Contractor shall support and review development of joint flight products as documented in DRD CRS 1-4 and Contractor Mission Operations Plan.

#### **2.8.3.3.2 MISSION TRAINING**

The Contractor shall provide mission specific training, including mission simulations, to NASA flight and ground crew.

The Contractor shall provide a mission specific crew training plan. The Contractor shall provide flight crew and ground personnel training sessions at the provider facility.

#### **2.8.3.3.3 MISSION SIMULATION SUPPORT**

The Contractor shall participate in six to eight Joint Multi-segment Simulation Training (JMST) events. NASA will conduct the JMSTs from the NASA-Johnson Space Center (JSC) training facilities, MCC and the ISS Management Center (IMC) to perform integrated mission training for each mission. One simulation shall last up to 24 hours and the remainder may last up to 12 hours.

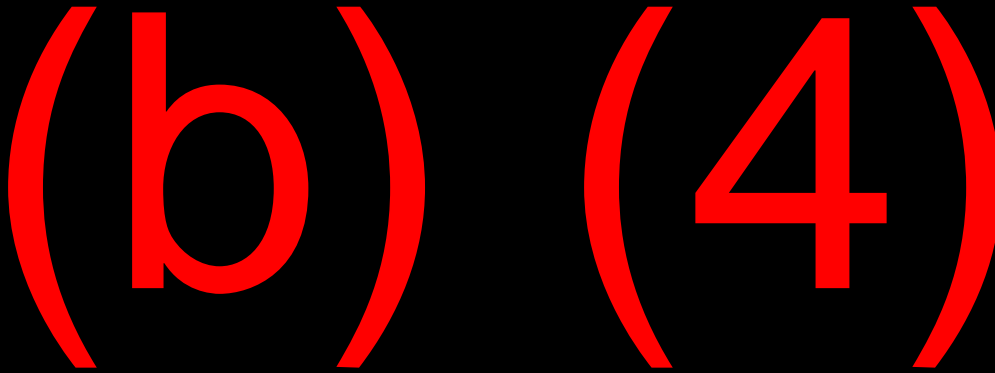
#### **2.8.3.3.4 REAL-TIME MISSION SUPPORT**

The Contractor shall support real-time mission operations for each ISS resupply service flight by providing technical expertise, on-console support during rendezvous, berthing/docking, unpressurized cargo retrieval, translation and integration, cargo transfer and unberthing/undocking.

The Contractor shall perform operations per DRD CRS 1-4. The Contractor must provide the appropriate level of support and technical expertise to respond to Mission Action Requests, real-time flight rule changes, and any contingencies involving the delivery or return/disposal system.

The Contractor shall provide support during quiescent phase of the mission to respond to crew or flight controller questions and issues.

NASA will be responsible for on-orbit integrated operations while the visiting vehicle is within the Approach Ellipsoid (AE).



## **2.9 CARGO INTEGRATION**

The Contractor shall safely integrate NASA cargo into the cargo module and/or unpressurized carrier. NASA will provide pressurized cargo already packed to the Contractor. NASA will provide unpressurized cargo without flight support equipment to the Contractor. The Contractor shall specify Center of Gravity (CG) range for pressurized and unpressurized cargo manifests for ascent and return/disposal. The Contractor should consider approaches that provide flexibility to pressurized cargo packing by ISS crew. The Contractor should consider approaches that provide flexibility for post-VBR changes to the unpressurized cargo manifest.

### **2.9.1 PRESSURIZED CARGO ANALYSIS AND INTEGRATION**

The Contractor shall perform the analysis and integration tasks required to safely integrate pressurized cargo for delivery to and return or disposal from the ISS consistent with SSP 50833. NASA will provide a preliminary pressurized cargo launch and return complement No Later Than (NLT) L-13 months. The preliminary pressurized cargo complement will define a representative bag-level manifest consisting of distribution of standard bag types and masses consistent with the vehicle capability, the number of powered and unpowered Middeck Lockers, and pressurized cargo or payloads that require special accommodation such as hard mounting. Preliminary late stow and early handover requirements will be included in this delivery. For cargo requiring hard mounting, the associated resource, operational, interface verification, ground processing requirements, and orientation constraints will also be provided at this time.

NASA will provide updated pressurized cargo launch and return complements NLT L-5 months. The update will include any known or projected changes from the L-13 month pressurized cargo complement but is still preliminary in nature.

At L-6 weeks, NASA will provide the final pressurized cargo launch complement and an updated return complement. NASA will provide the nominal as-packed cargo at cargo turnover to the Contractor (No earlier than L-30 days). NASA will update the cargo launch complement at L-2 weeks to reflect changes to cargo manifest for Late Load cargo turned-over at L-7 days and L-24 hours. NASA will provide as-packed late-load cargo at late-load cargo turnover (L-7 days and L-24 hours, respectively).

NASA will identify any and all late stow, early handover, special handling, orientation, and time critical on-orbit access requirements in the cargo complement deliveries to the Contractor.

The Contractor shall perform the following:

(a) Analyses of all cargo test and analytical data as it pertains to the physical (structural) and environmental (thermal, acoustics, electromagnetic interference and compatibility [EMI/C]) interfaces with the visiting vehicle. Structural verification shall be performed using the maximum mass capability as defined in SSP 50833 for all cargo types.

(b) Perform mission specific structural, thermal, and functional assessments (including power and data) to ensure the feasibility of the configuration for each mission. This will include a Coupled Load Analysis (CLA) of mission specific cargo, flight support equipment and visiting vehicle per DRD CRS 2-3. The Contractor shall coordinate resolution with NASA on any exceedances of the NASA-provided cargo environments.

(c) Develop a pressurized cargo ICD in accordance with DRD CRS 4-3, Pressurized Cargo Interface Control Document, for items planned to be hard-mounted in the visiting vehicle pressurized module volume per DRD CRS 2-3.

(d) Provide the physical configuration and pressurized cargo layout of the visiting vehicle pressurized module per DRD CRS 2-3 to ensure acceptable vehicle center of gravity configuration and support NASA development of flight products.

### **2.9.1.1 VEHICLE CONFIGURATION AND PRESSURIZED CARGO LAYOUTS**

The Contractor shall deliver launch and return vehicle configurations, cargo layouts and analytical products to support NASA flight products as follows:

(a) Launch and return vehicle configurations and cargo layouts as part of the DRD CRS 2-3 at L-3 month based on the updated cargo complements delivered at L-5 months,

(b) Launch and return vehicle configurations and cargo layouts as part of the DRD CRS 2-3 at L-1 month based on the final launch and updated return cargo complements delivered at L-6 weeks.

### **2.9.1.2 PRESSURIZED CARGO COMPLEMENT VARIABILITY**

The cargo manifest will change in response to NASA's needs and on orbit events. The cargo bag complement will change in response to the manifest changes. The Contractor shall accommodate the following variations and capabilities as standard work for each resupply service mission.

(a) Variations of +/- 10% of the total mass in the L-13 month and L-5 month cargo launch and return complements which covers the periods between L-13 months to L-5 months and L-5 month to L-6 week manifests, respectively. Variations of +/- 5% of the total mass in the L-6 week cargo launch which covers the periods between L-6 week and cargo delivery to cover nominal and late-load actuals.

(b) Variations of individual cargo bag mass can occur as shown in Table 2.9.1.2-1, Cargo Manifest Bag Mass Variability. The sum of the bag variations is within the +/-10% of the total as stated above.

**Table 2.9.1.2-1 – Cargo Manifest Bag Mass Variability**

<b>Percentage of Cargo Bags</b>	<b>Anticipated Change Percentage</b>
40% of bags	Change within +/- 10%
55% of bags	Change more than +/- 10% and up to +/- 35%
5% of bags	Change more than +/- 35% and up to +/- 50%

(c) The ability to accommodate limited changes in the bag types that fit in the same footprint as needed by NASA, e.g., the ability to replace an M-03 bag with a combination of one M-01 and one M-02 and vice versa, or one Double CTB with two single CTBs and vice versa, is highly desirable.

(d) The flexibility to accommodate irregular shaped bags should be considered.

(e) The ability to replace powered locker(s) with late load passive cargo or conditioned cargo bags (i.e. Double Cold Bags) and vice versa within the existing powered locker capability.

### **2.9.1.3 CARGO PHYSICAL PROCESSING**

The Contractor shall handle and process all cargo in accordance with the requirements specified in SSP 50833 and documented in DRD CRS 1-4. This includes all standard, nominal, late load, launch-scrub turnaround, early handover, powered and unpowered pressurized cargo, and all unpressurized cargo.

The Contractor shall provide FSE, GSE, and any other hardware needed to process and deliver the cargo to the ISS. The Contractor shall document the required ground handling procedures or constraints for complex cargo items such as pressurized hard mount items in accordance with DRD CRS 4-3, as applicable.

#### **2.9.1.3.1 STANDARD CARGO**

Standard cargo will be delivered to the Contractor as specified in SOW paragraph 2.1.2 at the Contractor's payload processing facility and according to the schedule documented in DRD CRS 1-4. The Contractor shall perform all functions required to safeguard, stow, track and integrate the standard cargo into the visiting vehicle.

#### **2.9.1.3.2 LATE STOW CARGO**

Late Load powered and unpowered cargo will be delivered to the Contractor as specified in SOW paragraph 2.1.2 and in accordance with the location and schedule documented in DRD CRS 1-4. The Contractor shall perform all functions required to safeguard, stow, track, and integrate the late stow cargo into the visiting vehicle. The Contractor shall perform integrated verification test/health check for powered cargo after installation. The Contractor shall document the late stow cargo for each mission within DRD CRS 2-3.

#### **2.9.1.3.3 LAUNCH SCRUB TURNAROUND**

The Contractor shall be able to perform Launch Scrub turnaround of the hardware listed in SOW paragraph 2.1.2.2 that may have Launch Scrub Turnaround requirements to support a launch attempt as soon as (b) (4) A Launch Scrub Turnaround to support a launch attempt the next day (~24-hour Launch Scrub Turnaround) is preferable in order to maximize the opportunities to deliver time critical cargo to the ISS. The Contractor shall process all cargo identified with Launch Scrub Turnaround requirements in accordance with their Launch Scrub Turnaround process documented in DRD CRS 1-4.

#### **2.9.1.4 CARGO RETURN AND/OR DISPOSAL**

The Contractor shall return or dispose of cargo per the return cargo complement provided. The Contractor shall identify constraints to the on-orbit packing of cargo for return per DRD CRS 2-3. NASA retains the right to update the return cargo manifest in response to on-orbit events and activities. The Contractor shall be available to assess real-time changes to the return cargo complement while the visiting vehicle remains mated to the ISS. The Contractor shall provide waste disposal at the Contractor cargo de-integration site for standard and hazardous waste cargo specified in Attachment V.L., Waste Cargo. Waste disposal is applicable to non-early access cargo only.

##### **2.9.1.4.1 EARLY HANDOVER RETURN CARGO DE-INTEGRATION**

The Contractor shall safely remove powered and unpowered early handover return cargo from the return vehicle once it returns from the ISS. The Contractor shall handover cargo to NASA within the timeframe specified in SOW paragraph 2.2.1.2 or SOW paragraph 2.3. at the

Contractor's Post-flight Payload processing facility as documented in DRD CRS 1-4. The Contractor shall document the early handover cargo for each mission within DRD CRS 2-3.

#### **2.9.1.4.2 STANDARD RETURN CARGO DE-INTEGRATION**

Any cargo not part of the Early Handover return cargo is considered standard return cargo. The Contractor shall safely remove standard return cargo from the entry vehicle upon return from the ISS. The Contractor shall handover the standard return cargo to NASA within the timeframe specified with SOW paragraph 2.2.1.1 at the Contractor's Post-flight Payload processing facility as documented in DRD CRS 1-4.

The Contractor shall transport and store this cargo at the same bag or ORU level in which it was transferred from the ISS into the visiting vehicle.

The Contractor shall coordinate with NASA to schedule any shipments of flight hardware and integrated bags.

#### **2.9.2 UNPRESSURIZED CARGO ANALYSIS AND INTEGRATION**

The Contractor shall perform the analysis and integration tasks required to safely integrate unpressurized hardware for delivery to and disposal from the ISS. These tasks include cargo integration and analysis, and on-orbit operations analysis.

The Contractor shall submit a DRD CRS 3-1 to describe the standard interface requirements, capabilities, interfaces, constraints, and environments of the launch vehicle, as they pertain to unpressurized cargo. NASA will use this data to assess the compatibility of NASA cargo with the launch vehicle. NASA will provide the Contractor with the preliminary unpressurized cargo manifest NLT L-24 months.

The Contractor shall also deliver mission-specific analysis documentation in accordance with DRD CRS 2-3. These mission specific MRAD analyses provide evidence of compatibility between the vehicle and the individual unpressurized cargo items.

The Contractor shall perform the following tasks for the NASA-provided cargo.

(a) Develop an unpressurized cargo Interface Control Document (ICD) for each cargo item (delivery or disposal) mounted on the unpressurized carrier. The unpressurized cargo ICD shall be submitted in accordance with DRD CRS 3-2, Unpressurized Cargo Interface Control Document. A preliminary unpressurized carrier layout shall be presented and reviewed at the VBR. The final layout will be delivered per DRD CRS 2-3 and reviewed at the MIR.

(b) Perform mission specific structural, thermal, power, integration and functional assessments to ensure the feasibility of the configuration for a mission. The assessment shall include a Couple Load Analysis (CLA) of mission specific cargo, flight support equipment, and

carrier in accordance with DRD CRS 2-3. The sensitivity of cargo response to vehicle configuration (location, mass, etc.) shall be analyzed and the preferred configuration provided. The expected cargo environments during all phases of flight shall be delivered in accordance with DRD CRS 2-3 and DRD CRS 3-1. If cargo requirements cannot be met, the Contractor shall coordinate resolution with NASA on any exceedances.

(c) Provide unpressurized carrier integrated assembly (vehicle and cargo) model in accordance with DRD CRS 4-1 to NASA for robotic analysis. The robotic analysis includes assessment of Space Station Remote Manipulator System (SSRMS) or Special Purpose Dexterous Manipulator (SPDM) kinematic operations, reach envelopes, and views of clearances during cargo transfer operation..

(d) If the standard mission includes a deployable unpressurized carrier, perform analyses and fit check (by using hardware or simulator approved by ISS Program) assessments to ensure the carrier interface is compatible with existing ISS on-orbit stowage sites and in accordance with SSP 42003, Space Station Manned Base (SSMB) to Mobile Servicing System (MSS) Interface Control Document Part 1, SSP 57003, Attached Payload Interface Requirements Document, SSP 57004, Attached Payload Hardware Interface Control Document, SSP 42004 Part 1, Mobile Servicing System (MSS) to User (Generic) Interface Control Document Part 1, SSP 42004 Part 2, Mobile Servicing System to User (Generic) Interface Control Document Part 2, and SSP 42131, Space Station Program Integrated Truss Segments P3 and S3 to Attached Payloads and Unpressurized Cargo Carriers (UCC) Standard Interface Control Document.

(e) Develop mass property data and finite element math models of the mission specific carrier in accordance with DRD CRS 4-4.

(f) Perform physical integration of the unpressurized cargo, FSE and vehicle unpressurized carrier.

(1) For FRAM based science payloads cargo: The Contractor shall provide required adapter plate assemblies (e.g., ExPA, CEPA) to NASA no later than L-18 months. NASA and or Payload Developer will integrate the science payload onto the adapter plate assembly and turn over the integrated cargo to Contractor NLT L-30 days. The Contractor shall complete final integration onto the unpressurized carrier.

(2) For FRAM based ORUs, NASA will deliver the ORU and its unique FSE, if provided by NASA, NLT L-60 days. The Contractor will integrate the FRAM adapter plate assembly, ORU, and unique FSE, and complete final integration onto the unpressurized carrier. In some cases and depending on NASA's inventory, NASA might also provide FRAM adapter plate assembly. NASA will provide integration drawings and procedures needed for the integrated assembly. NASA will also provide any unique ORU GSE needed.

(3) For JEM-EF Payloads, the Contractor shall install FSE onto Payloads and complete final integration onto the unpressurized carrier. NASA will deliver the payload NLT L-30 days.

(4) For other Direct Mount cargo, the Contractor shall install FSE onto the cargo (dependent on actual cargo design), and complete final integration onto the unpressurized carrier. NASA will deliver the cargo NLT L-60 days.

(g) Perform strategic and tactical planning across all flights for unpressurized cargo. Ensure critical milestones and products are identified, and capability exists to support multiple cargo items concurrently.

(h) Support weekly NASA unpressurized cargo integration working meetings, with a focus on working technical issues, forward planning, and exchanging information with the cargo developers.

### **2.9.3 FACILITIES**

The Contractor shall provide and maintain pre-flight and post-flight payload processing facilities that are equivalent to those defined in Attachment V.M., Payload Processing Capabilities Required at Launch and Landing Site. The facilities used to process NASA flight hardware shall also meet the cargo processing environments and capabilities defined in SSP 50808 and SSP 50833.

Personnel garments used at a Contractor facility in the integration of the payload shall be provided and cleaned by the Contractor. Personnel garments used in the integration of the payload shall comply with accepted clean room and personnel safety operating standards as specified in the mission specific contamination control plan.

In a “host role” the contractor shall provide the facilities, services, equipment, and supplies as described in Attachment V.M. NASA, NASA representatives, and International Partners will perform launch site flight hardware processing in these facilities prior to cargo turnover to the contractor for cargo integration.

### **2.9.4 DISCREPANT HARDWARE**

The Contractor shall document discrepancies to hardware turned over to the Contractor and report those discrepancies to NASA within 48 hours of identifying the discrepancy.

### **2.9.5 EQUIPMENT INTERFACE DEMONSTRATION (EID)**

The Contractor shall support an EID, as defined in DRD CRS 1-4 and scheduled per DRD CRS 2-3. The EID is to ensure that the interfaces for pressurized and unpressurized cargo meet the interface requirements as defined in SSP 50808 and SSP 50833. For each mission, the

Contractor shall provide assistance to disposition discrepancies found during the EID inspections that are related to this SOW.

Additionally the Contractor shall conduct power/data testing for all first time flown powered Middeck lockers to ensure interface compatibility. NASA will provide flight-like units and characteristic data to support testing, as required. If NASA cannot provide flight-like units to support testing, the Contractor shall not need to conduct this testing.

## **2.10 SAFETY AND MISSION ASSURANCE**

The Contractor shall establish, implement, and maintain comprehensive safety and health, system safety, reliability, quality assurance, and risk management programs covering program management, mission integration management, and the design, development, production, test, integration, launch and flight of the Resupply Service vehicles.

### **2.10.1 RISK MANAGEMENT**

The Contractor shall implement a risk management program with techniques that address the identification, analysis, mitigation, and tracking of potential impacts to safety or mission success. The Contractor shall develop the criteria, methods, and procedures used for identifying risk items. Delays that result from the Contractor's business judgment or as a result of the Contractor's business decisions involving risk are not considered beyond the reasonable control of the Contractor.

The Contractor shall make its risk tracking database(s) remotely accessible to select NASA personnel at NASA Centers where electronic files are posted and revisions maintained. This is to provide insight to current mission risks including a brief description, subsystems affected, status of ongoing root cause evaluation, mitigation efforts, and how the risk is being evaluated for impacts to upcoming flights.

### **2.10.2 VISITING VEHICLE SAFETY ASSESSMENTS AND REVIEWS**

The Contractor shall perform a safety assessment for each visiting vehicle mission that shall be approved by the ISS Program Safety Review Panel (SRP) in accordance with SSP 30599, Safety Review Process. The Contractor shall develop the Failure Modes and Effects Analysis per SSP 50808 to identify credible failures requiring hazard controls.

#### **2.10.2.1 PROXIMITY OPERATIONS AND ISS MATED SAFETY ASSESSMENTS**

The Contractor shall submit DRD CRS 3-6, Visiting Vehicle Safety Assessment/Hazard Reports, in accordance with the phased safety review process in SSP 30599 for the initial mission of each vehicle. For subsequent missions, the base-lined flight safety assessments shall be evaluated and

updated as required to incorporate vehicle and operational changes. Updated safety assessments shall be approved by the ISS Program SRP in accordance with SSP 30599. In addition to the visiting vehicle phased safety reviews, the Contractor shall support the ISS Integrated Phased SRP safety reviews.

#### **2.10.2.2 CARGO SAFETY ASSESSMENT**

The Contractor shall provide an integrated cargo assessment as part of DRD CRS 3-6, to ensure that the packaging of the cargo complement does not include hazards with insufficient controls. NASA will provide the Contractor a cargo safety assessment of the pressurized cargo bag manifest to support the Contractor's integrated cargo safety assessment. For non-NASA Cargo allowed under Clause II.A.5, Contractor Objectives on ISS Resupply Service Missions, the Contractor shall perform a safety assessment in accordance with SSP 30599 and shall obtain approval from the ISS SRP.

#### **2.10.3 GROUND SAFETY REVIEWS**

The Contractor shall develop and deliver integrated ground safety data packages to the appropriate authority to show compliance to all Federal and Range-Safety requirements and participate in ground safety reviews per launch or processing site requirements. The Contractor shall provide and update, for flight hardware ground operations and GSE, a Safety Data Package in support of each mission and provide a copy to NASA.

#### **2.10.4 SAFETY AND HEALTH PROGRAM**

The Contractor's Safety and Health Program shall ensure compliance with federal, state, and local government regulations as applied at the places of performance and as enforced in facility usage agreements. In addition, when the Contractor is performing work in any NASA-owned or controlled facility, all NASA requirements and documentation for that facility shall be adhered to. The Contractor shall submit a Safety and Health Plan at the time of proposal per Attachment V.E., Safety and Health Plan, and DRD CRS 1-5, Safety and Health Plan, and provide NASA updates when changes are made as Attachment V.E.

Each Contractor employee on NASA-owned property, or custodian of NASA assets elsewhere to the extent those assets are involved, shall report mishaps or close calls according to the Contractor's DRD CRS 1-1, Mishap Preparedness and Contingency Plan.

#### **2.10.5 QUALITY ASSURANCE PROGRAM**

The Contractor shall implement a quality assurance program that meets pertinent NASA and industry standards as described below.

### **2.10.5.1 QUALITY ASSURANCE MANAGEMENT**

The Contractor shall maintain a quality management system that is AS9100 certified. If the Contractor is not AS9100-certified, the Contractor shall obtain AS9100 certification within 24 months of contract award and in the interim shall accommodate an annual AS9100 compliance audit by NASA. The Contractor shall allow NASA participation in Contractor and subcontractor compliance and internal audits upon request. NASA insight will consist of monitoring NASA-selected audits with the Contractor's auditors and inspectors in order to provide understanding of the Contractor's quality system and insight of their processes.

The Contractor shall allow attendance of personnel, performing insight for this contract, from NASA, or NASA support contractors at flight hardware acceptance reviews and make available all documentation associated with those reviews.

To support NASA insight, the Contractor shall provide access to select NASA personnel at NASA Centers to Contractor database(s) where electronic files are posted and revisions maintained for all quality information such as: audit schedules, audit reports, Material Review Board (MRB) actions and minutes, non-conformances, discrepancy reports, test failure reports, system failure reports, anomalies, deviations and waivers, and data. This may take the form of read-only access to Quality Assurance database systems containing this information and to which the Contractor has regular and timely input.

The Contractor shall participate in the Government/Industry Data Exchange Program (GIDEP) and provide Alert System Documentation.

### **2.10.5.2 SOFTWARE QUALITY ASSURANCE SYSTEM**

For the visiting vehicle, the Contractor shall define and implement a Quality Assurance System in accordance with SSP 50808. For the launch vehicle, the Contractor shall define and implement a Quality Assurance System in accordance with ISO 90003:2004, Software Engineering – Guidelines for the Application of ISO 9001:2000 to Computer Software, and that meets or exceeds the intent of NASA-STD-8739.8, Software Assurance Standard. The Contractor shall provide access to select NASA personnel at NASA Centers to Contractor database(s) where electronic files are posted and revisions maintained for Software change requests, problem reports, and corrective actions. This may take the form of read-only access to Software database systems containing this information and to which the Contractor has regular and timely input.

## **2.11 NASA INSIGHT AND APPROVAL**

As part of the standard resupply service, the Contractor shall provide the data, documentation, drawings, analytical models, and support services as necessary to accommodate the requirements

specified under Clause II.A.19, NASA Insight and Approval. The Contractor shall provide this information for launch and visiting vehicle systems, subsystems, cargo FSE, materials, processes, and test equipment including, upon request, those used on non-NASA missions.

The Contractor shall notify NASA of qualification, acceptance or flight anomalies involving ISS Commercial Resupply launch and visiting vehicle systems, subassemblies, components, software and similar launch and visiting vehicles that the Contractor is aware of.

In the event of an in-flight anomaly or launch, on-orbit or entry failure, the Contractor shall allow NASA to participate fully in the Contractor's Failure Investigation Board including those for non-NASA missions.

NASA may elect to have representation as a resident office at the Contractor's major manufacturing, test, and engineering facilities for the life of the contract. The Contractor shall provide accommodations and services, such as badging, furniture, telephones, and use of easily accessible fax, projection, and copy machines for up to two residents. Two voice and two data lines shall be provided. Electronic data transfer compatibility between the resident office and off-site NASA institutions is required.

2.11.1 The Contractor shall grant NASA insight into Launch Vehicle (LV) and integrated Visiting Vehicle development, processing, and operation.

Prior to the first CRS mission, at or before its Vehicle Baseline Review (VBR), the Contractor shall provide to NASA key vehicle design data in accordance with DRDs CRS 3-3, Launch Vehicle Flight Software Input for IV&V Review; CRS 3-4, Launch Vehicle Guidance, Navigation and Controls Inputs for IV&V; and CRS 3-5, Launch Vehicle Key Systems Qualification and Acceptance Data. The Contractor shall support TIMs as needed to provide NASA understanding of Contractor-provided data and analysis results.

The Contractor shall provide NASA reports in accordance with the DRD CRS 5-1, DRD CRS 5-2, and CRS 5-3, for each mission flown by the launch vehicle or visiting vehicle on CRS2 and non-CRS2 missions, to the limit that other flight data may be government classified or customer proprietary.

2.11.1.1 The Contractor shall provide remote access to select NASA personnel at NASA Centers to Contractor database(s) where electronic files are posted and revisions maintained for data that provides evidence that the Launch Vehicle propulsion, avionics, flight controls, separation systems, their subsystems and components, and integrated function with software at the vehicle system level, were verified in a manner consistent with how they will be used in flight, have sufficient margin to their maximum expected environments and to their minimum required performance, and are acceptable for flight. This shall include:

- (a) System and Component Specifications including performance requirements,
- (b) Qualification and Acceptance Plans including;

- (1) Design and qualification requirements. Rationale for the requirements such as environmental predictions, factors of safety, performance requirements, and Contractor or industry standards. Industry standards may be provided by reference if publicly available,
- (2) Planned verification methods (Test, Analytical, Demonstration and/or Inspection), procedures, success criteria, assumptions, rationale, and comparisons to any similar proven designs.
- (c) Test Readiness Review package including description of test apparatus, test sequence and levels, configuration drawings and schematics,
- (d) Qualification packages and Acceptance packages including;
  - (1) Configuration of unit under test (UUT),
  - (2) Test, Analytical, Demonstration and/or Inspection results,
  - (3) Detailed description of any differences from Qualification or Acceptance Plans, failures and anomalies, deviations/waivers with rationale, mitigations/resolutions with rationale, and any closure plan of open items.

Data and/or reports that include sufficient detail presenting objective evidence of successfully passed test programs. If formal reports do not exist, the Contractor may provide copies of procedures, data sheets and success criteria. NASA personnel with access may distribute this evidence to NASA technical staff conducting the assessments of the Contractor's qualification and acceptance rationale.

## **2.12 FLIGHT READINESS REVIEWS**

To ensure flight readiness, the Contractor shall adhere to the processes defined in SSP 50108, ISS Program Certification of Flight Readiness Process Document, and SSP 50902, Transportation Integration Office Certification of Flight Readiness Implementation Plan.

## **3.0 SPECIAL TASK ASSIGNMENTS AND STUDIES (CLIN 0002)**

The Contractor shall perform special studies and analyses, outside the scope of the Standard Resupply Services Missions (CLIN 0001), that pertain to the Contractor's launch vehicle or spacecraft in support of this contract as required. These tasks include: initial ISS Integration, review and analysis of NASA requirement changes, and special task assignments. Special task assignments may include: advance planning and feasibility studies in support of future contemplated missions; development, fabrication, and test of hardware/software to support planning studies or special tests; mission unique studies; and material provision.

### **3.1 INITIAL ISS INTEGRATION CERTIFICATION (SUB-CLIN 0002A)**

For ISS Visiting Vehicles and/or launch vehicles that have not previously flown to ISS in the same configuration, the Contractor shall perform activities and provide evidence to show the readiness of the service to satisfy the requirements, and to proceed with performing the initial mission. This shall be performed once for the initial CRS2 flight and shall cover all of the Standard Mission types. Initial ISS Integration Certification of the Contractor's Service is composed of three main areas;

(a) Designs and implementation are proceeding as planned according to Contractor's internal processes and are consistent with satisfying the Contract requirements.

(b) ISS integration activities required to ensure that SSP 50808 and SSP 50833 requirements have been met according to SSP 50964, all necessary hardware and software development to interface with the ISS has been completed, joint on-orbit integrated operations plans have been finalized, and ISS Safety requirements have been met according to SSP 30599.

(c) All applicable non-NASA agreements and approvals have been granted.

The reviews to demonstrate compliance with these requirements are defined in SOW paragraph 4.1.3, ISS Integration Review.

3.1.1 The Contractor's systems shall be in accordance with SSP 50808.

3.1.2 The Contractor's systems shall satisfy cargo requirements in accordance with SSP 50833.

3.1.3 The Contractor shall perform activities, support reviews, follow processes, and provide products in accordance with the Visiting Vehicle responsibilities documented in SSP 50964.

3.1.4 The Contractor shall perform activities, support reviews, and provide information in accordance with the Visiting Vehicle responsibilities documented in SSP 30599.

### **3.2 NASA REQUIREMENTS CHANGE EVALUATION (SUB-CLIN 0002B)**

The Contractor shall evaluate proposed requirement changes to 1) SSP 50808 and SSP 50833 via Document Change Notices (DCNs), 2) Vehicle-specific hardware (HW) and software (SW) Interface Control Document (ICD) via Preliminary Interface Revision Notices (PIRNs), and 3) ISS Program documentation via Change Requests (CRs) and PIRNs that may impact visiting vehicles. The Contractor's initial assessment shall be completed and returned within two (2) weeks from notification of the change and shall result in a determination of whether the change falls into Category A (no impact or administrative change only) or Category B (impact, further evaluation required). There are no further actions required from the Contractor for changes in Category A. For Category B changes, within four (4) weeks from change notification, the Contractor shall evaluate and respond with an impact of:

- (a) whether the change can be implemented;
- (b) when the change can be implemented (at which flight the change goes into effect);
- (c) an impact assessment for which products would be affected for ISS Integration; and
- (d) a qualitative Rough Order of Magnitude (ROM) for implementation (minor, medium, major impact).

The Contractor shall plan on twenty (20) Category A changes and twenty (20) Category B changes. Note that the implementation of the changes being evaluated will be accomplished via CLIN0002C.

### **3.3 SPECIAL TASKS AND STUDIES (SUB-CLIN 0002C)**

The Contractor shall perform special studies and analyses, provide materials, and/or fabricate incidental hardware in support of this contract, as required. Each task will be initiated by written direction from the NASA Contracting Officer. These tasks include advance planning and feasibility studies in support of future contemplated missions; development, fabrication, and test of hardware/software to support planning studies or special tests; mission or cargo unique studies; material provision; and implementation of changes required due to changes in requirements as evaluated in sub-CLIN 0002B.

## **4.0 PROGRAM MANAGEMENT**

The Contractor shall provide all program management functions required to provide the ISS resupply services and to satisfy the mission requirements for each NASA mission. The program management function of this contract shall provide insight to NASA for technical and programmatic activities performed under this contract. The Contractor shall submit a Mission Integration and Operations Management Plan (MIOMP) prior to contract award in accordance with DRD CRS 1-4.

The Contractor shall develop, maintain and implement a process to verify flight readiness. This auditable approach shall verify that all flight preparation responsibilities and requirements have been met and that all problems have been dispositioned prior to launch. Prior to each launch, the Contractor shall certify launch and visiting vehicle readiness prior to receipt of NASA late stow cargo.

### **4.1 FORMAL REVIEWS**

The intent of the formal reviews is to provide a forum for open dialog between NASA and the Contractor with respect to vehicle and cargo integration and cargo transportation to and from the ISS. The Contractor shall submit a final electronic copy of the presentation material to NASA at least one (1) week before the review is held. The Contractor shall provide minutes that include a

list of attendees, agreements and action items resulting from each review to NASA within one week after the review; the payment milestone will not be considered complete until the minutes are provided and any actions identified as required to be completed for completion of the milestone are accomplished. The action item list shall be maintained and updated by the Contractor. The list shall include:

- (a) Due Date,
- (b) Subject,
- (c) Assigned tracking number for each action item,
- (d) Person or organization responsible for completing the action,
- (e) Status of action (i.e., open, closed, or deleted).

#### **4.1.1 PROGRAM REVIEWS**

During the task order performance period, the Contractor shall conduct Program Reviews with NASA at least once per quarter beginning at task order start to report:

- (a) The status, closure plan and schedule for remaining ISS Integration, SSP 50808 and SSP 50833 compliance tasks, or tasks to be repeated in the event of changes to the vehicle (launch and orbital) baseline. This shall be the focus of the review when tasks are open.
- (b) The integrated schedule and status for all missions with Authority to Proceed.
- (c) Key schedule items from other Contractor activities that may affect the technical, cost and schedule risk to NASA missions, such as, but not limited to, other program milestones, mission dates of other flights utilizing the same launch and visiting vehicles, and/or launch site activities.
- (d) Schedule Risks and Technical Risks, including risk statements, mitigation plans and mitigation schedules.
- (e) Summary status of the special task assignments (under CLIN002) that were started, in-work, or completed since previous review.
- (f) Action items from previous program and technical reviews, including their status, closure plan, closure rationale.
- (g) Minutes shall be published within one week of the meeting.
- (h) NASA and Contractor shall reconfirm current delivery window(s) at Program Reviews. At the program review closest to L-7 months for a given mission, mutually agree with NASA on a delivery window of 5 days.

NASA will provide status of program direction at the reviews.

At Program Reviews, any updates made in the previous quarter to the Program Plans included as Attachments to this SOW and in Table V.B-1, DRDs Required Near Proposal Submission, shall be provided but do not need to be briefed.

#### **4.1.2 TECHNICAL REVIEWS**

The Contractor shall conduct technical reviews to status the end-to-end integration of the launch and visiting vehicles. Each mission to the ISS establishes a Mission Baseline Vehicle. For a given mission, the Contractor shall address, at the Vehicle Baseline Review (VBR), the Mission Integration Review (MIR), and the Cargo Integration Review (CIR), design changes from the Mission Baseline Vehicle used during the immediately preceding mission.

##### **4.1.2.1 VEHICLE BASELINE REVIEW**

At not later than L-18 months, the Contractor shall allow NASA to participate in a Contractor review that establishes the integrated mission vehicle configuration (launch vehicle and visiting vehicle). The intent of the VBR is to establish the baseline vehicle for the mission and identify any design changes from the previous mission vehicle and the corresponding plans for executing and verifying these changes. In addition, at L-22 months the Contractor shall support pre-VBR mission design discussions to support unpressurized cargo design, specifically, but not limited to, thermal, structures, contamination concerns, FSE, and integration.

###### **4.1.2.1.1 MISSION BASELINE VEHICLE**

The Contractor shall:

- (a) Establish a baseline launch and visiting vehicle configuration so that subsequent mission integration efforts have definite launch and on-orbit environments and performance capabilities identified.
- (b) With NASA approval, reconfirm the 30-day delivery window.
- (c) Provide updates to the instrumentation plan, reduced thermal model, and thermal design reference mission as defined in DRD CRS 3-1, Vehicle Interface Definition Document (IDD).
- (d) Present a hardware development schedule and identify the Launch On Need (LON) vehicle(s) that meets Launch on Need readiness criteria, if applicable.
- (e) Present a preliminary unpressurized carrier layout to be approved by NASA, if applicable.

###### **4.1.2.1.2 DESIGN CHANGES FROM PRIOR MISSION BASELINE VEHICLE**

The Contractor shall also identify any design changes from the previous mission baseline vehicle (launch and visiting vehicle).

(a) For the visiting vehicle, the Contractor shall:

(1) Identify all SSP 50808 and SSP 50833 requirements that are impacted by the change and show how they have been allocated to the appropriate system, subsystem and/or component level. Also show how the requirement flow down is adequate to verify compliance with SSP 50808 and SSP 50833.

(2) Discuss analyses and tests performed to execute these design changes and include their methodology, assumptions and results, along with comparisons to any similar proven designs.

(3) Show how these changes affect performance and performance margins, reliability and environments.

(4) Present the status or results of any mission unique or special study task assessments requested by NASA for complex manifest options.

(5) Provide a schedule to complete all work required to accomplish the design changes and close requirement verifications prior to CIR.

(b) For the launch vehicle, the Contractor, shall:

(1) Define planned changes to Baseline vehicle, mission unique changes and first flight items. Discuss analyses performed to execute these design changes and include their methodology, assumptions and results, along with comparisons to any similar proven designs. Show how these changes affect performance, reliability and environments.

(2) Ensure all system requirements are appropriate and have been allocated to the subsystem and component level and the flow down is adequate to verify system performance.

(3) Confirm overall system architecture has been established.

(4) Demonstrate the design solution can be produced based on existing processes and techniques; if not, identify risk areas and risk mitigation plans for processes which require unique and unproven processes.

(5) Show an acceptable operations concept has been developed.

(6) Demonstrate preliminary plans are established for end-to-end testing methodologies.

#### **4.1.2.2 MISSION INTEGRATION REVIEW**

At not later than L-12 months, the Contractor shall allow NASA to participate in a review that provides NASA with a current mission integration status. NASA will utilize the information presented at this review to determine if the planned delivery date is achievable and if integration efforts should continue.

##### **4.1.2.2.1 MISSION BASELINE VEHICLE**

(a) The Contractor shall:

- (1) With NASA approval, reconfirm the 30-day delivery window.
- (2) Provide updates to the instrumentation plan, reduced thermal model, and thermal design reference mission as defined in DRD CRS 3-1.
- (3) Provide list of initial data and parameters that will be used for Mission Success Determination.
- (4) Present the updated unpressurized cargo carrier layout for approval by NASA, if applicable.
- (5) Present the status of hardware production according to LON schedule, if applicable.
- (6) Submit Vehicle and Integrated Assembly mass properties per DRD CRS 4-4.
- (7) Confirm the Acceptance Plans in DRD CRS 3-5, Launch Vehicle Key Systems Qualifications and Acceptance Data, and SOW subparagraph 2.11.1, for the Mission Baseline launch.

##### **4.1.2.2.2 DESIGN CHANGES FROM PRIOR MISSION BASELINE VEHICLE**

(a) For the visiting vehicle, the Contractor shall:

- (1) Present designs and their supporting analyses that implement mission unique requirements.
- (2) Present progress in manufacturing and lay out remaining milestones and risks to accomplishing them.
- (3) Present progress in ISS integration, including progress toward closure of SSP 50808 and SSP 50833 requirements, and lay out remaining milestones and risks to accomplishing them.
- (4) Present progress of ISS integrated safety hazard assessments including integrated safety analysis identifying any remaining hazards and proposed resolution per SOW paragraph 2.10.2 Visiting Vehicle Safety Assessments and Reviews.

(b) For the launch vehicle, the Contractor shall demonstrate the following to NASA:

(1) Provide updates to plans in DRD CRS 3-5 and SOW subparagraph 2.11.1, resulting from changes to the vehicle when qualification/acceptance margins in those systems decrease or new qualification/acceptance activities are going to result.

(2) The design solutions to be implemented are expected to meet the performance and functional requirements with applicable and acceptable margins.

(3) The design does not pose major problems that may cause schedule delays.

(4) Progress in manufacturing and lay out remaining milestones and risks to accomplishing them.

(5) Technical problems and design anomalies have been resolved and effects of design changes on system performance, reliability and safety have been identified.

(6) The detailed design will meet performance, functional requirements, and schedule.

(7) Software simulations and prototyping results do not present any potential mission risks.

(8) Complete updated Qualification content for DRD CRS 3-5 and SOW subparagraph 2.11.1.

#### **4.1.2.3 UNPRESSURIZED INTEGRATION REVIEW**

At L-10 months for missions with manifested unpressurized cargo, the Contractor shall allow NASA to participate in a review that demonstrates the Contractor readiness to receive and integrate unpressurized cargo and review results of unpressurized cargo analysis from DRD CRS 2-3.

The Contractor shall:

(a) Verify that ground processing facilities and ground support equipment are ready to receive NASA unpressurized cargo.

(b) Present ground processing integration plans, including schedule

(c) Verify that the visiting vehicle is on schedule for unpressurized cargo integration activities.

(d) Present mission unique design qualification and acceptance testing related to unpressurized cargo.

(e) Present status of verification closures for all open SSP 50808, SSP 50833, and ICD requirements related to unpressurized cargo. Review, as necessary, the Pre-Fight Imagery Plan previously provided.

(f) Review open hazards and safety issues related to the unpressurized cargo configuration.

(g) Present a status of all open unpressurized cargo item actions and status any Task Orders related to unpressurized cargo for that flight.

(h) Present results from mission analyses (e.g., Cargo layout, CLA & Loads, Dynamics, Thermal, Power, etc.).

(i) Present status (Design, Quality, Acceptance, schedule) of any mission FSE designs and builds.

(j) Deliver the following documentation:

- (1) Deliver DRD CRS 2-3, Mission Resource Allocation Document,
- (2) Deliver DRD CRS 3-2, Unpressurized Cargo Interface Control Document,
- (3) Updated Instrumentation Plan for unpressurized cargo, as necessary,
- (4) Layouts and CAD models of unpressurized configuration,
- (5) Analysis of launch specific unpressurized cargo environments,
- (6) FSE procurement or development schedule.

#### **4.1.2.4 CARGO INTEGRATION REVIEW**

At not later than L-3 months, the Contractor shall allow NASA to participate in a review that allows NASA to assess if the Contractor will be ready for NASA cargo turnover at L-30 days . A status of all open items presented in both the VBR and MIR shall be presented at this review. All mission unique design qualification and acceptance activities shall have been accomplished. For open items, low risk plans for completion shall be presented. All milestones to this point shall have been met.

The Contractor shall:

- (a) Provide the final instrumentation plan as defined in DRD CRS 3-1.
- (b) Present status of verification closures for mission unique ICDs, designs and requirements.
- (c) Present status of verification closures and a plan for all open SSP 50808 and SSP 50833 requirements.
- (d) Provide all analytical assessments that show the compatibility of NASA cargo with the launch and visiting vehicle such as integrated loads, mission specific thermal assessments, electromagnetic interference (EMI), and power.
- (e) Present evidence that all Safety Assessments have been approved by NASA.
- (f) Provide list of final data and parameters that will be used for mission success determination.

(g) For launch vehicle provide:

- (1) Complete updated Acceptance content for DRD CRS 3-5 and SOW subparagraph 2.11.1.
- (2) Show how changes affect performance, reliability and environments.
- (3) Provide status of the hardware production according to the LON schedule, if applicable.

#### **4.1.2.5 POST-DELIVERY REVIEW**

After the cargo delivery phase of each mission, the Contractor shall allow NASA to participate in a review to assess mission success and shall provide supporting data as related to launch and cargo delivery. The Contractor shall be responsible for providing telemetry data confirming the required launch and orbit conditions and cargo environments were met as stated in DRD CRS 3-1. This review shall coincide with delivery of DRD CRS 5-1, Post Delivery Assessment, that shall contain the data necessary to verify these conditions. The Contractor shall provide telemetry data to the extent required by SOW paragraph 2.7.2, Telemetry Data. NASA will be responsible for providing data supporting cargo status.

NASA shall provide available video of docking/berthing operations and cargo extraction for missions with unpressurized cargo operations.

Mission success for cargo delivery and mission completion will be determined based on the criteria set forth in Clause II.A.2, Mission Success Determination, Investigation and Corrective Action.

#### **4.1.2.6 POST-MISSION REVIEW**

After each mission, the Contractor shall allow NASA to participate in a review to assess mission success and shall provide supporting data. The Contractor shall be responsible for providing telemetry data confirming the required orbit conditions and cargo environments were met as stated in DRD CRS 3-1. This review shall coincide with delivery of DRD CRS 5-2, Post Mission Assessment, that shall contain the data necessary to verify these conditions. The Contractor shall measure and provide telemetry data to the extent required by SOW paragraph 2.7.2, Telemetry Data. NASA will be responsible for providing data supporting cargo status. NASA shall provide available video of undocking/unberthing operations and cargo insertion (for disposal) for missions with unpressurized cargo operations.

Overall mission success will be determined based on the criteria set forth in Clause II.A.2, Mission Success Determination, Investigation and Corrective Action.

The Contractor shall also provide DRD CRS 5-3, Post Flight Report, that formally documents all mission aspects (culmination of data in DRDs CRS 5-1 and CRS 5-2).

### **4.1.3 ISS INTEGRATION CERTIFICATION REVIEWS**

#### **4.1.3.1 ISS INTEGRATION CERTIFICATION MILESTONE 1**

The Contractor shall allow NASA to participate in a review that describes the plan for program implementation, which includes management planning for development of the launch and visiting vehicles to provide the service, an integrated schedule, supplier engagement plans and status, identification of risks and anticipated mitigations. The review shall also include the Contractor's program implementation plan, a strategic plan for interfaces with external entities, including international agreements, plans for obtaining licenses from Federal Communications Commission (FCC), Federal Aviation Administration (FAA), and National Telecommunications and Information Administration (NTIA), and plans for launch and landing range safety approvals. The Contractor shall provide responses to any questions NASA has No Later Than (NLT) two (2) weeks after the meeting.

#### **4.1.3.2 ISS INTEGRATION CERTIFICATION MILESTONE 2**

The Contractor shall perform activities, conduct reviews, and provide verifications, according to the Contractor's internal processes, to confirm that the service, and its systems, are being implemented in a manner that satisfies the requirements.

4.1.3.2.1 The Contractor shall hold a review to allow NASA to assess the progress towards meeting the ISS integration requirements. The review shall present and demonstrate :

(a) The resulting overall concept is reasonable, feasible, complete, responsive to the mission requirements, and is consistent with system requirements and available resources (schedule, mass, power, etc.).

(b) The project utilizes a sound process for the allocation and control of requirements throughout all levels, and a plan has been defined to complete the definition activity within schedule constraints.

(c) Requirements definition is complete with respect to top level mission requirements and between major internal elements.

(d) Plans have been developed for interfaces with external entities, including international agreements, foreign contracts, licenses from FCC, FAA, and NTIA, and launch and landing range safety approval.

(e) System and subsystem design approaches and operational concepts exist and are consistent with the requirements set.

(f) The requirements, design approaches, and conceptual design will fulfill the mission needs.

(g) Preliminary approaches have been determined for how requirements will be verified and validated down to the subsystem level.

(h) Major risks have been identified, and viable mitigation strategies have been defined.

4.1.3.2.2 The Contractor shall have started coordination with NASA for visiting vehicle mission operations in accordance with JSC 35089, Visiting Vehicle Operations Document.

#### **4.1.3.3 ISS INTEGRATION CERTIFICATION MILESTONE 3**

The Contractor shall perform activities, conduct reviews, and provide verifications, according to the Contractor's internal processes, to confirm that the service, and its systems, are being implemented in a manner that satisfies the requirements.

4.1.3.3.1 The Contractor shall hold a review to allow NASA to assess the progress towards meeting the ISS integration requirements. The review shall present and demonstrate :

(a) Agreement exists for the top-level requirements, including mission success criteria, and required service performance measures , and that these are finalized, stated clearly, and are consistent with the planned design and service architecture.

(b) Plans have been finalized for interfaces with external entities, including international agreements, foreign contracts, licenses from FCC, FAA, and NTIA, and launch and landing range safety approval.

(1) Initial submits of International Agreements and Range Safety are complete.

(2) Foreign contracts are in place.

(c) The planned design and service architecture is expected to meet the requirements at an acceptable level of risk

(d) Definition of the technical interfaces and constraints are consistent with the overall technical maturity and proves an acceptable level of risk including preliminary IDD per DRD CRS 3-1.

(e) Adequate technical margins exist with respect to required service performance measures.

(f) The project risks are understood, and plans and a process and resources exist to effectively manage them.

(g) Complete the Visiting Vehicle ISS Phase I Safety Review that demonstrates safety and mission assurance (i.e., safety, reliability, maintainability, quality, and electrical, electronic, and electromechanical [EEE] parts) have been adequately addressed in preliminary designs and any applicable preliminary Safety and Mission Assurance (S&MA) products (i.e., hazard analysis and failure modes and effects analysis) have been approved.

(h) The operational concept is technically sound, that it includes human factors that apply, and that requirements for its execution flow down.

(i) The Contractor shall submit Initial Visiting Vehicle Instrumentation Program and Command List (IP&CL) which shall include ground commands, telemetry, and stored command sequences.

(j) The Contractor shall perform activities, support reviews, follow processes, and provide products in accordance with the Visiting Vehicle responsibilities documented in SSP 50964, and in particular for this Milestone;

- (1) Initial Visiting Vehicle hardware and software ICDs,
- (2) Ground segment ICD,
- (3) Joint Integration, Verification, and Test Plan (JIVTP),
- (4) Verification and Validation (V&V) Plan,
- (5) Bilateral Data Exchange Agreements, Lists, and Schedules (BDEALS),
- (6) Bilateral Hardware and Software Exchange Agreements, Lists, and Schedules (BHSEALS),
- (7) Detailed Thermal Model per BDEALS.

#### **4.1.3.4 ISS INTEGRATION CERTIFICATION MILESTONE 4**

The Contractor shall perform activities, conduct reviews, and provide verifications, according to the Contractor's internal processes, to confirm that the service, and its systems, are being implemented in a manner that satisfies the requirements.

4.1.3.4.1 The Contractor shall hold a review to allow NASA to assess the progress towards meeting the ISS integration requirements. The review shall present and demonstrate:

- (a) The detailed design and service architecture is expected to meet the requirements with adequate margins at an acceptable level of risk which shall include the baselined IDD per DRD CRS 3-1.
- (b) Interface control documents are appropriately matured to proceed with fabrication, assembly, integration and test, and plans are in place to manage any open items.
- (c) High confidence exists in the product baseline, and adequate documentation exists and/or will exist in a timely manner to allow proceeding with fabrication, assembly, integration, and test.
- (d) The product verification and product validation requirements and plans are complete.

(e) The testing approach is comprehensive, and the planning for system assembly, integration, test, and launch site and mission operations is sufficient to progress into the next phase.

(f) Adequate technical and programmatic margins and resources exist to complete the development within schedule and risk constraints.

(g) Risks to mission success are understood, and plans and resources exist to effectively manage them.

(h) Progress is being made against plans for interfaces with external entities, including international agreements, licenses from FCC, FAA, and NTIA, and launch and landing range safety approval.

(1) Initial license requests to FCC, and NTIA have been completed.

(2) FAA initial pre-application consultation has been submitted.

(3) International agreements shall be complete and approved through the State Department or appropriate federal agency.

(4) Range safety approval is progressing per the appropriate range safety organization's approval process.

(i) Complete the Visiting Vehicle ISS Phase II Safety Review that demonstrates safety and mission assurance (i.e., safety, reliability, maintainability, quality, and EEE parts) have been adequately addressed in system and operational designs and any applicable S&MA products (i.e., hazard analysis and failure modes and effects analysis) have been approved.

4.1.3.4.2 The Contractor shall conduct compatibility test(s) with NISN and the Contractor's Ground systems confirming planned functionality.

4.1.3.4.3 The Contractor shall conduct data flow test(s) with USGS and the Contractor's mission control center systems confirming planned functionality per SSP 50808 and SSP 50833.

4.1.3.4.4 The Contractor shall perform activities, support reviews, follow processes, and provide products in accordance with the visiting vehicle responsibilities documented in SSP 50964, and in particular for this milestone;

(a) Visiting Vehicle hardware and software ICDs,

(b) Frequency Request Application,

(c) Vehicle Communication Plans,

(d) Deliverables per BDEALS and BHSEALS as agreed to at ISS Integration Milestone 3.

#### **4.1.3.5 ISS INTEGRATION CERTIFICATION MILESTONE 5**

The Contractor shall perform activities, conduct reviews, and provide verifications, according to the Contractor's internal processes, to confirm that the Service, and its systems, are being implemented in a manner that satisfies the requirements.

4.1.3.5.1 The Contractor shall conduct a Rendezvous and Proximity Operation (RPO) sensor demonstration test which includes:

(a) Flight-like RPO sensor suite configured in a fashion to represent planned vehicle installation creating representative sensor field of view, and conduct testing of the systems at a 6 Degree Of Freedom (DOF) test facility to characterize the systems performance over a wide range of angles of attack and lighting conditions in a closed loop control configuration.

(b) Presentation of test data, performance analysis, and anomalies.

4.1.3.5.2 The Contractor shall conduct demonstration test(s) of reentry and landing of the Pressurized Cargo return capability(ies) which includes (as applicable):

(a) Parachute deployment

(b) Airborne drop test of flight representative reentry vehicle

(c) Controlled landing test of flight representative reentry vehicle

(d) Presentation of test data, performance analysis, and anomalies

4.1.3.5.3 The Contractor shall conduct Visiting Vehicle Equipment Interface Demonstration(s) which includes:

(a) Conduct ground demonstration(s) of physical stowage of cargo simulators in/on flight representative Visiting Vehicle demonstration article, using an example manifest that matches Contractor's Standard Mission(s), and that as a minimum includes:

(1) Visiting Vehicle demonstration article that includes: flight representative volume and geometry, cargo interfaces (physical, power, cooling, data), translation paths, hatch hardware and motion, and cargo restraints and/or mounting.

(2) Maximum design mass simulators of: single passive CTBE, M01 Bag, M02 bag, M03 bag, conditioned CTBE (late load location), Powered Double Locker (late load location), Powered single locker (late load location), ISS Stowage Locker, and unpressurized cargo.

(i) NASA will provide pressurized cargo simulators for use during the demonstration(s),

(ii) NASA will provide cargo lifting and handling information,

(iii) Contractor shall provide FRAM-based cargo and standard JEM-EF payload simulator(s) that represents maximum mass.

(3) Demonstration of pre-flight and post-flight stowage procedures, including pressurized cargo late loading and early access.

(4) Provision of power and data to powered cargo and demonstration of commanding to, telemetry from, and air cooling of, powered cargo.

(5) Demonstration of on-orbit pressurized cargo operations and transfer via berthing or docking pathway using lightweight simulators of: single passive CTBE, M01 Bag, M02 bag, M03 bag, conditioned CTBE (late load location), Powered Double Locker (late load location), Powered single locker (late load location).

(b) Provide design information to support NASA simulation of on-orbit unpressurized cargo operations via ISS robotics (SSRMS and SPDM) that includes: removal and installation of a full complement of unpressurized cargo as defined in Attachment V.F, clearances, lighting, and camera views.

(c) Presentation and demonstration of the Contractor's pre-flight and post-flight ground operations for cargo including: processing timelines, description and walk through of facilities and their capabilities, and dry run for example manifest that matches Contractor's Standard Mission(s).

4.1.3.5.4 The Contractor shall perform activities, support reviews, follow processes, and provide products in accordance with the visiting vehicle responsibilities documented in SSP 50964, and in particular for this milestone;

(a) Visiting Vehicle to C2V2 Radio Frequency (RF) Interface Test,

(b) Thruster Plume Heating and Loads Analysis.

4.1.3.5.5 The Contractor shall conduct compatibility test(s) with TDRSS and the Contractor's Ground and Visiting Vehicle systems confirming planned functionality.

4.1.3.5.6 The Contractor shall conduct Thermal Vacuum test(s) of the initial Visiting Vehicle including;

(a) Temperatures, dwell times, and cycles according to planned on-orbit operations.

4.1.3.5.7 The Contractor shall conduct tests of Visiting Vehicle flight software, on a flight equivalent simulator, prior to beginning Joint Software Testing with NASA.

4.1.3.5.8 The Contractor shall provide a Visiting Vehicle Avionics Simulator for use in joint NASA ISS interface testing in the ISS Software Development Integration Laboratory (SDIL) that includes:

(a) Hardware and software maintained by Contractor to high enough fidelity to serve as visiting vehicle simulator for interface and integrated verification in accordance with SSP 50482, ISS Program Software Management Plan and SSP 50964.

(b) Training of NASA personnel to operate simulator in accordance with SSP 50482.

(c) Simulator remains Contractor property that is loaned to NASA for duration of CRS2 to be used in performing testing for ISS.

#### **4.1.3.6 ISS INTEGRATION CERTIFICATION MILESTONE 6**

The Contractor shall perform activities, conduct reviews, and provide verifications, according to the Contractor's internal processes, to confirm that the Service, and its systems, are being implemented in a manner that satisfies the requirements.

4.1.3.6.1 The Contractor shall conduct a Visiting Vehicle Integrated Avionics Test to validate performance and operations which includes:

(a) Hardware-In-The-Loop (HITL) test bed with flight-like hardware and software that includes:

(1) All elements of Visiting Vehicle avionics, software, and power management (power source and vehicle RF communications may be simulated),

(2) Simulated sensor inputs according to modelling of operations and environment.

(b) Performing test runs for:

(1) Nominal flight modes including Visiting Vehicle free flight and ISS-mated operation,

(2) Off-nominal flight modes including Visiting Vehicle free flight and ISS-mated operation and showing response/recovery to simulated failures and interruptions by the Contractor's Fault Detection Isolation and Recovery (FDIR) implementation.

4.1.3.6.2 The Contractor shall conduct a Launch Vehicle Integrated Avionics Test to validate performance and operations which includes:

(a) HITL test bed with flight-like hardware and software that includes:

(1) All elements of Launch Vehicle avionics, software, and power management (power source and vehicle RF communications may be simulated),

(2) Simulated sensor inputs according to modelling of operations and environment.

(b) Performing test runs for:

(1) Nominal Launch Vehicle flight modes,

(2) Off-nominal Launch Vehicle flight modes showing response/recovery to simulated failures and interruptions by the Contractor's FDIR implementation.

4.1.3.6.3 For Launch Vehicle Propulsion systems that are not in current US operation at equivalent performance, the Contractor shall conduct Risk Reduction activities which includes:

(a) Full mission duty cycle hot fire test(s) of liquid engine or solid propulsion motor, which includes:

- (1) Pre-test performance predictions and inspections,
- (2) Thrust Vector Control (TVC) system and demonstrating range of motion,
- (3) Engine/motor operating parameters, and propellant conditions that are representative of flight,
- (4) Engine/motor configuration and material condition matching the implementation on the flight vehicle,
- (5) Ignition/igniter system,
- (6) Post-test tear down, inspection, and analysis,
- (7) Post-test data assessment and report.

4.1.3.6.4 The Contractor shall perform activities, support reviews, follow processes, and provide products in accordance with the visiting vehicle responsibilities documented in SSP 50964, and in particular for this milestone;

- (a) Docking or Berthing Mechanism Acceptance Test,
- (b) ISS Power Quality and Electromagnetic Compatibility Test A and B,
- (c) Formal Integrated Software Stage Test (JT 4).

#### **4.1.3.7 ISS INTEGRATION CERTIFICATION MILESTONE 7**

The Contractor shall perform activities, conduct reviews, and provide verifications, according to the Contractor's internal processes, to confirm that the Service, and its systems, are being implemented in a manner that satisfies the requirements.

4.1.3.7.1 The Contractor shall perform activities, support reviews, and provide information in accordance with the Visiting Vehicle responsibilities in SSP 30599 and in particular for this Milestone;

- (a) ISS Visiting Vehicle Phase III Safety Review.

4.1.3.7.2 The Contractor shall provide evidence showing completion of all applicable non-NASA agreements and approvals that are required in order to perform any portion of the Contractor' Service, including (as applicable);

- (a) Agreements involving Foreign countries, including Contractor agreements with Foreign companies,

- (b) Launch Range Approval,
- (c) Landing Range Approval,
- (d) FAA Launch Approval,
- (e) FAA Reentry and/or Landing Approval,
- (f) FCC Approval,
- (g) NTIA Authorization.

## **4.2 CONFIGURATION MANAGEMENT**

The Contractor shall operate in compliance with the configuration management plan submitted in accordance with DRD CRS 1-2, Configuration Management Plan.

## **4.3 EXPORT CONTROL MANAGEMENT**

The Contractor shall operate in compliance with the Export Control Plan submitted in accordance with DRD CRS 1-3, Export Control Plan.

## **4.4 SCHEDULING**

The Contractor shall develop and maintain mission specific schedules that contain an end-to-end cargo and vehicle integration schedule in accordance with DRD CRS 2-2, Integrated Schedules.

## **4.5 DATA REVIEW FOR CREW PRIVACY**

Audio and imagery from within the pressurized volume will be protected in accordance with SSP 50521, Return, Processing, Distribution and Archiving of Imagery Products from the ISS, to protect crewmember privacy. For video taken during attached operations that is downlinked, the Contractor shall route the data in real-time to the NASA Mission Control Center. NASA will monitor the video feed and instruct the Contractor to terminate the feed from release to public outlets in the event of a privacy concern. For video and audio recorded during attached operations and recovered post-flight, the Contractor shall send a copy of the data to NASA for review. The Contractor shall not release any video with crewmembers in view until the NASA review is complete. NASA will tell the contractor if any data is restricted. Restricted data cannot be released by the Contractor, either internally or externally, or used in any way. Data that does not contain crewmembers video or audio data is not restricted and may be used by the Contractor without review. NASA will archive the data and any data not restricted will be classified as shared.

**ATTACHMENT V.B. DATA REQUIREMENTS LIST (DRL)**

The Data Requirements List (DRL) identifies critical elements of the contracted effort where NASA requires aspects of mission integration insight and approval. The following DRL defines the scope of documentation required; however, NASA will utilize the Contractor's existing documentation to the extent practical. Where there is not a direct match between a Data Requirement Description (DRD) item and the Contractor's standard documentation, the Contractor's documentation will be acceptable provided it contains equivalent data requirements.

DRD initial and recurring deliveries shall occur per the following Tables V.B.-1, DRDs Required Near Proposal Submission, through V.B-5, DRDs Required Post Flight.

DRD approval may be assumed unless the Contractor is notified by NASA of disapproval within thirty (30) days. Under certain circumstances, NASA may elect to eliminate certain submission cycles.

DRDs shall be maintained electronically in the Contractor's preferred format, unless a specified format is defined in the DRD. All electronic DRDs shall be submitted to the Program Repository via the Electronic Document Management System (EDMS) work. The Contractor shall notify the Contracting Officer electronically of the DRD delivery. When a DRD does not require an update from one mission to the next, the Contractor shall notify the Contracting Officer electronically prior to the due date that the product of the previous mission is still valid and need not produce a new one. Note: NASA will assist the Contractor in obtaining an EDMS account and provide training on the EDMS upload capabilities.

Nothing contained in this DRL provision shall relieve the Contractor from furnishing data not identified and described in the DRL attachment but called for by, or under the authority of, other provisions or as specified elsewhere in this contract.

Type 1 documents are to be provided for NASA's review and approval. Type 2 documents are to be provided for NASA's review. If no comments are received in 45 days, then the Type 2 document is considered complete.

**TABLE V.B-1 DRDS REQUIRED NEAR PROPOSAL SUBMISSION**

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference
<b>CRS 1-1</b>	Mishap Preparedness and Contingency Plan	Review	With Proposal	Updates at Program Reviews	II.A.19, VI.A.21, VII.B, SOW 2.10.4
<b>CRS 1-2</b>	Configuration Management Plan	Review	Contract Award +30 days	Updates at Program Reviews	SOW 4.2
<b>CRS 1-3</b>	Export Control Plan	Approve	Contract Award +30 days (draft); Contract Award +120 days (final)	Updates at Program Reviews	SOW 4.3
<b>CRS 1-4</b>	Mission Integration and Operations Management Plan (MIOMP)	Approve	With Proposal	Updates at Program Reviews	VI.A.21, VII.B, SOW 2.8.1, 2.8.3.3, 2.8.3.3.1, 2.8.3.3.4, 2.9.1.3, 2.9.1.3.1, 2.9.1.3.2, 2.9.1.3.3, 2.9.5, 4.0
<b>CRS 1-5</b>	Safety and Health Plan	Review	With Proposal	Updates at Program Reviews	II.A.19, VI.A.21, VII.B, SOW 2.10.4
<b>CRS 1-6</b>	Government Property Management Plan (PMP)	Review	Contract Award +30 days	Updates at Program Reviews	FAR 53.245, NFS 1845
<b>CRS 1-7</b>	Organizational Conflict of Interest Avoidance Plan	Review	With Proposal	Updates at Program Reviews	NFS 1852.237-72, NFS 1852.237-73

**TABLE V.B-2 RECURRING DRDS**

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference
<b>CRS 2-1</b>	Work Plan	Approve	With Proposal	Each mission at ATP -14 days and updates to keep current	II.A.1, II.A.3, VI.A.21, VII.B, SOW 2.8.1
<b>CRS 2-2</b>	Integrated Schedules	Review	T.O. Award +30 days	Updates only, monthly	SOW 4.4
<b>CRS 2-3</b>	Mission Resource Allocation Document (MRAD)	Approve	Initial: L- 10 months, Delta: L- 3 months Final: L- 1 month	Each Mission	SOW 2.8.2, 2.9.1, 2.9.2, 2.9.1.1, 2.9.1.3.2, 2.9.1.4, 2.9.1.4.1, 2.9.2, 2.9.5, 4.1.2.3

**TABLE V.B-3 DRDS REQUIRED NEAR VBR**

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference
<b>CRS 3-1</b>	Vehicle Interface Definition Document (IDD)	Approve	ISS Integration Milestone 3 (draft) ISS Integration Milestone 4 (final)	Updates as necessary	SOW 2.7.2, 2.9.2, 4.1.2.1, 4.1.2.1.1, 4.1.2.2, 4.1.2.4, 4.1.2.5, 4.1.2.6, DRD CRS 5-1, CRS 5-2
<b>CRS 3-2</b>	Unpressurized Cargo Interface Control Document	Approve	L-14 months(draft) L-10 months (final)	Each Mission	SOW 2.9.1.3, 2.9.2, 4.1.2.3
<b>CRS 3-3</b>	Launch Vehicle Flight Software Input for IV&V	Review	VBR for first mission	Updates at subsequent	SOW 2.11.1

Review				VBRs, as necessary	
<b>CRS 3-4</b>	Launch Vehicle Guidance, Navigation and Controls Input for IV&V	Review	VBR for first mission	Updates at subsequent VBRs, as necessary	SOW 2.11.1
<b>CRS 3-5</b>	Launch Vehicle Key Systems Qualification and Acceptance Data	Define Baseline and Changes	VBR	Updates, at subsequent VBRs	SOW 2.11.1, 4.1.2.2.1, 4.1.2.2.2, 4.1.2.4
<b>CRS 3-6</b>	Visiting Vehicle Safety Assessment/Hazard Reports	Approve	ISS Integration Milestone 3 (Phase I); ISS Integration Milestone 4 (Phase II); ISS Integration Milestone 7 (Phase III)	Each Mission	SOW 2.10.2.1, 2.10.2.2

(b) (4)

**TABLE V.B-4 DRDS REQUIRED NEAR MIR**

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference
<b>CRS 4-1</b>	Engineering Computer-Aided Design (CAD) Models	Review	L-18, L-12, L-10, L-6.5 months, L-9 weeks, L-25 days, L-1 week	Each Mission	SOW 2.8.2
<b>CRS 4-2</b>	Imagery Plan	Review	L-6 months	Each Mission	SOW 2.8.3.2
<b>CRS 4-3</b>	Pressurized Cargo Interface Control Document	Approve	L-8 months	Each Mission	SOW 2.9.1, 2.9.1.3
<b>CRS 4-4</b>	Mass Properties Data	Review	L-18, L-10, L-6.5,	Each Mission	SOW 2.8.2,

	L-4, L-1 month, and L-2 weeks.	4.1.2.2.1
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**TABLE V.B-5 DRDS REQUIRED POST FLIGHT**

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference
<b>CRS 5-1</b>	Post Delivery Assessment	Review	Cargo Delivery + 10 days	Per mission	II.A.2, SOW 2.7.2, 2.11.1, 4.1.2.5, 4.1.2.6, DRD CRS 3-1, CRS 5-3
<b>CRS 5-2</b>	Post Mission Assessment	Review	EOM+30 days	Per mission	II.A.2, SOW 2.7.2, 2.11.1, 4.1.2.6
<b>CRS 5-3</b>	Post Flight Report	Review	EOM+60 days	Per mission	II.A.2, SOW 4.1.2.6, DRD CRS 5-1, CRS 5-2

**ATTACHMENT V.C. DATA REQUIREMENTS DESCRIPTIONS****DATA REQUIREMENTS DESCRIPTION****(Based on JSC-STD-123)**

<b>1a. DRD Title:</b> Mishap Preparedness and Contingency Plan	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b> CRS 1-1	<b>3b. RFP/Contract No.</b> NNJ16GX08B
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 2 For NASA's review			<b>5. DRD Category</b> ___ Technical ___ Administrative <u>  X  </u> SR&QA
<b>6. References</b> (SOW, Clause, etc.) II.A.19, VI.A.21, VII.B, SOW 2.10.4		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

Contingency Action Planning involves planning and coordination between NASA and the Contractor before a mishap occurs and addresses responses. To provide NASA with an understanding of the Contractor's processes notifying NASA of mishaps, as well as how the Contractor plans to investigate and establish corrective action plans for mishaps that occur while performing the work required in support of this SOW.

**DATA REQUIREMENTS:**

1. **GENERAL:** Mishap reporting, investigation and corrective action requirements differ according to whether the specific mishap occurs on NASA property. Mishaps occurring on third party property will be handled in the same manner as those occurring on Contractor property.
2. **NASA MISHAP:** An unplanned event that results in at least one of the following:
  - a) Injury to non-NASA personnel, caused by NASA operations.
  - b) Damage to public or private property (including foreign property), caused by NASA operations
  - c) Occupational injury or occupational illness to NASA personnel.
  - d) NASA mission failure before the scheduled completion of the planned primary mission.

e) Destruction of, or damage to, NASA property except for a malfunction or failure of component parts that are normally subject to fair wear and tear and have a fixed useful life that is less than the fixed useful life of the complete system or unit of equipment, provided that the following are true: 1) there was adequate preventative maintenance; and 2) the malfunction or failure was the only damage and the sole action is to replace or repair that component.

2.1 Mishap classification shall occur as documented in NPR 8621.1, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping.

### 3. ONSITE MISHAPS OCCURRING ON NASA PROPERTY:

#### 3.1 Immediate Notification and Reporting of Mishaps Occurring on NASA Property.

a) Mishap Reporting. The Contractor shall notify the local safety office in accordance with local reporting requirements for all Type A or B injury and/or property damage mishaps occurring on NASA property while performing work in support of this SOW.

b) Emergency Reporting. All onsite emergencies, , immediately notify both emergency response (e.g., 911, fire, ambulance, Center security office) and a supervisor, management official, or a safety/health staff member of the circumstance of the mishap in accordance with the local emergency reporting requirements. The Contractor shall ensure that contract employees on NASA property know and comply with local safety, health and emergency response requirements. The Contractor's plan shall describe the processes required to accomplish this task.

### 4. MISHAPS OCCURRING ON CONTRACTOR PROPERTY, THIRD PARTY PROPERTY OR OTHER NON-NASA GOVERNMENT PROPERTY:

4.1. Immediate notification and reporting of mishaps occurring on Contractor property, Third Party property or other non-NASA Government Property. The Contractor shall immediately notify JSC Safety Office in the event of a Type A or B mishap occurs to NASA personnel or property while on Contractor, third party property or other non-NASA government property. The Contractor's plan describe the process through which notification will take place.

4.2. Mishap investigation and corrective action for mishaps on Contractor property, Third Party property, or other non-NASA Government Property.

a) An initial investigation by the Contractor is required for all mishaps which have been reported to NASA. NASA reserves discretionary authority to investigate mishaps which involve NASA personnel or resources regardless of location. The Contractor has the discretion to perform any collateral investigations. However, investigations implemented by NASA will take priority with regard to access to evidence, data, and witnesses. The proceedings of NASA investigations will remain confidential. The Contractor will have an opportunity to comment on the investigation report in accordance with NASA protocols.

b) Contractor Final Report. After the Contractor completes its investigation of the mishap and, when appropriate, has developed a plan of corrective action, the Contractor shall deliver this completed report to NASA within 15 days of completion. This plan will include any verification activities identified by the Contractor to ensure that corrective actions to be implemented by NASA or a third party have been implemented or, if applicable, accomplished.

## 5. MISHAPS OCCURRING POST LAUNCH AND PRIOR TO INTEGRATED OPERATIONS

5.1. Immediate notification and reporting of mishaps occurring post launch and prior to integrated operations. The Contractor shall immediately notify JSC Safety Office in the event of a Type A or B mishap occurs to NASA personnel or property post launch and prior to integrated operations. The Contractor's plan describe the process through which notification will take place.

5.2. Mishap Investigation and Corrective Action for Mishaps Occurring Post Launch and Prior to Integrated Operations.

a) An initial investigation by the Contractor is required for all mishaps which have been reported to NASA. NASA reserves discretionary authority to investigate mishaps which involve NASA personnel or resources regardless of location. The Contractor has the discretion to perform any collateral investigations. However, investigations implemented by NASA will take priority with regard to access to evidence, data, and witnesses. The proceedings of NASA investigations will remain confidential. The Contractor will have an opportunity to comment on the investigation report in accordance with NASA protocols.

b) Contractor Final Report. After the Contractor completes its investigation of the mishap and, when appropriate, has developed a plan of corrective action, the Contractor shall deliver this completed report to NASA within 15 days of completion. This plan will include any verification activities identified by the Contractor to ensure that corrective actions to be implemented by NASA or a third party have been implemented or, if applicable, accomplished.

## 6. MISHAPS OCCURRING DURING INTEGRATED OPERATIONS:

6.1 Immediate notification and reporting of mishaps occurring during integrated operations shall follow guidelines and requirements as documented in SSP 50190, Contingency Action Plan.

6.2 All CRS mishaps occurring during integrated operations will be considered NASA Mishaps, specifically an ISS Program Mishap.

a) Mishap investigation and corrective action shall be performed per SSP 50190. The Contractor has the discretion to perform any collateral investigations. However, investigations implemented by NASA will take priority with regard to access to evidence, data, and witnesses.

The proceedings of NASA investigations will remain confidential. The Contractor will have an opportunity to comment on the investigation report in accordance with NASA protocols.

b) Contractor Final Report. After the Contractor completes its investigation of the mishap and, when appropriate, has developed a plan of corrective action, the Contractor shall deliver this completed report to NASA within 15 days of completion. This plan will include any verification activities identified by the Contractor to ensure that corrective actions to be implemented by NASA or a third party have been implemented or, if applicable, accomplished.

## 7. MISHAPS OCCURRING AFTER INTEGRATED OPERATIONS:

7.1 Immediate notification and reporting of mishaps occurring after integrated operations. The Contractor shall immediately notify JSC Safety Office in the event of a Type A or B mishap occurs to NASA personnel or property after integrated operations. The Contractor's plan describe the process through which notification will take place.

7.2 Mishap investigation and corrective action for mishap occurring after integrated operations.

a) An initial investigation by the Contractor is required for all mishaps which have been reported to NASA. NASA reserves discretionary authority to investigate mishaps which involve NASA personnel or resources regardless of location. The Contractor has the discretion to perform any collateral investigations. However, investigations implemented by NASA will take priority with regard to access to evidence, data, and witnesses. The proceedings of NASA investigations will remain confidential. The Contractor will have an opportunity to comment on the investigation report in accordance with NASA protocols.

b) Contractor Final Report. After the Contractor completes its investigation of the mishap and, when appropriate, has developed a plan of corrective action, the Contractor shall deliver this completed report to NASA within 15 days of completion. This plan will include any verification activities identified by the Contractor to ensure that corrective actions to be implemented by NASA or a third party have been implemented or, if applicable, accomplished.

**FORMAT:** Contractor's format is acceptable.

**9. OPR:** NASA Safety and Mission Assurance

**10. FIRST SUBMISSION DATE:** Plan to be provided with proposal

**Frequency of Submission:** N/A

**Additional Submissions:** Updates at Program Reviews, as required

**11. MAINTENANCE:** N/A

**12. COPIES/DISTRIBUTION:**

**1 electronic copy:** Program Authorized Repository

**Program Authorized Repository Upload Notification:** NASA Contracting Officer Representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Configuration Management Plan	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  CRS 1-2	<b>3b. RFP/Contract No.</b>  NNJ16GX08B
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 1 For NASA CM's approval.			<b>5. DRD Category</b> — Technical <u>  X  </u> Administrative — SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW 4.2		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

This plan shall describe the assignment of responsibility organizationally and the procedures used in accomplishment of the specific configuration management (CM) requirements as required to support the requirements of this SOW.

**DATA REQUIREMENTS:**

This Configuration Management plan defines the requirements, responsibilities, and procedures for the Contractor's CM system pursuant to SSP 50123, Configuration Management Handbook, as it applies to this contract.

**FORMAT:** Contractor's format is acceptable.

**9. OPR:** NASA Configuration Management Office

**10. FIRST SUBMISSION DATE:** Contract Award plus 30 days

Frequency of Submission: N/A

Additional Submissions: Updates at Program Reviews, as required

**11. MAINTENANCE:** N/A

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Configuration Manager, Contracting Officer and Contracting Officer's Representative.

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Export Control Plan	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  CRS 1-3	<b>3b. RFP/Contract No.</b>  NNJ16GX08B
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 1 For NASA's approval.			<b>5. DRD Category</b> — Technical — <b>X</b> Administrative — SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW 4.3		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

The plan shall describe all export control activities related to the performance of the contract requirements.

**DATA REQUIREMENTS:**

The Contractor shall prepare and submit an Export Control Plan (ECP), describing the Contractor's planned approach for accomplishing contract functions while adhering to export laws, regulations and directives, including International Traffic in Arms Regulations (ITAR).

The ECP requires concurrence of the ISS Export Administrator.

**FORMAT:** Contractor's format is acceptable.

**9. OPR:** ISS Export Control

**10. FIRST SUBMISSION DATE:** Draft plan to be provided at Contract Award plus 30 days.

**Frequency of Submission:** N/A

**Additional Submissions:** Final plan shall be submitted for approval within 120 days after contract award. Updates, as required.

**11. MAINTENANCE:** Annual review

**12. COPIES/DISTRIBUTION:**

**1 electronic copy:** Program Authorized Repository

**Program Authorized Repository Upload Notification:** NASA Contracting Officer Representative, Contractor's Contracting Officer, others as negotiated:

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Mission Integration and Operations Management Plan (MIOMP)	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  <b>CRS 1-4</b>	<b>3b. RFP/Contract No.</b>  <b>NNJ16GX08B</b>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 1 For NASA's approval.			<b>5. DRD Category</b> _X_ Technical ___ Administrative ___ SR&QA
<b>6. References</b> (SOW, Clause, etc.) VI.A.21, VII.B, SOW 2.8.1, 2.8.3.3, 2.8.3.3.1, 2.8.3.3.4, 2.9.1.3, 2.9.1.3.1, 2.9.1.3.2, 2.9.1.3.3, 4.0		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

To define the various operations and processes, product delivery templates, and organizational interfaces necessary for the Contractor to implement the Integration and Operations (I&O) activities required for the Contractor's resupply missions.

**DATA REQUIREMENTS:**

This DRD covers the end-to-end array of principal functions carried out by the Contractor in the performance of contract I&O responsibilities, including:

- (a) Cargo capabilities as specified in SSP 50833, including:
  - (1) Standard cargo turnover schedule and location for pressurized cargo,
  - (2) Standard cargo turnover schedule and location for unpressurized cargo,
  - (3) Late stow pressurized cargo capacity and turnover schedule and location,
  - (4) Powered cargo capacity and turnover schedule and location,
  - (5) Launch and scrub turnaround capability and schedule,
  - (6) Early handover cargo capacity and return location and schedule.
- (b) Cargo manifesting and integration support and schedules.
- (c) Contractor to ISS Program Mission Integration support.
- (d) Vehicle flight operations documentation preparation.
- (e) Vehicle and unpressurized systems operations training.

- (f) Simulations and mission operations support as defined in JSC 35089.
- (g) Ground facility interfaces.
- (h) Data Management.

The Contractor will keep this document current with established processes, schedules, interfaces, and vehicle design modifications throughout the contract period. The document shall contain integrated text and graphics as required to describe and/or illustrate the various aspects of services provided, including process descriptions, schedule flows, facility and tool illustrations, organizational hierarchies, and any other information deemed necessary to accurately convey to the NASA the Contractor's operational processes.

The main body of this document shall be non-proprietary in nature and available for dissemination among the ISS Program. Any proprietary information may be included in appendices and access-controlled separately.

The following information shall be included under the corresponding principal function material:

### 1. Cargo Capabilities:

Define the Contractor's cargo capability and schedule flexibility in the following table:

**Cargo Capabilities Table**

<b>Cargo Type</b>	<b>Maximum Volume</b>	<b>Maximum Mass</b>	<b>Turnover Schedule</b>
<b>Standard Pressurized</b>	<b>TBP</b>	<b>TBP</b>	<b>L-TBP</b>
<b>Standard Unpressurized</b>	<b>TBP</b>	<b>TBP</b>	<b>L-TBP</b>
<b>Late Stow</b>	<b>TBP</b>	<b>TBP</b>	<b>L-TBP</b>
<b>Powered Cargo</b>	<b>TBP</b>	<b>TBP</b>	<b>L-TBP</b>
<b>Early Handover</b>	<b>TBP</b>	<b>TBP</b>	<b>Return + TBP</b>

### 2. Cargo Manifesting and Integration Support:

Presents a functional breakdown and description of how the Contractor works with the ISS Program Office, the COR, and hardware developers to establish a mission manifest within the capability of the vehicle and identify candidate non-NASA cargo. The processes shall include the collection and documentation of pertinent technical and operational data, establish mission manifests and execution, and physically integrate cargo into and out of the pressurized volume or the unpressurized carrier of the visiting vehicle both for nominal loading and unloading and launch scrub turn around scenarios.

**3. Mission Integration Support:**

Presents a functional breakdown and description of how the Contractor interfaces with the ISS Program Office to ensure the timely provision of data requirements to support the associated development of ISS mission integration documentation, and to provide the necessary data for ISS to determine pre-mission status and flight readiness.

**4. Mission Operations Process and Products:**

Presents a functional breakdown and description of how the Contractor manages the processes and products required in JSC 35089, Visiting Vehicle Operations Document, for the vehicle and cargo flown in the visiting vehicle pressurized module or unpressurized carrier.

**5. Vehicle Systems and Commercial Payload Operations Training:**

Presents a functional breakdown and description of how the Contractor manages the visiting vehicle, unpressurized carrier systems, and commercial payload training for the various NASA flight crews, console operators, and simulator instructors. This includes the approach to (1) development of training plans, study materials, and hardware and software aids; (2) development of training requirements and schedules; and (3) development and utilization of training mockups.

**6. Ground Facility Utilization:**

Presents a functional breakdown and description of the Contractor's approach to the utilization of (or support to the NASA utilization of) major Government and Contractor facilities during the preparation, execution, and post-flight phases of resupply mission operations.

**7. Data Management:**

Presents a functional breakdown and description of how the Contractor manages the visiting vehicle command and data. This includes the approach to development of vehicle, cargo and payload data requirements (including requirements for data processing, storage, and distribution), coordination of the method(s) by which this data is integrated into the standard ISS communication and data services, establishment of interfaces with NASA and non-NASA components of the air-to-ground communications network, coordination of the Contractor's data management plan with NASA.

**FORMAT:**

**9. OPR:** Transportation Integration, Mission Integration and Operations

**10. FIRST SUBMISSION DATE:** Plan to be provided with proposal.

Frequency of Submission: N/A

Additional Submissions: Updates at Program Reviews, as required

**11. MAINTENANCE:** N/A**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated.

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Safety and Health Plan	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  CRS 1-5	<b>3b. RFP/Contract No.</b>  NNJ16GX08B
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 2 For NASA's review.			<b>5. DRD Category</b> ___ Technical ___ Administrative __X SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW 2.10.4, II.A.19, VI.A.21, VII.B		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

A detailed Safety and Health Plan is submitted to show how the Contractor intends to protect the life, health, and well-being of the public, employees as well as property and equipment. The plan should include detailed discussions of the policies, procedures, and techniques for all anticipated working conditions that will be encountered throughout the performance of the contract.

If the Contractor will conduct work or be located on a NASA site or in a NASA facility, the Safety and Health Plan should discuss measures to be taken to ensure the protection of property, equipment, and the environment in the production of Contractor deliverables and/or in the pursuit of any of its activities.

**DATA REQUIREMENTS:**

The Safety and Health Plan should contain the following information:

**1.0 MANAGEMENT LEADERSHIP AND EMPLOYEE PARTICIPATION.**

1.1 Policy. Provide the Contractor's corporate safety policy statement. Compare this policy statement with those of NASA and OSHA and discuss any differences.

1.2 Goals and Objectives. Describe specific goals and objectives of the Safety and Health Plan.

1.3 Management Leadership. Describe the process and procedures for implementing management commitments to safety and health through visible activities and initiatives including the exercise of controls to ensure workplace safety and health.

1.4 Employee Involvement. Describe procedures to implement and promote employee (e.g., non-supervisory) involvement in safety and health program development, implementation, and decision making. Describe the scope and breadth of employee participation so that all safety and

health risk areas are addressed.

1.5 Assignment of Responsibility. Describe the line and staff responsibilities for safety and health program implementation. Identify, by title, the official(s) responsible for implementing the proposed Safety and Health Plan. Identify all formal contacts with regulatory agencies and with NASA.

1.6 Accountability. Describe the procedures for ensuring that management and employees will be held accountable for implementing their tasks in a safe and healthful manner.

1.7 Program Evaluation. Describe the method to be used for internal safety and health program reviews and evaluations. When a written program review and evaluation is requested, it should be delivered to the Government no later than 30 days after the end of each contract year or at the end of the contract, whichever is applicable. Distribution of these program reviews and evaluations will be the same as that for the Safety and Health Plan.

1.8 The prospective Contractor will describe the approach to be taken to document its safety and health program performance to provide necessary visibility and insight into activities that could affect NASA employees or property.

1.9 Government Access to Safety and Health Program Documentation. The Contractor shall recognize in its plan that it will be expected to make all safety and health documentation (including relevant personnel records) available for inspection or audit at the Government's request.

**2.0 WORKPLACE ANALYSIS.** Describe the method and techniques the Contractor will use to systematically identify the hazards within the workplace for the duration of the contract.

2.1 Employee Reports of Hazards. The Contractor will identify the methods to be used to encourage employees to report hazardous conditions (e.g., close calls) and analyze/abate hazards. The Contractor will describe steps to be taken to create reprisal-free employee reporting with emphasis on management support for employees.

### **3.0 MISHAP TRENDING ANALYSIS.**

3.1 Trend Analysis. The Contractor will describe the approach to be used to perform trend analysis of data (occupational injuries and illnesses; facilities, systems, and equipment performance; etc.). The discussion should include methods to identify and abate common cause failures or occurrences indicated by the trend analysis. Further, the Contractor should describe how the results of these trend analysis will be shared with employees so that they are aware of potential safety problems or hazards.

(a) Log of Occupational Injuries and Illnesses. For each location on or off NASA property that performs work on this contract, the Contractor will deliver to the Government (under separate Contractor's cover letter), a copy of an annual summary of occupational injuries and

illnesses (or equivalent) as described in 29 CFR Part 1904.32, Annual Summary. If Contractor is exempt by regulation from maintaining and publishing such logs, equivalent data in the Contractor's format is acceptable (such as loss runs from insurance carrier). This data will be compiled and reported each calendar year and provided to the Government within 45 days after the end of the year to be reported.

**4.0 HAZARD PREVENTION AND CONTROL.** Identified hazards must be eliminated or controlled. Describe the approach to implementing this requirement.

4.1 Hazardous Operations. Identify Contractor policies and procedures for the management and implementation of hazardous operations procedures.

**5.0 SAFETY AND HEALTH TRAINING.** Describe the Contractor's training program including the identification of responsibility for training employees in safe work practices, hazard recognition, and appropriate responses (including protective and/or emergency countermeasures).

**FORMAT:**

**9. OPR:** NASA Safety and Mission Assurance

**10. FIRST SUBMISSION DATE:** Plan to be provided with proposal

Frequency of Submission: N/A

Additional Submissions: Updates at Program Reviews, as required

**11. MAINTENANCE:** N/A

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Government Property Management Plan	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b> <b>CRS 1-6</b>	<b>3b. RFP/Contract No.</b> <b>NNJ16GX08B</b>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 2 For NASA review.			<b>5. DRD Category</b> — Technical — <input checked="" type="checkbox"/> Administrative — SR&QA
<b>6. References</b> (SOW, Clause, etc.) FAR 52.245, NFS 1845		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

The Government Property Management Plan defines the Contractor's use, maintenance, repair, protection, and preservation of Government personal property. The Plan shall describe the Contractor's approach to receiving, handling, stocking, maintaining, protecting, and issuing Government property. The Plan should include interaction and Departmental/Office responsibilities. The Contractor shall submit to the delegated Government Property Administrator (GPA) detailed supplemental property procedures (NFS 1852.245-80), which are separate from this plan, no less than 60 days after the contract start date.

**DATA REQUIREMENTS:**

This Plan shall reference those policies and procedures, which constitutes the Contractor's Property Management Manual and shall include at a minimum the following categories:

- A. Property Management,
- B. Acquisition of Property,
- C. Receipt of Government Property
  - 1. Receiving
  - 2. Identification,
- D. Records of Government Property,
- E. Physical Inventory,
- F. Subcontractor Control,

G. Reports,

H. Relief of Stewardship

1. Loss, Theft, Damage, Destruction
2. Consumed
3. Delivered
4. Contractor Inventory Disposal
5. Abandonment of Government Property.

I. Utilizing Government Property

1. Utilization
2. Consumption
3. Movement
4. Storage.

J. Maintenance,

K. Property Closeout,

L. Reconcile Contractor Records with NASA Financial Property Records (NASA Form 1018 and CHATS if applicable),

M. JSC-Unique Considerations (as they arise or known now).

**FORMAT:** Contractor's format is acceptable

**9. OPR:** NASA Property Office

**10. FIRST SUBMISSION DATE:** Contract Award plus 30 days

Frequency of Submission: N/A

Additional Submissions: As required, after coordination with the GPA

**11. MAINTENANCE:** N/A

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Configuration Manager, Contracting Officer and Contracting Officer's Representative, and GPA.

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Organizational Conflicts of Interest Avoidance Plan	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  <b>CRS 1-7</b>	<b>3b. RFP/Contract No.</b>  <b>NNJ16GX08B</b>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) To document the Contractor's comprehensive management approach and implementation methods for avoiding, neutralizing, and mitigating organizational conflicts of interest.  Type 1: for NASA approval			<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 1852.237-72 and NFS 1852.237-73, VI.A.20, VII.A		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

(a) Content: The OCI Plan shall discuss the following:

(1) Purpose: A summary of the Contractor's rationale for instituting and applying the OCI Plan;

(2) Update Criteria: A description of the criteria and process for determining when an update to the plan is required;

(3) OCI Assessment Methodology: A summary of the general methodology use to avoid, neutralize, or mitigate OCI issues;

(4) OCI Risks: A description of potential OCI risks, due to the Contractor's relationships or potential relationships with the Government, other companies, and other contracts. The description shall characterize the risk and measures to avoid, neutralize, or mitigate each OCI threat;

(5) Personnel Clearance Procedures: A description of the procedures the Contractor will use if needed to identify and partition Contractor personnel requiring access to or participation in activities that would otherwise create an OCI issue;

(6) OCI Response Procedures: A summary of the steps that the Contractor will take when an OCI has been identified of when circumstances have changed such that an OCI issue is probable; and

(7) OCI Training: A description of the training to be provided to Contractor personnel regarding potential OCIs on this contract.

**FORMAT:** Contractor's format is acceptable.

**9. OPR:** Transportation Integration

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

Frequency of Submission: Updates at Program Reviews, if required

Additional Submissions: Updates at Program Reviews, if required

**11. MAINTENANCE:****12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: Contracting Officer and Contracting Officer's Representative.

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Work Plan	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  <b>CRS 2-1</b>	<b>3b. RFP/Contract No.</b>  <b>NNJ16GX08B</b>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 1 For NASA's approval.			<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.) II.A.1, II.A.3, SOW 2.8.1, VI.A.21, VII.B		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

The Work Plan will establish the schedule milestones, payment milestones and completion criteria for each mission. The first flight work plan will also contain the milestones for initial ISS Integration.

**DATA REQUIREMENTS:**

(a) For initial ISS integration, the Contractor shall submit with the first flight work plan that contains:

(1) Milestone events, by name and description of the milestone event, corresponding to the payment number for ISS integration

(2) Number of months after contract ATP (ATP+)

(3) An accomplishment criteria narrative (i.e., describe accomplishments and progress in terms of activities completed prior to the payment event).

(b) For each mission scheduled to deliver cargo to ISS, the Contractor shall submit a work plan that contains:

(1) Milestone events, by name and description of the milestone event, corresponding to the payment number

(2) Number of months before (L-) launch

(3) An accomplishment criteria narrative (i.e., describe accomplishments and progress in terms of activities completed prior to the payment event).

**FORMAT:** Contractor's preferred format.

**9. OPR:** Transportation Integration

**10. FIRST SUBMISSION DATE:** First flight and ISS Integration Plan to be provided with proposal

Frequency of Submission: Updates, as necessary (per mission)

Additional Submissions: Each mission, ATP minus 14 days

**11. MAINTENANCE:** N/A

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:** N/A

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

<b>1a. DRD Title:</b> Integrated Schedules	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  <b>CRS 2-2</b>	<b>3b. RFP/Contract No.</b>  <b>NNJ16GX08B</b>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 2 For NASA's review.			<b>5. DRD Category</b> — Technical — <input checked="" type="checkbox"/> Administrative — SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW 4.4		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

To provide integrated Program schedules using established standard processes, data structures and reporting conventions to plan, manage, and report the work required in the performance of this SOW. Schedules typically include, at a minimum, an Integrated Master Schedule (IMS) and production schedules.

**DATA REQUIREMENTS:**

(a) The Contractor shall provide schedules which clearly depict the interrelationships and constraints among related tasks. 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 schedules shall be developed, maintained (updated), and provided to ensure a consistent, accurate, and stable scheduling approach that provides for the identification, coordination, sequencing, control, implementation and tracking of all required activities.

(c) The approach shall provide the ability to fully identify, analyze, mitigate and control scheduling risks and impacts; accurately identify and analyze critical path activities; and allow its users to easily measure the progress towards achieving the intended plan.

(d) The approach shall not only represent the scheduled work for that activity, but also the requirements commitment from all interfacing organizations.

(e) Schedule consistency as used in this DRD is defined as the degree to which the Contractor utilized standardized scheduling approaches between similar processing activities and flows. Accurate scheduling as used in this DRD is defined as the accurate representation of work content and tasks duration (predicted vs. actuals). A stable schedule as used in this DRD

refers to the degree to which daily schedule changes are minimized and limited to unforeseen hardware or software problems or NASA-directed changes.

(f) Schedules shall also include detailed production schedules for the launch vehicle and visiting vehicle, ISS Integration milestones, SSP 50808 and SSP 50833 verification closures, DRD deliverables, and any NASA-provided data needed by the Contractor to meet SOW requirements.

**FORMAT:** Microsoft Project

**9. OPR:** Transportation Integration

**10. FIRST SUBMISSION DATE:** Task Order award plus 30 days.

Frequency of Submission: Updates, monthly until contract end

Additional Submissions: N/A

**11. MAINTENANCE:** N/A

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Mission Resource Allocation Document (MRAD)	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  <b>CRS 2-3</b>	<b>3b. RFP/Contract No.</b>  <b>NNJ16GX08B</b>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 1 For NASA's approval.			<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 2.8.2, 2.9.1, 2.9.1.1, 2.9.1.3.2, 2.9.1.4, 2.9.1.4.1, 2.9.2, 2.9.5, 4.1.2.3		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

To establish the allocation of resources and the technical requirements for integration of the cargo elements and their support hardware with the visiting vehicle pressurized and unpressurized (as warranted) volumes for each resupply mission. The associated analyses will provide the required assessment to show cargo compatibility with the associated vehicle environments defined in the IDD and vehicle compatibility with SSP 50808, International Space Station (ISS) to Commercial Orbital Transportation Services (COTS) Interface Requirements Document (IRD), and SSP 50833, International Space Station Cargo Transport Interface Requirements Document.

The Contractor shall provide an initial MRAD that addresses specific technical and operational issues pertaining to each proposed cargo item and contain recommendations for combining the proposed cargo items into an optimized pressurized and unpressurized configuration based on the priorities of the proposed cargo item and overall resource allocation.

The initial MRAD shall be required for the first Contractor flight under this contract for both pressurized and unpressurized cargo. For subsequent flights, the initial MRAD shall focus on the specific unpressurized cargo only (as applicable) and the pressurized cargo incorporated in the Delta MRAD deliverable.

The Contractor shall provide a Delta MRAD that contains the updated analytical data as reported in the initial MRAD but is based on the NASA updated cargo complement and configuration.

The Contractor shall provide a Final MRAD that contains the analytical data required for the final cargo complement and configuration.

The Delta and Final reports shall be in response to the updated NASA cargo complement delivered NLT L-5 months and L-6 weeks, respectively. The Contractor's response shall contain an optimized pressurized and unpressurized configuration based on the priorities of the proposed cargo item and overall resource allocation. Any technical or operational issues that could not be resolved shall be documented in the report with a recommended forward action plan. This report shall also capture the final planning and associated milestones with vehicle design changes that may affect the requirements in SSP 50808 and SSP 50833 and associated analytical products necessary for the berthing/docking of the Contractor's visiting vehicle.

#### **DATA REQUIREMENTS:**

The Contractor's format will be acceptable, except for those sections concerned with stowage and labeling data for payloads on ISS logistics missions.

(a) The MRAD shall be the source of accurate data pertaining to the mission-unique mass, volume, power, and other resources allocated to each cargo item, and its supporting hardware. All data shall be updated with the latest cargo complement.

(b) The following categories of requirements shall be included in the specific MRAD as required by the DRD delivery schedule:

	<b>Initial MRAD (L-10 Months)</b>	<b>Delta MRAD (L-3 Months)</b>	<b>Final MRAD (L-1 Month)</b>
1	Initial physical configuration of the visiting vehicle pressurized module and unpressurized carrier volumes, including ascent, on-orbit, and return/disposal stowage configurations (cargo layouts).	Updated physical configuration of the visiting vehicle pressurized module and unpressurized carrier volume.	Final physical configuration of the visiting vehicle pressurized module and unpressurized carrier volume for cargo delivery and final physical configuration of the visiting vehicle for cargo return/disposal.
2	Initial mass and volume allocations for each individual pressurized and unpressurized cargo item and its support hardware	Updated mass and volume allocations.	Final mass and volume allocations.
3	Mission complement electrical power and energy for all mission phases	Updated mission complement electrical power and energy for all mission phases	Final mission complement electrical power and energy for all mission phases
4	Initial identification of vehicle command and data interface and operations	Updated identification of vehicle command and data interface and operations	Final identification of vehicle command and data interface and operations
5	Thermal/environmental assessment	Updated thermal/environment	Updated thermal/environment

	including mission specific analysis for all unpressurized cargo and flight profile. See details in paragraph below.	assessment	assessment
6	The Contractor shall supply thermal and material data consistent with BDEALS in SSP 50964 for contamination assessments as part of specific timeline/manifest thermal analysis of the unpressurized volume. The thermal data shall encompass the expected on-orbit temperature range over the expected range of beta angles with temperature mapping to external material data sets for both unpressurized structure surfaces exposed to cargo and the corresponding cargo external surfaces. The thermal data shall include max/min operating temperatures and percent time spent within the specified temperature ranges (bins) accounting for the expected range of orbital temperature profiles. The temperature range bins for the vehicle and unpressurized cargo thermal nodes will be worked on a case-by-case basis.	Updated thermal and material data	Updated thermal and material data
7	Initial visiting vehicle dynamics analysis	Final visiting vehicle dynamics analysis	
8	Initial identification of vehicle robotic/ berthing and docking interface and operations	Final identification of vehicle robotic/ berthing and docking interface and operations	
9	Initial visiting vehicle structural math model	Final visiting vehicle structural math model	
10	Initial visiting vehicle thruster plume and firing history, propellant types	Final visiting vehicle thruster plume and firing history, propellant types	
11	Coupled Loads Analysis (1 or	Updated CLA and reports, as	Updated CLA and reports, as

	<p>more),</p> <p>(i) Report shall include sensitivity of ORU response to cargo configuration (location and mass),</p> <p>(ii) Report shall include expected cargo environment during all phases of flight and associated margins against NASA-provided environmental limits.</p> <p>(iii) Report shall include results from Loads, Random Vibe, Shock, and Acoustics assessments.</p>	required.	required.
12	Initial late access and/or early retrieval plan	Updated late access and/or early retrieval plan	Final late access and/or early retrieval plan
13	Flight operations support, standards for console time and plan for Certification status of support personnel	Updated flight operations support plans	Final flight operations support plans
14	Initial mission-unique hardware and government furnished equipment (GFE) plan	Updated mission-unique hardware and GFE plan	Final mission-unique hardware and GFE plan
16	Initial Interface and Equipment Interface Test Dates	Updated Interface and Equipment Interface Test Dates	Final Interface and Equipment Interface Test Dates
17	Any vehicle design changes that may affect the requirements in SSP 50808 and SSP 50833 and associated analytical products necessary for the berthing/docking of the Contractor's on-orbit vehicle.	Updated analytical products necessary for the berthing/docking of the Contractor's on-orbit vehicle.	Final analytical products necessary for the berthing/docking of the Contractor's on-orbit vehicle.
18	N/A	Initial IMS Bar Code Report including Transfer Bag or Item Name (from label), serial number, IMS bar code label and size	Final IMS Bar Code Report

Preflight Mission Specific Timeline/Manifest Thermal Analysis (item 5 in table):

The Contractor shall perform mission specific timeline analysis of the integrated unpressurized cargo manifest covering the full range of solar constant and ISS beta angle and using cargo provided thermal models to verify thermal compatibility of the manifest from launch through initiation of cargo deployment at the applicable ISS ports, including definition of any necessary flight attitude trajectory timeline and solar beta angle constraints, addressing ISS interface requirements (e.g. Passive Common Berthing Mechanism [PCBM], docking adapter, grapple fixture) and cargo compatibility. Results shall include transient plots of ISS interface requirements and all cargo and FSE critical nodes with time-to-limits noted and summarized, and a summary of cargo heater power usage and duty cycle. The Contractor shall also provide analysis of unpressurized cargo disposal with a reduced scope defined on a case-specific basis.

**FORMAT:** Contractor's preferred format

**9. OPR:** Transportation Integration

**10. FREQUENCY OF SUBMISSION:** Initial MRAD at L-10 months, Delta MRAD at L-3 months, Final MRAD at L-1 month

Additional Submissions: Each Mission, per frequency

**11. MAINTENANCE:** N/A

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Vehicle Interface Definition Document (IDD)	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  CRS 3-1	<b>3b. RFP/Contract No.</b>  NNJ16GX08B
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 1 For NASA's approval.			<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 2.7.2, 2.9.2, 4.1.2.1, 4.1.2.1.1, 4.1.2.2, 4.1.2.4, 4.1.2.5, 4.1.2.6		<b>7. Interrelationships</b> (e.g., with other DRDs) CRS 5-1, CRS 5-2	

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

**DESCRIPTION/PURPOSE:**

To provide NASA with an understanding of the Contractor's vehicle environments (launch, on-orbit, and landing) so that NASA can perform end item certification on individual cargo and payload items to ensure survivability in accordance with SSP 50808 and SSP 50833 requirements.

**DATA REQUIREMENTS:**

The environments shall include low frequency loads, random vibration loads, acoustic loads, thermal loads, pressure loads, and shock. Environments shall be reported at the cargo/payload interface with the visiting vehicle. The Contractor shall specify any vehicle constraints.

The Contractor shall provide an instrumentation plan for translation from flight instrumentation to the cargo interface of interest. This plan shall be provided at the VBR, updated at the MIR, and finalized at the CIR. The plan shall include location and type of sensors, sampling rate, and downlink method and bandwidth for each mission phase and for all cargo environments.

Launch and landing load factors and rotational accelerations shall be provided in the following reference frame:  $N_x(g)$ ,  $N_y(g)$ ,  $N_z(g)$ ,

$$R_x(\text{rad/sec}^2), R_y(\text{rad/sec}^2), R_z(\text{rad/sec}^2)$$

X: The longitudinal axis of the vehicle. Positive x axis extends from the base or bottom of the cargo vehicle to the nose of the cargo vehicle

Y: Y axis is perpendicular to the x axis.

Z: Z axis is perpendicular to the x and y axes and completes the right-handed coordinate system

Random vibration environments shall be provided in each axis from 20-2000 Hz at the cargo/payload interface to the visiting vehicle. The overall grms values shall be reported. The duration of the excitation shall be reported.

Acoustic environments shall be provided 1/3-octave band format, starting from a 31.5 Hz center frequency and extending to a 2500 Hz center frequency, at the cargo/payload interface. The overall acoustic environment shall also be provided. A reference sound pressure level of  $2 \times 10^{-5}$  N/m<sup>2</sup> shall be used to report the acoustic environment in terms of decibels.

Shock environments shall be provided from 10-10000 Hz at the cargo/payload interface. The response shall be reported in units of peak acceleration.

Load spectrums shall be provided which cover the expected loading events for one flight (launch, free-flight, berthing/docking) at the cargo/payload interface. The spectrum shall be divided by a minimum of 10% amplitude tiers.

Pressure and thermal environments for pressurized and unpressurized cargo interfaces in the visiting vehicle shall be provided.

The Contractor shall provide a Vehicle Reduced Thermal Model and a Thermal Design Reference Mission, in accordance with SSP 50808 and SSP 50833. These will allow unpressurized cargo developers to perform thermal design verification in support of the cargo design cycle.

(a) Reduced Thermal Model:

(1) Defines the induced external thermal environment to be commonly used by all ISS participants for their on-orbit thermal analysis and enable the thermal design of space station elements against a consistent set of external thermal parameters.

(2) NASA performs an overall space station thermal integration analysis that defines the thermal interface characteristics of the ISS components based on the thermal math models of the ISS elements. The model:

- (i) Shall be suitable for ISS integration and usage by all ISS participants, including developers of unpressurized cargo.
- (ii) Shall define the induced external thermal environment to be commonly used by all ISS participants for their on-orbit thermal analysis and enable the thermal design of space station elements against a consistent set of external thermal parameters.
- (iii) Shall include thermal radiation math models (TRMM) which reflect the geometry and thermo-optical properties of the hardware, and Passive Thermal Math Models (PTMM) which represent the thermal network.

(b) Thermal Design Reference Mission (TDRM):

- (1) The TDRM shall be defined and documented with the following attributes:
  - (i) Enveloping flight attitude trajectory timeline for on-orbit free-flight through rendezvous and mating to applicable ISS ports
  - (ii) COTS vehicle clocking orientations at applicable ISS ports
  - (iii) Enveloping flight attitude trajectory timeline for ISS un-mating from applicable ISS port through start of descent for disposal/return missions
  - (iv) Nominal capability to control exposure to direct sun and deep space during on-orbit free-flight, and limit exposure while attached to ISS, in order to maintain thermal conditioning of unpressurized cargo. Generic representations of unpressurized cargo passive heat rejection capability will be provided by NASA.
  - (v) Natural Environments
  - (vi) ISS solar beta range from -75 to +75 deg
  - (vii) Altitude

**FORMAT:** IDD and TDRM in Contractor's preferred format. The thermal model shall be compatible with Thermal Desktop model software. If models are converted from alternate format, models shall be re-verified after conversion and prior to delivery. Refer to JSC 66617, ISS PTCS Analysis Guide, for additional information. Note for unpressurized cargo models, TRMM shall also be TRASYS compatible and PTMM shall also be SINDA/FLUINT compatible in order to facilitate ISS integration and sustaining requirements.

**9. OPR:** Transportation Integration

**10. FIRST SUBMISSION DATE:** Draft to be provided at ISS Integration milestone 3.

**Frequency of Submission:** N/A

**Additional Submissions:** Baseline to be provided at ISS Integration milestone 4; updates as necessary.

**11. MAINTENANCE:** N/A

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Unpressurized Cargo Interface Control Document	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  CRS 3-2	<b>3b. RFP/Contract No.</b>  NNJ16GX08B
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 1 For NASA's approval.			<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 2.9.1.3, 2.9.2, 4.1.2.3		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

The Unpressurized Cargo Interface Control Document (ICD) is designed to provide the requirements definition and interface details between the visiting vehicle and the unpressurized cargo. The ICD will evolve as mission requirements are identified. An ICD will be required for each individual unpressurized cargo item (launch and/or disposal).

A draft ICD is required to facilitate discussions to finalize requirements and verifications that need to be baselined.

**DATA REQUIREMENTS:**

The cargo ICD shall define, to the extent required by each specific cargo item, the hardware interfaces and resource requirements, ground processing requirements, safety and interface verification requirements, and operational requirements. The final ICD shall include verifications along with the agreed-to method for closure, and shall be signed by the Contractor, ISS Unpressurized Cargo Integration Office, and the specific cargo provider.

Each ICD shall follow a standard template across all missions and cargo items.

**FORMAT/CONTENTS**

**9. OPR:** Transportation Integration

**10. FREQUENCY OF SUBMISSION:** L-18 months (template), L-14 months (draft); L-10 months (final)

Additional Submissions: Each Mission

**11. MAINTENANCE:** The final ICD shall be baselined and kept under configuration control. All changes post ICD baseline shall be included in ICD revisions and agreed to/signed by the Contractor, ISS Unpressurized Cargo Integration Office, and the specific cargo provider.

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA Unpressurized Cargo Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Launch Vehicle Flight Software Input for IV&V Review	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  <b>CRS 3-3</b>	<b>3b. RFP/Contract No.</b>  <b>NNJ16GX08B</b>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 2 For NASA review.			<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 2.11.1		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

Assessments consist primarily of documentation and data review by the NASA flight software team. The focus is on technical adequacy and robustness to support mission success consistent with risk posture. Evaluation criteria are based on prior independent verification and validation (IV&V) efforts, NASA standards and industry practices.

- (a) Allocation of roles and responsibilities of groups.
- (b) Established system configuration, capability, and constraints.
- (c) Internal and external compatibility.
- (d) Established software processing capabilities and constraints.
- (e) Completeness and testable requirements.
- (f) Adherence to coding standards and verify design to code conformance.
- (g) Hardware in the loop test facilities capability, test plan, data management process, and run review approach.
- (h) Accurate delivery for flight use.
- (i) Scope of development tool use and potential risk points.

**DATA REQUIREMENTS:**

- (a) Organization documents – Org chart, product team, software quality assurance (SQA), Office of the Chief Engineer (OCE), and analysis role and responsibility documents.
- (b) Vehicle system description – Vehicle overview, Avionics component ICDs, flight computer specification.

(c) Development process documents – Software development plan and process, change review board charter, and change tracking data base.

(d) Requirements documents and data base reports – System and derived requirements documents. Tracking data base. Requirements to design and test trace matrices, but NASA can generate the trace products independently if need be.

(e) Design documents – Program flow diagrams or equivalent. Algorithm derivation documents.

(f) Implementation – Source code, under a mutually agreed Data Protection Plan. Code table top review. As built code products include unit testing plan and results, build scripts, compiler options file, build library description.

(g) Release process – Configuration management plan, pedigree review plan, media release process, and process for configuration control on flight vehicle.

(h) Development Tools – Input parameter processing and code generation scripts.

(i) Models – Simulation code used for developmental test.

(j) Qualification and Acceptance test – System integration lab (SIL) test facilities capability documentation, test plan, test case matrices with description of nominal and off-nominal cases, data management plan, test review process, requirements to test closure, identify and describe any differences between as-tested and as-to-be-flown software, test results, and data if specific areas of concern are found. Includes Hardware-Out-Of-The-Loop, Hardware-In-The-Loop and Vehicle-In-The-Loop tests.

**FORMAT:**

**9. OPR: LSP**

**10. FIRST SUBMISSION DATE: VBR for first mission**

Frequency of Submission: N/A

Additional Submissions: Updates only, at subsequent mission VBRs

**11. MAINTENANCE: N/A**

**12. COPIES/DISTRIBUTION:**

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Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Launch Vehicle Guidance, Navigation and Controls Inputs for IV&V	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  <b>CRS 3-4</b>	<b>3b. RFP/Contract No.</b>  <b>NNJ16GX08B</b>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 2 For NASA's review.			<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 2.11.1		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

NASA will perform independent analyses to assess adequacy and robustness of the Contractor's Guidance, Navigation, and Control (GN&C) design and compare with Contractor's GN&C analysis results and flight data, if vehicle has flown. Independent vehicle model will be built using NASA's Universal Controls Analysis Tool (UCAT). NASA will perform nominal and dispersed linear stability analyses to assess adequacy of autopilot stability margins. Analysis will include effects of aerodynamics, bending, propellant slosh, and actuator and sensor dynamics. NASA will also perform Nonlinear GN&C Simulation Analysis. This includes nominal and dispersed nonlinear time-domain simulations to assess robustness of GN&C design, including gimbal margins, consumables margins, and injection accuracy. Analysis will include effects of aerodynamics, bending, propellant slosh, actuator and sensor dynamics, and winds.

Flight software model can incorporate Contractor's flight software code directly (preferred) or a model can be built using Contractor's flight software algorithm description documentation. Analyses will be performed for a selected mission which may or may not have been previously flown, but for which Contractor analysis results are available. Data can be provided in formats already used by Contractor, though Matlab or NASA's WinPlot are preferred.

**DATA REQUIREMENTS:**

(a) Flight software code and/or flight software documentation (preferred). NASA can also build a model using Contractor's flight software algorithm description documentation; Contractor code results in a higher-fidelity simulation with mutual benefit.

(b) Flight software parameters.

(c) Vehicle characteristics:

- (1) Propulsion characteristics,
  - (2) Aerodynamics parameters,
  - (3) Mass properties,
  - (4) Bending mode parameters,
  - (5) Propellant slosh characteristics (or tank geometry description),
  - (6) GN&C sensor and actuator dynamics parameters.
- (d) Flight data, if selected mission has flown. Data shall be transmitted electronically.
- (e) Contractor linear stability and nonlinear simulation analysis results and reports.

**FORMAT:****9. OPR:** LSP**10. FIRST SUBMISSION DATE:** VBR for first mission

Frequency of Submission: N/A

Additional Submissions: Updates only, at subsequent mission VBRs

**11. MAINTENANCE:** N/A**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Launch Vehicle Key Systems Qualification and Acceptance	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  <b>CRS 3-5</b>	<b>3b. RFP/Contract No.</b>  <b>NNJ16GX08B</b>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 2 For NASA's review.			<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 2.11.1, 4.1.2.2.1, 4.1.2.2, 4.1.2.4		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

The Contractor shall provide qualification rationale and data for its launch vehicle liquid engines, solid motors, igniters, stage-level propulsion systems, and system-level separation tests. The Contractor shall provide acceptance rationale and data for the mission-specific engines, motors, igniters, stages and separation components. The Contractor shall provide systems and component specifications, success criteria for qualification and acceptance tests, and rationale for those criteria. The rationale could include environmental prediction analyses and performance requirements. This evidence demonstrates the components and systems were tested in a manner consistent with how they will be used in flight, have sufficient margin to their maximum expected environments and to their minimum required performance and are acceptable for flight.

**DATA REQUIREMENTS:**

For liquid engines, solid motors, stage propulsion systems, igniters, and separation components and systems, the following shall be provided:

(a) System and Component Specifications including performance requirements.

(b) Qualification and Acceptance Plans including:

(1) Design and qualification requirements. Rationale for the requirements such as environmental predictions, factors of safety, performance requirements, and Contractor or industry standards. Industry standards may be provided by reference if publicly available

(2) Planned verification methods (Test, Analytical, Demonstration and/or Inspection), procedures, success criteria, assumptions, rationale, and comparisons to any similar proven designs.

(c) Test Readiness Review package including description of test apparatus, test sequence and levels, configuration drawings and schematics.

(d) Qualification packages and Acceptance packages including:

(1) Configuration of unit under test (UUT),

(2) Test, Analytical, Demonstration and/or Inspection results,

(3) Detailed description of any differences from Qualification or Acceptance Plans, failures and anomalies, deviations/waivers with rationale, mitigations/resolutions with rationale, and any closure plan of open items.

(4) Data and/or reports that include sufficient detail presenting objective evidence of successfully passed test programs. If formal reports do not exist, the Contractor may provide copies of procedures, data sheets and success criteria.

**FORMAT:**

**9. OPR:** Launch Services Program (LSP)

**10. FIRST SUBMISSION DATE:** VBR for the first mission

Frequency of Submission: N/A

Additional Submissions: Updates only, at subsequent mission VBRs

**11. MAINTENANCE:** N/A

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Visiting Vehicle Safety Assessment/Hazard Reports	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  <b>CRS 3-6</b>	<b>3b. RFP/Contract No.</b>  <b>NNJ16GX08B</b>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 1 For NASA's approval.			<b>5. DRD Category</b> — Technical — Administrative <input checked="" type="checkbox"/> SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW 2.10.2.1, 2.10.2.2		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

The ISS Safety Review Panel (SRP) will use the visiting vehicle system description and Safety Assessment with Hazard Reports to assess the design and operation for compliance with the applicable safety requirements in SSP 50808 and to provide SRP approval.

**DATA REQUIREMENTS:**

Submittals shall consist of system descriptions and a Safety Assessment with Hazard Reports of the visiting vehicle design and operations during Proximity Operations and ISS Berthed/Docked Operations. The system description shall describe the visiting vehicle systems, ISS interfaces, associated support equipment, and mission operations.

The Safety Assessment with Hazard Reports shall include all cargo, including non-NASA cargo, that will be integrated into the visiting vehicle pressurized module and the integrated assembly on the unpressurized carrier. The Contractor shall provide a system description of the launch and on-orbit configuration of the hardware.

Safety Assessment with Hazard Reports shall be provided in accordance with SSP 30309, Safety Analysis and Risk Assessment Requirements Document.

The system description and Safety Assessment with Hazard Reports shall be developed in accordance with SSP 30599, Safety Review Process. Top-level schematics/functional block diagrams that depict safety features shall be submitted and supplemented with descriptions of interfaces and operations. The system description and Safety Assessment with Hazard Reports shall be submitted with a level of maturity commensurate with the hardware, software, and operations that are being reviewed in accordance with SSP 30599. The Contractor shall deliver the Safety Assessment with Hazard Reports to the ISS Safety Review Panel (SRP) 45 days prior to the phased safety review.

Once the initial assessments and hazard reports are approved for the first mission, for each subsequent mission, the Contractor shall assess the visiting vehicle hardware, software, cargo, and operations changes and update the system description and Safety Assessment with Hazard Reports in accordance with SSP 30599.

**FORMAT:**

**9. OPR:** NASA Safety and Mission Assurance

**10. FIRST SUBMISSION DATE:** ISS Integration Milestone 3 (Phase I)

Frequency of Submission: ISS Integration Milestone 4 (Phase II); ISS Integration Milestone 7 (Phase III)

Additional Submissions: Each Mission

**11. MAINTENANCE:**

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

**DATA REQUIREMENTS DESCRIPTION**

(b) (4)

(b) (4)

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

<b>1a. DRD Title:</b> Engineering Computer-Aided Design (CAD) Models	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  CRS 4-1	<b>3b. RFP/Contract No.</b>  NNJ16GX08B
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 2 For NASA's review.			<b>5. DRD Category</b> <input checked="" type="checkbox"/> Technical — — Administrative — — SR&QA
<b>6. References</b> (SOW, Clause, etc.) SOW 2.8.2		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

The three-dimensional CAD models will be accurate geometrical depictions of the exterior and interior of the vehicle. The CAD models will be used to support mission design, procedure development, clearance analysis, cargo integration, Extra-vehicular worksite analysis, solar array shadowing, Aerodynamics/Mass Properties Data Book development, and Neutral Buoyancy Lab reconfiguration. The CAD models will also be used to validate hardware interfaces, to ensure hardware will mate on-orbit with International Space Station and performing Intra-Vehicular analysis.

**DATA REQUIREMENTS:**

The 3-D CAD models shall be of sufficient detail that the unpressurized and pressurized geometry shows an accurate depiction of the vehicle. CAD models are required of the end items up to the major assembly.

**Exterior CAD models**

CAD models of the exterior of the vehicle shall require the following (but not limited to): docking aids, antennae, cables, cable clamps, debris shields, EVA aids, sensors, thrusters, handrails, vents, cameras, lights, targets, unpressurized volume (including cargo when appropriate). All objects that deploy, rotate or otherwise move shall be appropriately modeled with location and limit parameters described.

**Interior CAD models**

CAD models of the interior of the vehicle shall require the following (but not limited to): internal pressure shell, standoff, hatches, ports, stowage compartments, rack attachments, vents, lights, handrails, seat tracks, emergency equipment. All objects that deploy, rotate or otherwise move shall be appropriately modeled with location and limit parameters described.

**FORMAT:**

- (a) Models shall be full scale in English (inches) units.
- (b) Models shall be constructed to nominal dimensions.
- (c) Models should be built with respect to element local coordinate system.
- (d) Use a format that is compatible with ISS Program.
- (e) Models shall be supplied in one of the following formats: Unigraphics (preferred), Computer-Aided Three-Dimensional Interactive Application (CATIA), PTC Pro-Engineer, Parasolid, Stereo Lithography (SLA), Virtual Reality Modeling Language (VRML), or Product Vision (JT).
- (f) Solid Models Only—Models may be unparameterized “dumb solids” meaning tolerance data; model history, material properties, etc. need not be included.
- (g) 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.
- (h) Description on movement limits for any articulating items should be provided.
- (i) As-designed and as-built (validated and final) models shall be validated to release engineering drawings.
- (j) 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.
- (k) 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.
- (l) A model tree shall be provided which documents the element model assembly architecture as well as model and subassembly titles.
- (m) Models shall be under configuration management so that the pedigree and source of models are documented and retained.
- (n) Models and associated assembly trees and configuration data shall be delivered electronically.

**9. OPR: Transportation Integration****10. FREQUENCY OF SUBMISSION:**

## Interior:

L-10 months (best available)

L-9 weeks (vehicle as-measured; laser scan raw data)

Additional Submissions: updates, as necessary

## Exterior :

L-18 months (best available, including integrated unpressurized cargo carrier with integrated cargo)

L-12 months (final as-designed, including integrated unpressurized cargo carrier and vehicle updates if design changes)

L-10 months (updated as-designed, including unpressurized carrier and vehicle as a result of L-10 MRAD)

L-6.5 months (final as-designed integrated CAD model)

L-9 weeks (vehicle as-measured; laser scan raw data)

L-25 days (empty unpressurized cargo carrier; laser scan raw data)

L-1 week (unpressurized cargo carrier with integrated payloads scanned with laser, laser scan raw data – final scan after all trunk closeouts have been completed)

Additional Submissions: Each Mission, as necessary

**11. MAINTENANCE: N/A****12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Imagery Plan	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  <b>CRS 4-2</b>	<b>3b. RFP/Contract No.</b>  <b>NNJ16GX08B</b>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 1 For NASA's approval			<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 2.8.3.2		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

The Contractor shall provide imagery of berthing/docking interfaces, crew interfaces, connectors, Extravehicular Activity (EVA) and Extravehicular Robotic (EVR) interfaces of the visiting vehicle. This imagery shall capture all ISS interfaces on the visiting vehicle and cargo transported to the ISS.

**DATA REQUIREMENTS:**

The three categories of imagery that comprise this task are:

- 1) Visiting Vehicle Imagery,
- 2) Pressurized Cargo Imagery,
- 3) Unpressurized Cargo Imagery.

An imagery plan shall be constructed to facilitate Contractor planning and the submittal of the imagery. The Preflight Imagery Plan (PFIP) shall be submitted to NASA based on the requirements in this document.

**PREFLIGHT IMAGERY PLAN (PFIP)**

A Contractor-provided PFIP shall be submitted to NASA for review and approval by the ISS/Imagery Working Group (IWG). The imagery plan will specify the imagery to be captured by the Contractor.

Complex payload hardware, installed or mounted in the visiting vehicle pressurized module, shall require imagery of attach points, connectors, fluid lines, and crew interfaces. The PFIP will list all hardware to be imaged, the type of view (close up, normal, wide view) and the

integration stage of the hardware (before, during or after integration onto the pressurized and unpressurized volumes).

Imagery requirements will be captured according to the steps defined below:

**Before Integration:**

Standalone or bench top imagery of the hardware before it is integrated into the Next Higher Assembly (NHA) of the vehicle. Imagery shall capture crew and EVA/EVR interfaces, guides, connectors and labels. Before integration imagery is only required for hardware mounted on the FSE. This is generally close up imagery that allows for drill down magnification of points of interest.

**During Integration:**

This is imagery of the hardware before installation of shields, covers, labels or Multilayer Insulation (MLI). Several viewpoints should be provided to show all details of the installation, attach points and surrounding hardware. This imagery will also capture any modifications to the hardware that affect form, fit or function. Close up and normal views can be used to satisfy these requirements.

**After Integration:**

This imagery captures the final flight configuration of the hardware. This is imagery taken after the installation of shields, covers, labels or MLI blankets. For cargo hard mounted on FSE, post-integration imagery shall include all sides of the cargo hard mounted on.

**VISITING VEHICLE IMAGERY**

Potential problems during on-orbit robotic berthing/docking operations require imagery of all visiting vehicle ISS interfaces. For berthing/docking interfaces, detailed close up and overall wide view imagery documenting ISS interfaces are required. The integration and final configuration of EVR grappling fixtures are required to support EVA/EVR operations and anomaly resolution. Any EVR interface or EVA crew aid on the module will require final configuration imagery. Cable and fluid lines that connect to the ISS after berthing/docking require final configuration imagery of the connectors. This imagery will provide the clocking and pin configuration of all ISS connections.

**PRESSURIZED CARGO IMAGERY**

Pressurized cargo imagery shall be taken to support cargo unloading and loading operations and crew training. All FSE attach points, connectors and crew interfaces shall be imaged before, during and after integration. This imagery will be included in the PFIP to ensure requirements are defined and communicated to the integrator. The PFIP shall define imagery requirements for the “before integration”, “during integration”, and “after integration” phases of the integration.

## UNPRESSURIZED CARGO IMAGERY

Unpressurized cargo imagery shall be taken to support EVR operations on each ISS mission that transports unpressurized cargo. All FSE attach points, EVR hardware interfaces, connectors and crew interfaces shall be imaged before, during and after integration. This imagery will be included in the PFIP to ensure requirements are defined and communicated to the integrator. The PFIP shall define imagery requirements for the “before integration”, “during integration”, and “after integration” phases of the integration. Examples of the unpressurized cargo carrier imagery requirements include:

EVR interfaces – Defined as imagery documenting the mechanisms that either a robotic arm must interface with for removal of hardware from the carrier. This imagery includes attach points of ISS hardware to the carrier, crew interfaces, connectors and EVR release mechanisms.

Crew Aids (as applicable) – Imagery of EVA crew assist aids resident to the carrier (handrails, worksite interface fixture)

Power and Thermal Interfaces – Imagery of electrical, thermal and data interfaces to ISS hardware.

Hardware Modifications – After hardware is turned over to the Contractor doing the carrier integration, imagery will be taken of any modifications to either the ISS hardware or to the carrier interfaces, if these modifications affect form, fit, or function.

## IMAGERY SUBMITTALS

The minimum resolution for the digital still imagery shall be no less than 6 megapixel. Images downloaded from the camera shall be in a “.JPEG” format for maximum image resolution. Image cataloging data with enough detail to support subsequent retrieval shall be submitted for incorporation into the NASA-JSC Digital Imagery Management System (DIMS) database. The preferred submittal method consists of submitting the imagery and data via File Transfer Protocol to the ISS Imagery Working Group (details to be in the PFIP)

### FORMAT:

**9. OPR:** Transportation Integration, ISS Imagery Working Group

### 10. FREQUENCY OF SUBMISSION:

The PFIP shall be submitted to NASA at L-6 months.

Imagery will be submitted shall be submitted to NASA per the PFIP (will include multiple deliveries based on the timing of cargo integration).

Additional Submissions: per mission

### 11. MAINTENANCE: N/A

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository (PFIP: EDMS, Images: DIMS)

Program Authorized Repository Upload Notification: ISS Imagery Working Group  
NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager,  
NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Pressurized Cargo Interface Control Document	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  <b>CRS 4-3</b>	<b>3b. RFP/Contract No.</b>  <b>NNJ16GX08B</b>
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 1 For NASA's approval			<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 2.9.1, 2.9.1.3		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

The Pressurized Cargo Interface Control Document (ICD) is designed to provide the visiting vehicle pressurized module to cargo item requirements definition and interface details. This is required for complex pressurized payloads or ORUs. It defines the mission requirements and interfaces as they are known. It shall also include any other Contractor-furnished hardware and services required such as transportation or analytical support services. The ICD will evolve as mission requirements are identified.

**DATA REQUIREMENTS:**

The cargo ICD shall define, to the extent required by each specific payload or ORU, the hardware interfaces and resource requirements, ground processing requirements, safety and interface verification requirements, and operational requirements of each complex cargo item identified for the resupply mission.

**1. INTERFACE CONTROL DOCUMENT (ICD)**

Active payloads or hard mounted ORUs which require crew operation, or require resources such as power, cooling, command and data, etc., shall utilize ICDs. Once baselined, each ICD shall be under configuration control. Approved cargo-specific ICDs shall be published in hard copy and available in an electronic format (softcopy) that is compatible with personal computers. All figures are not required to be imbedded in the softcopy ICDs, but must be available for delivery if requested.

**2. STOWAGE INTERFACE AGREEMENT (SIA)**

Passive payloads with ground handling constraints and/or verification requirements shall utilize SIAs. The cargo specific SIA may follow the format specified by the Contractor. Once

baselined, each SIA shall be under configuration control. Approved payload-specific SIAs shall be published in hard copy and available in an electronic format (softcopy) that is compatible with personal computers. Figures (if any) are not required to be imbedded in the softcopy SIAs, but must be available for delivery if requested.

**FORMAT/CONTENTS:** Depending on the complexity of the payload and its interfaces two types of ICDs shall be available:

**9. OPR:** Transportation Integration, Mission Integration and Operations

**10. FIRST SUBMISSION DATE:** L-8 Months

Frequency of Submission: N/A

Additional Submissions: Each Mission

**11. MAINTENANCE:** Cargo-specific ICDs shall be maintained throughout the mission preparation period and flight as complete, updated ICDs.

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Mass Properties Data	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  CRS 4-4	<b>3b. RFP/Contract No.</b>  NNJ14ZBG007L
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 2 For NASA's review.			<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 2.8.2, 4.1.2.2.1		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

The Contractor shall provide the following data, required to define the vehicle mass properties to perform flight-specific robotics analysis and to ensure vehicle mass properties remain within analyzed space for Rendezvous, Prox-Ops, and Capture (RPOC), Vehicle Integrated Performance, Environments, and Resources (VIPER), and structures analyses.

**DATA REQUIREMENTS:**

- (a) Vehicle mass, moments of inertia, and products of inertia about the center of gravity in its ISS approach configuration. Vehicle mass properties shall include separate line items for the orbiting vehicle, trunk with arrays (if applicable), pressurized cargo, propellant (if applicable), ballast, and unpressurized cargo.
- (b) Unpressurized cargo integrated assembly mass, moments of inertia, and products of inertia about the center of gravity in its extraction configuration. Shall include payload and Flight Support Equipment attached to the payload.
- (c) Coordinate system description.
- (d) List of analysis assumptions.
- (e) Basis of Estimate – Which masses are estimated? Which are actuals?
- (f) List of vehicle changes included in estimate.
- (g) Values should be provided in both English (slug/ft<sup>2</sup>) and metric units.
- (h) Vehicle mass properties both with and without propellant.
- (i) Vehicle mass properties with propellant both at the start of CE2 and at capture.

(The deliveries at L-18, L-10, L-6.5, L-4, L-1 months, and L-2 weeks are the same, except the L-1 month delivery is expected to be a weighed, final vehicle mass and the L-2 week delivery is expected to be a weighed vehicle mass with cargo. It is acceptable for the integrated payloads mass data to not be provided until L-10. The L-18 delivery is expected to be coupled with the Contractor VBR data pack delivery. The L-10 delivery is expected to be coupled with the Preliminary Unpressurized ICD delivery.)

**NOTE:** If no updated data is available from the previous submission, Contractor will notify NASA that the previous drop is still valid.

**FORMAT:**

**9. OPR:** Transportation Integration

**10. FIRST SUBMISSION DATE:** L-18months

Frequency of Submission:

L-18 months (vehicle approach/departure mass properties)

L-10 months (updated vehicle approach/departure mass properties)

L-6.5 months (updated vehicle approach/departure mass properties and integrated unpressurized cargo for removal)

L-4 months (updated vehicle approach/departure mass properties and updated integrated unpressurized cargo for removal)

L-2.5 months (updated vehicle/cargo mass properties - as required based on L-5 manifest)

L-1 month (updated vehicle/cargo mass properties – as weighed empty vehicle ; as required updated based on L-6 week manifest)

L-2 weeks (updated vehicle/cargo mass properties – as weighed with cargo loaded to date)

Additional Submissions: Each mission

**11. MAINTENANCE:** N/A

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Post Delivery Assessment	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  CRS 5-1	<b>3b. RFP/Contract No.</b>  NNJ16GX08B
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 2 For NASA's review.			<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.) II.A.2, 2.7.2, 2.11.1, 4.1.2.5, 4.1.2.6		<b>7. Interrelationships</b> (e.g., with other DRDs) CRS 3-1, CRS 5-3	

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

**DESCRIPTION/PURPOSE:**

After cargo delivery phase of the mission, a post-delivery assessment shall be provided to include an initial post-delivery summary of the performance of the launch and visiting vehicles, including raw data. Preliminary notification and investigation status of any anomalies cited to this point shall be provided in the report.

This report shall contain sufficient detail and evidence to support the NASA Contracting Officer's mission success determination for cargo delivery.

On non-CRS missions only Data Requirements (d) and (e) as described below are required.

**DATA REQUIREMENTS:**

(a) Full-rate Visiting Vehicle flight data in accordance with the instrumentation plan in DRD CRS 3-1, Vehicle Interface Definition Document (IDD).

(b) Full-rate data for launch vehicle systems and launch vehicle ground support equipment. Providing this data real-time is not required.

(c) Description of (b) data and its embedded channels that allows NASA independently to decommutate the raw telemetry stream.

(1) This description shall describe the stream itself, including at a least bit rate in bits per second, location and description of sync word, number of minor frames in major frame, size of minor frame, number of bits per word or syllable.

(2) This description shall describe the measurements in the stream using standard American Standard Code for Information Interchange (ASCII) text file or other file read by applications included in Windows or MacOS. This file shall include:

- (i) Measurement Identification (ID),
  - (ii) Measurement description,
  - (iii) Engineering units of measurement,
  - (iv) Location of measurement in minor frame,
  - (v) Word step rate of measurement if supercommutated,
  - (vi) Size of measurement in bits or bytes,
  - (vii) Type of measurement,
  - (viii) Initial minor frame number where measurement is found,
  - (ix) Frame step rate of measurement if found in more than 1 minor frame,
  - (x) Special conversion algorithm from raw to engineering units if not standard polynomial,
  - (xi) Calibration coefficients for conversion from raw to engineering units,
  - (xii) Bit number in word if measurement is a discrete,
  - (xiii) List of guidance modes that measurement is valid,
  - (xiv) Method of determining guidance modes,
  - (xv) Measurement mask if required.
- (3) If other information is embedded in the Pulse Code Modulation (PCM) stream, such as video, this description shall provide documentation on its decommutation as well.
- (d) Contractor's Flight and/or Launch Readiness Review package,
- (e) Pre-flight prediction and preliminary evaluation of as-flown performance of:
- (1) expected flight environments (i.e., acoustic/vibration/shock, quasi-static acceleration, thermal, and pressure). Generic vehicle environmental data may be submitted unless mission unique environmental requirements are identified in the ICD.
  - (2) 6-degree of freedom (DOF) trajectory simulation and its inputs, nominal and 3-sigma orbit elements, performance, margins, reserves, sequence of events and tracking.
  - (3) Component and system performance.
  - (4) The time of flight events and the coincident position and velocity state vectors. If event can occur at variable times, this must include a description for determining event time during flight.

(f) Presentation and analysis of the Mission Success Criteria for cargo delivery, which are determined in accordance with Clause II.A.2, Mission Success Determination, Investigation, and Corrective Actions.

**FORMAT:** Contractor's preferred format except as noted above.

**9. OPR:** Transportation Integration, NASA Launch Services Program (LSP)

**10. FREQUENCY OF SUBMISSION:** Cargo Delivery plus 10 days

Additional Submissions: Per mission (including non-CRS missions, as defined)

**11. MAINTENANCE:** N/A

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Post Mission Assessment	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  CRS 5-2	<b>3b. RFP/Contract No.</b>  NNJ16GX08B
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 2 For NASA's review.			<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.) II.A.2, SOW 2.7.2, 2.11.1, 4.1.2.6		<b>7. Interrelationships</b> (e.g., with other DRDs)	

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

**DESCRIPTION/PURPOSE:**

After each mission, a post-mission assessment shall be provided to include an initial post-flight summary of the performance of the visiting vehicle through return/disposal, including raw data. Preliminary notification and investigation status of any anomalies cited to this point shall be provided in the report.

This report shall contain sufficient detail and evidence to support the NASA Contracting Officer's mission success determination for end of mission.

**DATA REQUIREMENTS:**

- (a) Full-rate flight data in accordance with the instrumentation plan in DRD CRS 3-1, through vehicle return.
- (b) Contractor's post mission assessment, including predicted and actual vehicle system, subsystem and component performance data, including:
  - (1) expected flight environments (i.e., acoustic/vibration/shock, quasi-static acceleration, thermal, and pressure).
  - (2) 6-degree of freedom (DOF) flight path simulation and its inputs, nominal and 3-sigma orbit elements, performance, margins, reserves, sequence of events and tracking.
  - (3) Component and system performance.
  - (4) The time of flight events and the coincident position and velocity state vectors. If event can occur at variable times, this must include a description for determining event time during flight.
- (c) Post flight determination of actual flight environments, including a preliminary post-flight mission specific timeline/manifest thermal analysis of the integrated cargo manifest

covering the as-flown conditions per mission launch date and duration with model analysis comparisons to flight data for both vehicle and cargo. As-flown conditions shall include time-of-year solar constant, solar beta angle range, altitude, and flight attitude timeline.

(d) Explanation of significant differences between the predicted and actual flight environments,

(e) When applicable, accident investigation and resolution documentation, responses and implementations to the mishap board's recommendations and return to flight activities,

(f) Identification of problems, anomalies and malfunctions over the course of the mission and their impact on the payload and the overall mission,.

(g) Recommended corrective actions and anomaly resolutions. This would include model and predicted environment updates due to collected flight data, and any expected resulting changes to Acceptance Test Plans and/or re-Qualification.

(h) Initial assessment of the adequacy of training, both for flight and ground personnel.

**FORMAT:** Contractor's preferred format except as noted above.

**9. OPR:** Transportation Integration

**10. FREQUENCY OF SUBMISSION:** End of Mission plus 30 days

Additional Submissions: Per mission

**11. MAINTENANCE:** N/A

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

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

<b>1a. DRD Title:</b> Post Flight Report	<b>2. Date of Current Version</b>	<b>3a. DRD No.</b>  CRS 5-3	<b>3b. RFP/Contract No.</b>  NNJ16GX08B
<b>4. Use</b> (Define need for, intended use of, and/or anticipated results of data) See description/purpose.  Type: 2 For NASA's review.			<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.) II.A.2, SOW 4.1.2.6		<b>7. Interrelationships</b> (e.g., with other DRDs) CRS 5-1 and CRS 5-2	

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

**DESCRIPTION/PURPOSE:**

After each mission, a final post-flight report shall be provided to formally provide a comprehensive post-flight summary of the performance of the launch and visiting vehicles through return/disposal (supported by raw data provided in DRDs CRS 5-1 and CRS5-2).

On non-CRS missions all Data Requirements with the exception of (b) as described below are required.

**DATA REQUIREMENTS:**

(a) Contractor's post flight report, including predicted and actual vehicle system, subsystem and component performance data,

(b) Post flight determination of actual flight environments, including a final post-flight mission specific timeline/manifest thermal analysis of the integrated cargo manifest covering the as-flown conditions per mission launch date and duration with model analysis comparisons to flight data for both vehicle and cargo. As-flown conditions shall include time-of year solar constant, solar beta angle range, altitude, and flight attitude timeline,

(c) Explanation of significant differences between the predicted and actual flight environments,

(d) When applicable, accident investigation and resolution documentation, responses and implementations to the mishap board's recommendations and return to flight activities,

(e) Identify problems, anomalies and malfunctions over the course of the mission and their impact on the payload and the overall mission,.

(f) Provide recommended corrective actions and anomaly resolutions. This would include model and predicted environment updates due to collected flight data, and any expected resulting changes to Acceptance Test Plans and/or re-Qualification.

(g) Assess the adequacy of training, both for flight and ground personnel.

**FORMAT:** Contractor's preferred format.

**9. OPR:** Transportation Integration Office, NASA Launch Services Program (LSP)

**10. FREQUENCY OF SUBMISSION:** End of Mission (EOM) plus 60 days

Additional Submissions: Per mission (including non-CRS missions, as defined)

**11. MAINTENANCE:** N/A

**12. COPIES/DISTRIBUTION:**

1 electronic copy: Program Authorized Repository

Program Authorized Repository Upload Notification: NASA Contracting Officer Representative, NASA Visiting Vehicle (VV) Integration Manager, NASA VV EDMS representative, Contractor's Contracting Officer, others as negotiated

**13. REMARKS:**

**ATTACHMENT V.D. SMALL BUSINESS SUBCONTRACTING PLAN****Attachment V.D. Small Business Subcontracting Plan**

(b) (4)

**Pages #192-196 are withheld from release in full pursuant to  
5 USC 552 Exemption (b)(4)**

**ATTACHMENT V.E****SAFETY AND HEALTH PLAN****Attachment V.E. Safety and Health Plan**

# **ISS Commercial Resupply Services 2 (CRS2)**

## **Safety and Health Plan (DRD CRS 1-5)**

**December 4, 2015**

**Pages #198-207 are withheld from release in full pursuant to  
5 USC 552 Exemption (b)(4)**

**ATTACHMENT V.F.****TYPICAL UNPRESSURIZED CARGO  
COMPLEMENTS**

Unpressurized cargo is defined as science payloads, Orbital Replacement Units (ORUs), and ancillary ISS elements that are mounted to FSE that include FRAMs and unique direct mount FSE. To maximize design flexibility, the following unpressurized cargo complements should be considered for any single mission for upmass to the ISS and/or disposal from the ISS.

- (a) 1-3 Small Adapter Plate Assembly (SAPA)/Express Pallet Adapter (ExPA)/Columbus External Payload Adapter (CEPA) FRAM-based cargo item(s),
- (b) 1 Large Adapter Plate Assembly (LAPA) FRAM-based cargo item,
- (c) 1 Medium Adapter Plate Assembly (MAPA) FRAM-based cargo item,
- (d) 2 standard Japanese Experiment Module – Exposed Facility (JEM-EF) payloads,
- (e) 1 FRAM-based cargo item in (a) and 1 standard JEM-EF payload,
- (f) 1 heavy JEM-EF payload,
- (g) 1 large Direct Mount cargo item

Note that for b (LAPA) and c (MAPA), NASA will provide these FSE assemblies.

Vehicle-Cargo interface requirements are defined in SSP 50833 for all cargo/FSE types. Cargo FSE is to be supplied by the Contractor as part of the unpressurized cargo service (SOW paragraphs 2.4 and 2.5). Direct Mount FSE will be defined in vehicle ICDs on a case by case basis. JEM-EF FSE will be defined after contract award.

**ATTACHMENT V.G.      RESERVED**

**ATTACHMENT V.H. ACRONYMS AND ABBREVIATIONS**

AAALAC	Association for Assessment and Accreditation of Laboratory Animal Care
AE	Approach Ellipsoid
ASCII	American Standard Code for Information Interchange
ASSIST	Acquisition Streamlining and Standardization Information System
ATP	Authority/Authorization to Proceed
BDEALS	Bilateral Data Exchange Agreements, Lists, and Schedules
BHSEALS	Bilateral Hardware and Software Exchange Agreements, Lists, and Schedules
BICE	Bureau of Immigration and Customs Enforcement
BIS	Bureau of Industry Security
BSL	Bio Safety Level
CAD	Computer-Aided Drafting/Design
CATIA	Computer-Aided Three-Dimensional Interactive Application
CBM	Common Berthing Mechanism
CCS	Center Chief of Security
CD-R	Compact Disk - Record
CD-ROM	Compact Disk – Read Only Memory
CEPA	Columbus External Payload Adapter
CFR	Code of Federal Regulations
Cg	Center of Gravity
CHeCS	Crew Health Care System
CIR	Cargo Integration Review
CLA	Coupled Loads Analysis
CLIN	Contract Line Item Number
CM	Configuration Management
CO2	Carbon Dioxide
CoFR	Certification of Flight Readiness
COR/COTR	Contracting Officer (Technical) Representative
COTS	Commercial Orbital Transportation Services
	Commercial-Off-The-Shelf
CRS	Commercial Resupply Services
CSO	Corporate Security Officer
CTB	Cargo Transfer Bag
CTBE	Cargo Transfer Bag Equivalent
CY	Calendar Year
C2V2	Common Communications for Visiting Vehicles
DCII	Defense Clearance and Investigation Index
DCN	Document Change Notice
DIMS	Digital Imagery Management System
Div.	Division
DoDSSP	Department of Defense Single Stock Point
DOF	Degrees of Freedom
DOT	Department of Transportation

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DRD	Data Requirements Document
DRL	Data Requirements List
DUNS	Data Universal Numbering System
EAR	Export Administration Regulations
ECP	Export Control Plan
EDV	Russian Water Container
EDWOSB	Economically Disadvantaged Women-Owned Small Business
EDMS	Electronic Document Management System
EEE	Electrical, Electronic, and Electromechanical
EFT	Electronic Funds Transfer
EID	Equipment Interface Demonstration
EMA	Experiment Monitoring Area
EMI	Electromagnetic Interference
EMI/C	Electromagnetic Interference/Compatibility
E.O.	Executive Order
EOD	Entrance on Duty
EOM	End of Mission
e-QIP	Electronic Questionnaires for Investigations Processing
EULA	End User License Agreement
EVA	Extravehicular Activity
EVR	Extravehicular Robotics
ExPA	Exposed Pallet Adapter
FAA	Federal Aviation Administration
FAPIIS	Federal Awardee Performance and Integrity Information System
FAR	Federal Acquisition Regulations
FCC	Federal Communications Commission
FDIR	Fault Detection Isolation and Recovery
FIPS	Federal Information Processing Standards
f.o.b.	Freight On Board
FPMR	Federal Property Management Regulations
FRAM	Flight Releasable Attach Mechanism
FRB	Failure Review Board
FRGF	Flight Releasable Grapple Fixture
FSC	Federal Supply Clauses
FSE	Flight Support Equipment
FSG	Federal Supply Group
FSO	Facility Security Officer
GAO	Government Accountability Office
GFE	Government Furnished Equipment
GFEPS	Government Furnished Equipment, Property and Services
GFP	Government Furnished Property
GIDEP	Government Industry Data Exchange Program
GN&C	Guidance, Navigation and Controls

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GPA	Government Property Administrator
GSA	General Services Administration
GSE	Ground Support Equipment
HBCU/MI	Historically Black College or University / Minority Institution
HBZ	HUBZone Small Business Concerns
HDBK	Handbook
HITL	Hardware-In-The-Loop
HQ	Headquarters
HSPD	Homeland Security Presidential Directive
HUBZone	Historically Underutilized Business Zone
HW	Hardware
Hz	hertz
ICD	Interface Control Document
ID	Identification
IDD	Interface Definition Document
IDIQ	Indefinite Delivery Indefinite Quantity
IDMS	Identity Management System
IEEE	Institute of Electrical and Electronics Engineers
IGA	Intergovernmental Agreement
IMC	International Space Station Management Center
IMS	Integrated Master Schedule
INKSNA	Iran, North Korea, and Syria Nonproliferation Act
I&O	Integration and Operations
IP&CL	Instrumentation Program and Command List
IRC	Internal Revenue Code
IRD	Interface Requirements Document
IRS	Internal Revenue Service
ISR	Individual Subcontracting Report
ISS	International Space Station
ISSES	International Space Station Environmental Simulator
IT	Information Technology
ITAR	International Traffic in Arms Regulations
IV&V	Independent Verification and Validation
IWG	Imagery Working Group
JEM-EF	Japanese Experiment Module – Exposed Facility
JIVTP	Joint Integration, Verification and Test Plan
JMST	Joint Multi-Segment Simulation Training
JSC	Johnson Space Center
JT	Product Vision
K	Thousand
kg	kilogram
KSC	Kennedy Space Center

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L-	Launch minus (time before launch)
LCN	Limited Communications Notice
LON	Launch On Need
LSP	Launch Services Program
LV	Launch Vehicle
MCC	Mission Control Center
MIOMP	Mission Integration and Operations Management Plan
MIR	Mission Integration Review
MLI	Multi-Layer Insulation
MOU	Memorandum of Understanding
MRAD	Mission Resources Allocation Document
MRB	Material Review Board
MSFC	Marshall Space Flight Center
MSS	Mobile Servicing System
MT	Metric Tons
MTC	Modified Truncated Cone
NAC	National Agency Check
NACI	National Agency Check with Inquiries
NAICS	North American Industry Classification System
NASA	National Aeronautics and Space Administration
NASIRC	NASA Incident Response Center
NCIC	National Crime Information Center
NDS	NASA Docking System
NFNMS	NASA Foreign National Management System
NFS	NASA FAR Supplement
NHA	Next Higher Assembly
NISN	NASA Integrated Services Network
NIST	National Institute of Standards and Technology
NLT	No Later Than
NPR	NASA Procedural Requirement
NTE	Not To Exceed
NTIA	National Telecommunications and Information Administration
O2	Oxygen
OCI	Organizational Conflicts of Interest
OFAC	Office of Foreign Asset Control
OMB	Office of Management and Budget
OPM	Office of Personnel Management
OPR	Office of Primary Responsibility
ORU	Orbital Replacement Unit
OSHA	Occupational Safety and Health Administration
PACS	Physical Access Control System

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PAO	Public Affairs Office
PCBM	Passive Common Berthing Mechanism
PCI	PIV Card Issuance
PCM	Pulse Code Modulation
PDF	Portable Document Format
PFIP	Preflight Imagery Plan
PIN	Personal Identification Number
PIP	Personal Identity Provider
PIRN	Preliminary Interface Revision Notice
PIV	Personal Identity Verification
PKI	Public Key Infrastructure
P.L.	Public Law
PM	Program Manager
PMP	Property Management Plan
POC	Point of Contact
POIC	Payload Operations Integration Center
PTCS	Passive Thermal Control Systems
PUB	Publication
Pub. L.	Public Law
QA	Quality Assurance
R+	Return Plus (after landing)
R&D	Research and Development
RF	Radio Frequency
RFP	Request for Proposal
ROM	Rough Order of Magnitude
Roscosmos	Russian Federal Space Agency
RPO	Rendezvous and Proximity Operations
RPOC	Rendezvous, Prox-Ops, and Capture
S&MA	Safety and Mission Assurance
SA	Single Access
SAM	System for Award Management
SAPA	Small Adapter Plate Assembly
SART	Security Analysis Response Team
SB	Small Business
SBU	Sensitive But Unclassified
SDB	Small Disadvantaged Business
SDVOSB	Service Disabled Veteran-Owned Small Business
SF	Standard Form
SIA	Stowage Interface Agreement
SIL	Systems Integration Lab
SLA	Stereo Lithography
SORR	Stage Operations Readiness Review
SOW	Statement of Work

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SP	Special Publication
SPDM	Special Purpose Dexterous Manipulator
SQA	Software Quality Assurance
sq. ft.	Square Feet
SRP	Safety Review Panel
SR&QA	Safety Reliability and Quality Assurance
SSMB	Space Station Manned Base
SSMP	SART Security Management Plan
SSN	Social Security Number
SSRMS	Space Station Remote Manipulator System
STD	Standard
SW	Software
TBD	To Be Determined
TBP	To Be Proposed
TDRSS	Tracking and Data Relay Satellite System
TIM	Technical Interchange Meeting
TIN	Taxpayer Identification Number
T.O.	Task Order
TOS	Terms of Service
TRL	Technology Readiness Level
UCAT	Universal Controls Analysis Tool
UCC	Unpressurized Cargo Carrier
URL	Uniform Resource Locator
U.S.	United States
U.S.C.	United States Code
USGS	United States Ground Segment
UUT	Unit Under Test
VBR	Vehicle Baseline Review
VIPER	Vehicle Integrated Performance, Environments, and Resources
VLA	Verification Loads Analysis
VOSB	Veteran-Owned Small Business
VRML	Virtual Reality Modeling Language
VV	Visiting Vehicle
WHC	Waste and Hygiene Container
WOSB	Woman-Owned Small Business

## Technology Readiness Level Definitions

TRL 1: Basic principles observed and reported. This is the lowest “level” of technology maturation. At this level, scientific research begins to be translated into applied research and development.

TRL 2: Technology concept and/or application formulated. Once basic physical principles are observed, then at the next level of maturation, practical applications of those characteristics can be ‘invented’ or identified. At this level, the application is still speculative: there is not experimental proof or detailed analysis to support the conjecture.

TRL 3: Analytical and experimental critical function and/or characteristic proof of concept. At this step in the maturation process, active research and development (R&D) is initiated. This must include both analytical studies to set the technology into an appropriate context and laboratory-based studies to physically validate that the analytical predictions are correct. These studies and experiments should constitute “proof-of-concept” validation of the applications/concepts formulated at TRL 2.

TRL 4: Component and/or breadboard validation in laboratory environment. Following successful “proof-of-concept” work, basic technological elements must be integrated to establish that the “pieces” will work together to achieve concept-enabling levels of performance for a component and/or breadboard. This validation must be devised to support the concept that was formulated earlier, and should also be consistent with the requirements of potential system applications. The validation is relatively “low-fidelity” compared to the eventual system: it could be composed of ad hoc discrete components in a laboratory.

TRL 5: Component and/or breadboard validation in relevant environment. At this level, the fidelity of the component and/or breadboard being tested has to increase significantly. The basic technological elements must be integrated with reasonably realistic supporting elements so that the total applications (component-level, sub-system level, or system-level) can be tested in a “simulated” or somewhat realistic environment.

TRL 6: System/subsystem model or prototype demonstration in a relevant environment (ground or space). A major step in the level of fidelity of the technology demonstration follows the completion of TRL 5. At TRL 6, a representative model or prototype system or system – which would go well beyond ad hoc, ‘patch-cord’ or discrete component level breadboarding – would be tested in a relevant environment. At this level, if the only ‘relevant environment’ is the environment of space, then the model/prototype must be demonstrated in space.

TRL 7: System prototype demonstration in a space environment. TRL 7 is a significant step beyond TRL 6, requiring an actual system prototype demonstration in a space environment. The prototype should be near or at the scale of the planned operational system and the demonstration must take place in space.

TRL 8: Actual system completed and “flight qualified” through test and demonstration (ground or space). In almost all cases, this level is the end of true “system development” for most technology elements. This might include integration of new technology into an existing system.

TRL 9: Actual system ‘flight proven’ through successful mission operations. In almost all cases, the end of last ‘bug fixing’ aspects of true ‘system development’. This might include integration of new technology into an existing system. This TRL does not include planned product improvement of ongoing or reusable systems.

**ATTACHMENT V.I. GLOSSARY**

Approach Ellipsoid	Approach Ellipsoid: A 2.5 x 1.25 x 1.25 mile (4 x 2 x 2 km) ellipsoid, centered at the ISS center of mass, with the long axis aligned with the V-Bar.
Baseline	This is the hardware or software utilized to accomplish the prior CRS flight. For spacecraft or launch vehicle with no prior CRS flights the Baseline design is the design intended to perform the first CRS flight.
Changes to Baseline	This is the hardware or software utilized to accomplish a CRS mission that differs from the previously-baselined configuration of the launch or visiting vehicle, and that is intended to be used for an upcoming flight and subsequent flights.
Cargo	Cargo and/or payloads including packing materials, attachment hardware and/or FSE.
Discrepant	Visibly damaged or out of configuration.
Early Handover	Cargo that needs to be removed from the visiting vehicle within three to six hours of the visiting vehicle landing.
ISS Integration Certification	The activities required to ensure that SSP 50808 and SSP 50833 requirements have been met according to SSP 50964, all necessary hardware and software development to provide the service has been completed; joint on-orbit integrated operations plans have been finalized; the safety requirements have been met according to SSP 30599, and all applicable non-NASA agreements and approvals have been granted. ISS Integration is a milestone used as input for NASA-managed Stage Operations Readiness Review (SORR) which produces the ISS Certificate of Flight Readiness (CoFR).
Mission Unique	This is the hardware or software utilized to accomplish a CRS mission that differs from the previously base-lined configuration of the launch or visiting vehicle, and that is intended to only be to accommodate unique needs of an upcoming flight.
Non-NASA Cargo	Any cargo on an ISS Resupply Mission that is not NASA cargo will be considered non-NASA cargo in accordance with Clause II.A.5, Contractor Objectives on ISS Resupply Service Missions.
Prox Ops	Proximity Operations
Real-time	Period of time during which integrated operations are taking place.

**ATTACHMENT V.J. GOVERNMENT FURNISHED PROPERTY****Table V.J.1. GOVERNMENT FURNISHED PROPERTY**

Item Description	Acquisition Date	Acquisition Cost	Qty	If Equipment		Return Status
				Model	Serial Number	
1	(b) (4)					
2						
3						
4						
5						
6						

	(b) (4)						
7							
8							

**ATTACHMENT V.K. APPLICABLE AND REFERENCE DOCUMENTS**

Applicable Documents are considered contractually binding.

Reference Documents are provided for general context or information purposes.

**Applicable Documents**

<b>Document #</b>	<b>Revision</b>	<b>Document Title</b>
51 U.S.C. Subtitle V, Ch. 509		Commercial Space Launch Activities
14 C.F.R. Ch. III		FAA Commercial Space Transportation Regulations
AS9100	C	Aerospace Quality Management Systems Requirements
ISO 90003	2004	Software Engineering – Guidelines for the Application of ISO 9001:2000 to Computer Software
JSC 35089	Final	Visiting Vehicle Operations Document
NASA-STD 8739.8	1	Software Assurance Standard
NPR 8621.1	B	NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating and Recordkeeping
NPR 8715.3	C	NASA General Safety Program Requirements
NPR 8715.6	A	NASA Procedural Requirements for Limiting Orbital Debris
SSP 30309	G (Draft)	Safety Analysis and Risk Assessment Requirements Document
SSP 30599	F	Safety Review Process
SSP 41175-39	Baseline + PIRNs	Software Interface Control Document (ICD) Station Management and Control to International Space Station (ISS) Book 39, Commercial Orbital Transportation Services (COTS) Free Flyer Common Interface
SSP 42003	Part 1: H Part 2: C	Space Station Manned Base (SSMB) to Mobile Servicing System (MSS) Interface Control Document
SSP 42004	Part 1: K Part 2: C	Mobile Servicing System (MSS) to User (Generic) Interface Control Document
SSP 42131	E	Space Station Program Integrated Truss Segments P3 and S3 to Attached Payloads and Unpressurized Cargo Carriers (UCC) Standard Interface Control Document
SSP 50108	E + DCN 014	ISS Program Certification of Flight Readiness Process Document
SSP 50123	C	Configuration Management Handbook
SSP 50190	E	Contingency Action Plan
SSP 50482	D	ISS Program Software Management Plan
SSP 50521	E	Return, Processing, Distribution and Archiving of Imagery Products from the International Space Station
SSP 50525	Baseline	ISS Ground Segment SART Security Management Plan

SSP 50808	F + DCNs 175A, 176, and 179	International Space Station (ISS) to Commercial Orbital Transportation Services (COTS) Interface Requirements Document (IRD)
SSP 50833	B	International Space Station Program Cargo Transport Interface Requirements Document
SSP 50902	A	Transportation Integration Office Certification of Flight Readiness Implementation Plan
SSP 50934	A	Common Communications for Visiting Vehicles (C2V2) Radio Frequency (RF) Interface Control Document (ICD) Part 1
SSP 50964	Baseline + DCN	Visiting Vehicle ISS Integration Plan
SSP 57003	J	Attached Payload Interface Requirements Document
SSP 57003-ELC	E	Attached Payload Interface Requirements Document – EXpedite the PROcessing of Experiments to Space Station (EXPRESS) Logistics Carrier (ELC) Cargo Interface Requirements
SSP 57004	G	Attached Payload Hardware Interface Control Document Template
SSP 57004-ELC	E	Attached Payload Interface Control Document – EXPRESS Logistics Carrier (ELC) Cargo Interface Control Document Template

### Reference Documents

Document #	Revision	Document Title
JSC 66617	Baseline	ISS Passive Thermal Control Systems (PTCS) Analysis Guide
NASA-HDBK-6003	C	Application of Data Matrix Identification Symbols to Aerospace Parts Using Direct Part Marking Methods/Techniques
NASA-STD-6002	D	Applying Data Matrix Identification Symbols on Aerospace Parts
SSP 50261-01		Generic Groundrules, Requirements, and Constraints Part 1: Strategic and Tactical Planning

**ATTACHMENT V.L.****WASTE CARGO**

<b>Category</b>	<b>Description or Examples</b>
Common trash	Clothing, food wrappers and other plastic packaging, papers, packing foam, office supplies, used or expired medical supplies
Solid Waste Containers	Metal canisters with biohazard/toxic material contained
EDVs (Russian Fluid Containers)	Metal canisters w/ bladders of urine
Bags of used WHC equipment	Hardware (cables/hoses/components) with some amount of biohazard/toxic material remaining
Urine Containment Bags	Bags with biohazard/toxic material
Payload equipment/consumables	Scientific experiment components, electronics, could have biohazard/toxic material, batteries
Used CHeCS (Crew Health Care System) exercise equipment	Ropes, cables, bungees, fasteners, biocide wipes, medical accessory kits
Used equipment/hardware	ISS ORUs (Orbital Replaceable Units), computers, electronic assemblies, mechanical equipment; may contain batteries / magnets / glass / mercury / pressurized gas containers
Urine Brine	Container with biohazard/toxic material

## **ATTACHMENT V.M. PAYLOAD PROCESSING CAPABILITIES REQUIRED AT LAUNCH AND LANDING SITE**

### **Payload Processing Capabilities Required at Launch Site**

1. **Services** - shipping, receiving, supplies, equipment loans
  2. **Facilities** - processing areas, labs, science annex
- 

### **1. SERVICES**

The Contractor shall provide the following services at the launch site for final processing of some ORUs, experiment payloads, and other cargo items. The support includes test support for unpressurized payloads, science and hardware labs, animal care capability for rodent research, and late stow integration and transportation. The support continues from prior to launch, through mission support, post landing de-integration, and science dissemination.

#### **General**

- Shipping and receiving support
- Payload processing areas (see facilities section below)
- Facility environmental and cleanliness controls
- Limited office space and communications (phone, wireless internet, etc.)
- Limited quantities of consumables, bench stock items, clean-room garments
- Loan pool tools and equipment
- Payload transportation and handling
- Lift slings and handling equipment
- Handling and disposal of biohazardous, chemicals, and radioactive waste, including BioSafety Level -2 (BSL-2) organisms and experiments utilizing them

#### **Late Stow Operations**

- Integration and coordination of all late stow and scrub activities
- Weight and Center of Gravity (CG) measurements
- NASA Quality Assurance (QA) and Contractor technician support
- Payload Locker handling equipment (transport boxes, cradles)
- Powered payload transportation equipment (custom batteries, power control boxes, cables)

- Transportation to pad and for launch scrubs - air conditioned transport

### ORU Processing

These ORU processing tasks are examples of activities to be performed by NASA, NASA representatives, and International Partners in the contractor provided facilities. The contractor shall provide the required facilities, equipment, supplies, and other services as described in the appendix as necessary to support NASA's execution of these tasks.

- ORU servicing for certain items involving ammonia and Oxygen (O<sub>2</sub>) (once serviced cannot be transported on public roads)
- post-shipment verification tests
- final installations and configuration verification
- remove-before-flight items
- fluid fills
- hoisting and handling equipment needed for removal from shipping containers
- installation of limited-life items

## **2. FACILITIES**

A variety of facility accommodations are required at the launch site for payload processing. The space is typically required in close proximity to the launch site for operations such as post-shipment verification tests, final installations/removals, and configuration verifications. Facilities for hazardous operations are required at times and should be optionally available as needed.

Large item processing space - such as a high bay for processing FRAM based and other large payloads

- 100k clean area
- overhead cranes

Laboratories - Space for Principal Investigators and other payload efforts is required for operations such as: preflight science activities; science-to-hardware integration; preparation for installation of payloads into the launch vehicle; ground control activities; and post-flight activities for experiments returning from orbit.

- 13 to 16 Science Labs (include sinks, freezers, fume hoods, deionized water source and other laboratory equipment)
- 6 hardware labs
- approximately 500 square feet per lab (sq. ft.)

- biosafety level (BSL) certified
- for a typical launch containing 6 powered payloads, 7 conditioned stowage bags and 5 CTBEs of passive late load stowage, 13 or more payload teams (140+ individuals) will arrive at the launch between L-14 days and L-40 days and stay up to several weeks after launch

Animal Care Accommodations - provides animal care services for Rodent Research Missions

- Support from roughly L-40 days to L+60 days
- Certification from “Association for Assessment and Accreditation of Laboratory Animal Care” (AAALAC) is required
- Capacity to house 1000 mice

International Space Station Environmental Simulator (ISSES) - provides a capability to conduct ground control tests using real-time ISS telemetry control variables.

- Three 600 sq. ft. ISSES Environmental Chambers
- Supports Near Real Time (10 Minute Delay) ISS Data Collection to replicate ISS environment (Temperature, Lighting, Carbon Dioxide [CO<sub>2</sub>], Relative Humidity)
- Support for ground control using ISS replicated environmental data
- Delayed replay of the ISS environmental conditions to each chamber, available to replicate past mission environments
- Supports customer specific profiles for hardware / science testing and verification
- Remote web cam provides offsite monitoring capabilities
- Chamber environment continuously monitored and supported
- Records real time environmental chamber data for future analysis

Administrative Space - office and conference rooms

- including access to wi-fi, printers, phones, fax machines, etc.

Experiment Monitoring Area (EMA) - the capability to support on-orbit payload monitoring and control via the Payloads Operations Integration Center (POIC) is beneficial but not required.

- Supports 4 ISS Video Downlink Streams
- Provides Marshall Space Flight Center (MSFC) remote user software
- Allows Investigators to stay in contact with on orbit activities
- Provides uplink commanding capability for experiment control
- Provides Internet voice loops for communications for ISS activities

**Payload Processing Capabilities Required at Landing Site**

1. **Services** - shipping, receiving, supplies, equipment loans
  2. **Facilities** - processing areas
- 

**1. SERVICES**

The contractor shall provide the following services at the landing site

**General**

- Shipping and receiving support
- Payload processing areas (see facilities section below)
- Facility environmental and cleanliness controls
- Limited office space
- Communications (phone, wireless internet, etc.)
- Limited quantities of consumables, bench stock items, clean-room garments
- Loan pool tools and equipment
- Payload transportation and handling
- Handling and disposal of biohazardous, chemical, and radioactive waste, including BioSafety Level -2 (BSL-2) organisms and experiments utilizing them
- Contractor technician support
- Payload Locker handling equipment (transport boxes, cradles)
- Powered payload transportation equipment (custom batteries, power control boxes, cables)
- Transportation from return/landing site (hazardous area) to payload turnover facility

**2. FACILITIES**

Facility accommodations are required at the landing site for payload return.

- 6 to 8 payload user rooms (with sinks, freezers) approximately 500 sq ft
- 1 payload recovery team room, 500 sq ft
- 1 integrated operations/turnover room, approximately 1,000 sq ft

**Animal Care Accommodations** - provides animal care services for Rodent Research Missions

- Support from roughly L+3 hours to L+60 days
- Certification from “Association for Assessment and Accreditation of Laboratory Animal Care” (AAALAC) is required
- Capacity to dissect 60 mice returned from orbit