Prepared in Response to:
NASA CRS RFP #NNJ08ZBG001R
Submitted to:
NASA Lyndon B. Johnson Space Center
Attn: Craig G. Burridge
Mail Code: BG/Bldg 265
2101 NASA Parkway
Houston, TX 77058-3696

10 November 2008

ISS COMMERCIAL RESUPPLY SERVICES

VOLUME I – OFFER

Security CAGE Code: 9X711

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SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS
OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, & 30

1. REQUISITION NO.	PAGE 1 OF 151

2. CONTRACT NO.	3. AWARD/EFFECTIVE DATE	4. ORDER NO.	5. SOLICITATION NO.	6. SOLICITATION ISSUE DATE
NNJ09GA02B				

7. FOR SOLICITATION INFORMATION CALL	7a. NAME	7b. TELEPHONE NO.	8. OFFER DUE DATE/LOCAL TIME
	Craig Burridge	(281) 483-2501	

9. ISSUED BY CODE BG

NASA-Johnson Space Center
ISS Procurement Office/BG
2101 NASA Pkwy
Houston, TX 77058

10. THIS ACQUISITION IS
- [X] UNRESTRICTED OR
- [ ] SET ASIDE ____ % FOR
  - [ ] SMALL BUSINESS
  - [ ] HUBZONE SMALL BUS.
  - [ ] SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS
  - [ ] 8(A) [ ] EMERGING SMALL BUSINESS

NAICS: 481212
SIZE STANDARD: 1500

11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED	12. DISCOUNT TERMS	13a. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)	13b. RATING / 14. METHOD OF SOLICITATION
[ ] SEE SCHEDULE	Net 30	[X]	DO-C9 / [ ] RFQ [ ] IFB [X] RFP

15. DELIVER TO CODE

NASA-Johnson Space Center
Attn: Craig Burridge/BG
2101 NASA Pkwy
Houston, TX 77058

16. ADMINISTERED BY CODE

NASA-Johnson Space Center
Attn: Craig Burridge/BG
2101 NASA Pkwy
Houston, TX 77058

17a. CONTRACTOR/ OFFEROR CODE 9X711 FACILITY CODE 101916062

Orbital Sciences Corporation
21839 Atlantic Boulevard
Dulles, VA 20166

18a. PAYMENT WILL BE MADE BY CODE LF

NASA-Johnson Space Center
Financial Management Division/LF
2101 NASA Pkwy
Houston, TX 77058

[ ] 17b. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER

18b. SUBMIT INVOICES TO ADDRESS SHOW IN BLOCK 18a UNLESS BLOCK ON RIGHT IS CHECKED [ ] SEE ADDENDUM

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES	21. QUANTITY	22. UNIT	23. UNIT PRICE	24. AMOUNT
	See Schedule I.A.4				

25. ACCOUNTING AND APPROPRIATION DATA

26. TOTAL AWARD AMOUNT (Govt. Use Only)

[ ] 27a. SOLICITATION INCORPORATES BY REFERENCE FAR 52.212-1, 52.212-4. FAR 52.212-3 AND 52.212-5 ARE ATTACHED. ADDENDA [ ] ARE [ ] ARE NOT ATTACHED

[ ] 27b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4. FAR 52.212-5 IS ATTACHED. ADDENDA [X] ARE [ ] ARE NOT ATTACHED

[ ] 28. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN 3 COPIES TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED HEREIN.

[ ] 29. AWARD OF CONTRACT: REFERENCE ____ OFFER DATED ____ YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH HEREIN, IS ACCEPTED AS TO ITEMS:

30a. SIGNATURE OF OFFEROR/CONTRACTOR	31a. UNITED STATES OF AMERICA (Signature of Contracting Officer)
Antonio L. Elias	

30b. NAME AND TITLE OF SIGNER (Type or Print)	30c. DATE SIGNED	31b. NAME OF CONTRACTING OFFICER (Type)	31c. DATE SIGNED
Dr. Antonio L. Elias, Executive VP & GM, APG	10 Nov 2008		

AUTHORIZED FOR LOCAL REPRODUCTION — Standard Form 1449 (REV. 3/2005

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I.A. ADDENDUM TO 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 PERIOD COVERED BY PROCUREMENT

This effort covers a contract period of 7 years. The total period of performance for this effort is December 23, 2008 through December 31, 2015.

I.A.3 INDEFINITE DELIVERY INDEFINITE QUANTITY (IDIQ), FIRM FIXED PRICE CONTRACT

In accordance with Clause VI.A.5, Single or Multiple Awards (FAR 52.216-27) (Oct 1995), NASA may elect to award multiple contracts. The guaranteed minimum value of this contract is the negotiated value of 20,000 kg (20 MT) of upmass to the International Space Station (ISS) based on the values established in Clause I.A.4. If the contract includes the acceptance of Sub-CLIN 0001AE, an additional guaranteed minimum value of this contract is increased by the negotiated value of 3,000 kg (3 MT) of Return Cargo Downmass, based on the values established in Clause I.A.4 (at award, the Government declined Sub-CLIN 0001AE).

The total maximum value of each contract awarded is $3.1 billion.

I.A.4 CONTRACT LINE ITEMS (CLINS)

CLIN 0001 Standard Resupply Service

Sub-CLIN 0001AA Pressurized Upmass ($/Kg)

Mission Configuration:

64

Sub-CLIN 0001AA Pricing Conditions:

1) The above prices are conditional upon the pressurized cargo module being loaded to its maximum predicted mass capacity for each mission. The maximum predicted upmass capacity for pressurized cargo missions (starting with the third mission in 2011) is 2,000 Kg. For the single 2010 pressurized cargo mission the maximum predicted upmass capacity is 800 Kg, and for the first two 2011 pressurized cargo missions the maximum predicted upmass capacity is 1,575 Kg and 1,775 Kg respectively.

2) The above pricing is based upon a predicted increase in upmass capacity over the first three PCM missions (i.e. first mission in 2010 – 800 Kg, and the second and third missions in 2012 – 1,575 Kg and 1,775 Kg respectively). Thus, if the first mission occurs in 2010, and no missions are ordered in 2011, the next mission predicted upmass capacity will be 1,575 Kg. If, however, the Contractor is able to perform a successful Basic Capability mission for another customer in between these three CRS missions, the predicted increase in upmasss capacity associated with these non-CRS missions will be realized for subsequent CRS missions.

Sub-CLIN 0001AB Pressurized Upmass ($/Kg)

Mission Configuration:

b4

Sub-CLIN 0001 AB Pricing Conditions:

1) The above prices are conditional upon the pressurized cargo module being loaded to its maximum predicted mass capacity for each mission. The maximum predicted upmass capacity for pressurized cargo missions (starting with the second mission in 2013) is 2,700 Kg. For the first Enhanced Capability pressurized cargo mission the maximum predicted upmass capacity is 2,500 Kg.

2) The above prices are conditional upon the Government ordering during the period of performance of this contact a minimum of six (6) Pressurized Upmass missions utilizing the Enhanced Capability.

Sub-CLIN 0001AC Unpressurized Upmass ($/Kg)

Mission Configuration:

Unpressurized Cargo Module (UCM), Basic Capability

b4

Sub-CLIN 0001AC Pricing Conditions:

1) The above prices are conditional upon the unpressurized cargo module being loaded to its maximum predicted mass capacity for each mission. The maximum predicted gross capacity (combined mass of ORUs and all FSE) for an unpressurized cargo mission is 2.,000 Kg, and assumes 25% FSE mass that remains attached to the UCM, resulting in a 1,500 Kg delivered cargo capacity (ORUs plus ORU-attached FSE) per UCM mission.

Sub-CLIN 0001AD Return Cargo Upmass ($/Kg)

Mission Configuration:

Return Cargo Module (RCM), Basic Capability

b4

Sub-CLIN 0001AD Pricing Conditions:

1) The above prices are conditional upon the Return cargo module being loaded to its maximum predicted mass capacity for each mission. The maximum predicted upmass capacity for all Return cargo missions is 1,100 Kg.

Sub-CLIN 0001AE Return Cargo Downmass ($/Kg)

Mission Configuration:

Return Cargo Module (RCM), Basic Capability

b4

Sub-CLIN 0001AE Pricing Conditions:

1) The above prices are conditional upon the Return cargo module being loaded to its maximum predicted mass capacity for each mission. The maximum predicted downmass capacity for all Return cargo missions is 1,100 Kg.

Sub-CLIN 0001AF Disposal Cargo Downmass ($/Kg)

Mission Configuration:

Pressurized Cargo Module (PCM), Basic Capability

b4

Sub-CLIN 0001AF Pricing Conditions:

1) The above prices are conditional upon the pressurized cargo module being loaded to its maximum predicted mass capacity for each mission. The maximum predicted downmass (disposal) capacity for pressurized cargo missions is 2,000 Kg. For the single 2010 pressurized cargo mission the maximum predicted downmass (disposal) capacity is 500 Kg.

Sub-CLIN 0001AG Disposal Cargo Downmass ($/Kg)

Mission Configuration:

Pressurized Cargo Module (PCM), Enhanced Capability

b4

Sub-CLIN 0001AG Pricing Conditions:

1) The above prices are conditional upon the pressurized cargo module being loaded to its maximum predicted mass capacity for each mission. The maximum predicted downmass (disposal) capacity for all pressurized cargo missions is 2,700 Kg.

Sub-CLIN 0001AH Mission Configuration Prices ($/Mission)

Mission Configuration:

Pressurized Cargo Module (PCM) and Disposal Service, Basic Capability

b4

Sub-CLIN 0001AH Pricing Conditions:

1) The above prices are conditional upon the pressurized cargo module not exceeding its maximum predicted mass capacity for each mission. The maximum predicted upmass capacity for pressurized missions (starting with the third mission in 2011) is 2,000 Kg. For the single 2010 mission the maximum predicted upmass capacity is 800 Kg, and for the two initial 2011 missions the maximum predicted upmass capacity is 1,575 Kg and 1,775 Kg respectively. The maximum predicted downmass (disposal) capacity for pressurized cargo missions is 2,000 Kg. For the single 2010 pressurized cargo mission the maximum predicted downmass (disposal) capacity is 500 Kg.

Sub-CLIN 0001AI Mission Configuration Prices ($/Mission)

Mission Configuration:

Pressurized Cargo Module (PCM) and Disposal Service, Enhanced Capability

b4

Sub-CLIN 0001AI Pricing Conditions:

1) The above prices are conditional upon the pressurized cargo module not exceeding its maximum predicted mass capacity for each mission. The maximum predicted upmass capacity for pressurized missions (starting with the second mission in 2013) is 2,700 Kg. For the first 2013 pressurized cargo mission the maximum predicted upmass capacity is 2,500 Kg. The maximum predicted downmass (disposal) capacity for all pressurized cargo missions is 2,700 Kg.

2) The above prices are conditional upon the Government ordering during the period of performance of this contact a minimum of six (6) Pressurized Upmass missions utilizing the Enhanced Capability.

Sub-CLIN 0001AJ Mission Configuration Prices ($/Mission)

Mission Configuration:

Return Cargo Module (RCM) (Upmass and Return downmass service), Basic Capability

b4

Sub-CLIN 0001AJ Pricing Conditions:

1) The above prices are conditional upon the Return cargo module not exceeding its maximum predicted mass capacity for each mission. The maximum predicted upmass capacity for Return cargo missions is 1,100 Kg. The maximum predicted downmass capacity for all Return cargo missions is 1,100 Kg.

Sub-CLIN 0001AK Mission Configuration Prices ($/Mission)

Mission Configuration:

Unpressurized Cargo Module (UCM) (Upmass service only), Basic Capability

b4

Sub-CLIN 0001AK Pricing Conditions:

1) The above prices are conditional upon the unpressurized cargo module not exceeding its maximum predicted mass capacity for each mission. The maximum predicted gross capacity (combined mass of ORUs and all FSE) for an unpressurized cargo mission is 2,000 Kg, and assumes 25% FSE mass that remains attached to the UCM, resulting in a 1,500 Kg delivered cargo capacity (ORUs plus ORU-attached FSE) per UCM mission.

CLIN 0002 Non-Standard Services

b4

CLIN 0003 Special Task Assignments and Studies

$4

I.A.4A OPTIONAL CONTRACT LINE ITEMS (CLINS)

This Section Reserved.

(End of Section)

II. CONTRACT TERMS AND CONDITIONS—COMMERCIAL ITEMS (FAR 52.212-4) (OCT 2008)

(a) *Inspection/Acceptance.* In lieu of FAR 52.212-4(a), this contract incorporates Inspection of Services—Fixed Price (FAR 52.246-4) (Aug 1996).
(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 Governmentwide commercial purchase card), the Contractor may not assign its rights to receive payment under this contract.
(c) *Changes.* This contract incorporates Changes – Fixed Price (Deviation) (FAR 52.243-1) (Aug 1987) Alternate II at Clause II.A.10.
(d) *Disputes.* This contract is subject to the Contract Disputes Act of 1978, as amended (41 U.S.C. 601-613). 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, 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—Central Contractor Registration, or 52.232-34, Payment by Electronic Funds Transfer—Other Than Central Contractor Registration), 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 Section 611 of the Contract Disputes Act of 1978 (Public Law 95-563), 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, and the Contractor shall be liable to the Government for any and all rights and remedies provided by law. If it is determined that the Government improperly terminated this contract for default, such termination shall be deemed a termination for convenience.
(n) *Title.* Unless specified elsewhere in this contract, title to items furnished under this contract shall pass to the Government upon acceptance, regardless of when or where the Government takes physical possession.
(o) Deleted.
(p) *Limitation of liability.* Except as otherwise provided by an express warranty, the Contractor will not be liable to the Government for consequential damages resulting from any defect or deficiencies in accepted items.
(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. 3701, *et seq.*, Contract Work Hours and Safety Standards Act; 41 U.S.C. 51-58, Anti-Kickback Act of 1986; 41 U.S.C. 265 and 10 U.S.C. 2409 relating to whistleblower protections; 49 U.S.C. 40118, Fly American; and 41 U.S.C. 423 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, and Compliance with Laws Unique to Government Contracts 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) *Central Contractor Registration (CCR).* (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 CCR database, and for any liability resulting from the Government's reliance on inaccurate or incomplete data. To remain registered in the CCR 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 CCR database to ensure it is current, accurate and complete. Updating information in the CCR 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 CCR 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 CCR 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 CCR 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 CCR database. Information provided to the Contractor's CCR 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 the internet at *http://www.ccr.gov* or by calling 1-888-227-2423 or 269-961-5757.

(End of clause)

II.A. ADDENDUM TO FAR 52.212-4

NOTE: In accordance with paragraph (s) of FAR clause 52.212-4, any inconsistencies between FAR Clause 52.212-4 and the Addendum to FAR 52.212-4 of this solicitation or contract shall be resolved by giving precedence to the Addendum to FAR 52.212-4, except for the paragraphs listed in (s)(2).

II.A.1 ON-RAMP

1.1 The purpose of the Indefinite Delivery Indefinite Quantity (IDIQ) on-ramp is to provide NASA with a mechanism to recompete due to the loss of an existing ISS Commercial Resupply Services (CRS) supplier or to procure a vehicle service that is not currently being provided within the scope of this contract during the period of performance. NASA will determine whether those conditions are met prior to synopsizing and conducting the "On-Ramp" competition.

1.2 The parties mutually agree that the original solicitation, as revised, will be used as a basis to add additional awardees to the pool of existing awardee(s) to compete on future task orders. The decision to request proposals under the clause will be solely at NASA's discretion and will only occur after this requirement has been synopsized.

If NASA issues a solicitation notice, new and existing 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.

1.3 Existing Contractors 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" Request for Proposal, they remain as a candidate for competition of future orders under the terms of the existing contract.

(End of clause)

II.A.2 NFS 1852.232-77 LIMITATION OF FUNDS (FIXED-PRICE CONTRACT) (MAR 1989)

(a) Of the total price of CLINs 0001 through 0003, the sum of $ 64 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.6, until the total price of said 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.6 and Table II.A.6-1. 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) Reserved.

(1) It is contemplated that funds presently allotted to this contract will cover the work to be performed until September 30, 2009.

(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.6 and Table II.A.6-1.

(3) Reserved.

(i) The notice shall state the estimate when the point referred to in paragraph I(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.3 SECURITY FOR RESUPPLY SERVICE PAYMENT FINANCING

3.1 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. The amount of all invoices submitted shall not exceed the total contract price for all Resupply Task Orders.

3.2 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. 255(f)*, 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.

3.3 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.4 LICENSES, PERMITS, AND OTHER AUTHORIZATIONS FOR A LAUNCH OR REENTRY SERVICE OPERATOR

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. The Contractor must obtain a Federal Aviation Administration license or permit, in accordance with 49 U.S.C. Subtitle IX, chapter 701 for operations under this contract. All costs and fees associated with obtaining licenses, permits and clearances are included in the standard resupply service price.

(End of clause)

II.A.5 TASK ORDERING PROCEDURES

5.1 **Requirements for Competition.**

In the event there are multiple award Contractors, NASA will provide all multiple award 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.

5.2 **Types of Task Orders**

There are three types of task orders that may be issued under this contract. The first type is Resupply Service Task Orders which apply to any Sub CLIN of CLIN 0001. CLIN 0002 task orders include Non-Standard Services tasks. CLIN 0003 task orders are referred to herein as Special Task Assignment Task Orders.

5.3 **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 original and five copies 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 contract holders under multiple award 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:

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

(ii) *Price.*

(iii) 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 its 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. Pursuant to FAR 16.505(a) (7), a task order award, or proposed award, is not subject to protest except on the grounds that the order increases the scope, period, or maximum value of the contract. The debriefing requirements of FAR 15.5 are not applicable to orders issued under this contract. 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 in writing. However, any facsimile or electronic task orders issued by the Contracting Officer will be confirmed in writing within five (5) business days. The Contractor will acknowledge receipt and acceptance of the task order by signing the task order and returning it to the Contracting Officer. Each task order will include the following information:

(i) Date of the task order and signature of the Contracting Officer
(ii) Contract number and task order number
(iii) Statement of Work and any other documentation on which the price is based
(iv) Product or service to be delivered
(v) Task order price
(vi) Completion, Delivery date, or Delivery window, as applicable
(vii) Accounting and appropriation data
(viii) Any other necessary information

5.4 **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 be applicable to the current Resupply Service Task Order only and will not be deemed as a permanent reduction of the prices contained in the Schedule.

(End of clause)

II.A.6 RESUPPLY MISSION PAYMENTS, MILESTONE EVENTS AND COMPLETION CRITERIA

6.1 Resupply mission payments will be based upon successful completion of approved milestone schedule and accomplishment criteria per the NASA-approved Work Plan (DRD C1-8). 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 Technical Representative (COTR), and approval by the Contracting Officer, the invoices will be forwarded to the payment office within fifteen (15) calendar days of receipt of the invoices at NASA.

6.2 These interim payments are contract financing payments that 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. 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. In accordance with 42 U.S.C 2465d, NASA shall not take title to launch vehicles or orbital vehicles under contract for resupply services.

6.3 The Contractor shall propose mission milestones, associated payment amounts, and accomplishment criteria that correspond to key production and required deliverable schedules in accordance with the NASA-approved Work Plan (DRD C1-8). The date for completion of ISS integration shall be included in the milestones. Table II.A.6-1 identifies the minimum milestones the Contractor shall propose.

Table II.A.6-1: *Mission Payment Schedule*

6.4 The following constraints apply:

(A) Mission milestone payments made for resupply missions prior to completion of ISS integration, shall not exceed 30% of the cost of that mission.

(B) The final milestone payment must equal at least 20% of the cost of each mission.

(C) After successful completion of ISS integration, the total of milestone payments prior to (and including) the MIR shall not exceed 50% of the total cost of the mission.

6.5 Payment schedules may be deferred or canceled by NASA if the Contractor fails to make substantial progress in accomplishing the major resupply service milestone events. The Contracting Officer will either approve or withhold the final payment within fifteen calendar days after NASA determines Mission Success in accordance with Clause II.A.19. The final payment amount shall be determined in accordance with the criteria in Clause II.A.19. In the event of a failed mission, the final payment shall be forfeited by the Contractor and is not recoupable.

6.6 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.20, 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 attached NASA-approved Work Plan (DRD C1-8). The requirement to make substantial progress in general conformance with the attached Work Plan, however, is not waived for any postponed resupply mission.

(End of clause)

II.A.7 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.

(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.8 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) The price of 2,000 kg (2 MT) of Upmass, pursuant to CLIN 0001
(2) A Non-Standard Service valued at $25,000, pursuant to CLIN 0002
(3) Special Task Assignments valued at $5,000, pursuant to CLIN 0003

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 four missions for any single Sub-CLIN of 0001AA, Pressurized Upmass, PCM, Basic Capability; Sub-CLIN 0001AB, PCM, Enhanced Capability; Sub-CLIN 0001AC Unpressurized Upmass, UCM, Basic Capability; Sub-CLIN 0001AD Return Cargo Upmass (starting in CY2012); Sub-CLIN 0001AE Return Cargo Downmass, RCM, Basic Capability (starting in CY 2012); Sub-CLIN 0001AF Disposal Cargo Downmass, PCM, Basic Capability; or Sub-CLIN 0001AG Disposal Cargo Downmass, PCM, Enhanced Capability (starting in CY2013);

(2) Any order for a combination of items in excess of six missions of Sub-CLIN of 0001AA, Pressurized Upmass, PCM, Basic Capability; Sub-CLIN 0001AB, PCM, Enhanced Capability; Sub-CLIN 0001AC Unpressurized Upmass, UCM, Basic Capability; Sub-CLIN 0001AD Return Cargo Upmass (starting in CY2012); Sub-CLIN 0001AE Return Cargo Downmass, RCM, Basic Capability (starting in CY 2012); Sub-CLIN 0001AF Disposal Cargo Downmass, PCM, Basic Capability; or Sub-CLIN 0001AG Disposal Cargo Downmass, PCM, Enhanced Capability (starting in CY2013); 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.9 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 I.A.2. 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.7, FAR 52.216-18, Ordering (Oct 1995). 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.8, FAR 52.216-19 Order Limitations (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, 2016.

(End of clause)

II.A.10 CHANGES—FIXED PRICE (DEVIATION) (FAR 52.243-1) (AUG 1987) ALTERNATE II

(a) The Contracting Officer may at any time, by written order, and without notice to the sureties, if any, make changes within the general scope of this contract in any one or more of the following:

(1) Description of services to be performed.

(2) Time of performance (i.e., hours of the day, days of the week, etc.).

(3) Place of performance of the services.

(4) Drawings, designs, or specifications when the supplies to be furnished are to be specially manufactured for the Government, in accordance with the drawings, designs, or specifications.

(5) Method of shipment or packing of supplies.

(6) Place of delivery.

(7) Completion dates or delivery dates related to the ISS Program as a result of stretch-out or acceleration of the ISS Program.

(b) Except as defined in Clause II.A.20, if any such change causes an increase or decrease in the cost of, or the time required for, performance of any part of the work under this contract, whether or not changed by the order, the Contracting Officer shall make an equitable adjustment in the contract price, the delivery schedule, or both, and shall modify the contract.

(c) The Contractor must assert its right to an adjustment under this clause within 30 days from the date of receipt of the written order. However, if the Contracting Officer decides that the facts justify it, the Contracting Officer may receive and act upon a proposal submitted before final payment of the contract.

(d) If the Contractor's proposal includes the cost of property made obsolete or excess by the change, the Contracting Officer shall have the right to prescribe the manner of the disposition of the property.

(e) Failure to agree to any adjustment shall be a dispute under the Disputes clause. However, nothing in this clause shall excuse the Contractor from proceeding with the contract as changed.

(End of clause)

II.A.11 INSPECTION OF SERVICES—FIXED PRICE (FAR 52.246-4) (AUG 1996)

(a) *Definition.* "Services," as used in this clause, includes services performed, workmanship, and material furnished or utilized in the performance of services.

(b) The Contractor shall provide and maintain an inspection system acceptable to the Government covering the services under this contract. Complete records of all inspection work performed by the Contractor shall be maintained and made available to the Government during contract performance and for as long afterwards as the contract requires.

(c) The Government has the right to inspect and test all services called for by the contract, to the extent practicable at all times and places during the term of the contract. The Government shall perform inspections and tests in a manner that will not unduly delay the work.

(d) If the Government performs inspections or tests on the premises of the Contractor or a subcontractor, the Contractor shall furnish, and shall require subcontractors to furnish, at no increase in contract price, all reasonable facilities and assistance for the safe and convenient performance of these duties.

(e) If any of the services do not conform with contract requirements, the Government may require the Contractor to perform the services again in conformity with contract requirements, at no increase in contract amount. When the defects in services cannot be corrected by reperformance, the Government may—
(1) Require the Contractor to take necessary action to ensure that future performance conforms to contract requirements; and
(2) Reduce the contract price to reflect the reduced value of the services performed.

(f) If the Contractor fails to promptly perform the services again or to take the necessary action to ensure future performance in conformity with contract requirements, the Government may—
(1) By contract or otherwise, perform the services and charge to the Contractor any cost incurred by the Government that is directly related to the performance of such service; or
(2) Terminate the contract for cause.

(End of clause)

II.A.12 PRESERVATION, PACKING, PACKAGING, AND MARKING FOR DOCUMENTATION

Preservation, packing, packaging and marking for shipment of all items ordered hereunder shall be in accordance with commercial practice and adequate to insure safe transportation, acceptable by common carrier, and transportation at the most economical rate(s). The Contractor shall place identical requirements on all subcontracts for items delivered to NASA. This provision applies to requirements not covered under in SOW Section V.A.2.4.5, Cargo Labeling.

(End of clause)

II.A.13 FAR 52.246-11 HIGHER LEVEL CONTRACT QUALITY REQUIREMENT (FEB 1999)

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

	Number	*Title*	*Revision*	*Applicability*
X	AS9100	SAE Aerospace Quality Management System	Latest	Compliance Required

(End of clause)

II.A.14 PERSONAL IDENTITY VERIFICATION OF CONTRACTOR PERSONNEL (FAR 52.204-9) (SEP 2007)

(a) The Contractor shall comply with agency personal identity verification procedures identified in contract Attachment V.G that implement Homeland Security Presidential Directive-12 (HSPD-12), Office of Management and Budget (OMB) guidance M-05-24 and Federal Information Processing Standards Publication (FIPS PUB) Number 201.

(b) The Contractor shall insert this clause in all subcontracts when the subcontractor is required to have routine physical access to a Federally-controlled facility and/or routine access to a Federally-controlled information system.

(End of clause)

II.A.15 PLACE OF PERFORMANCE

The place of performance and launch site will be identified in each task order. 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.16 EXPORT LICENSES (NFS 1852.225-70) (FEB 2000)

(a) The Contractor shall comply with all 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.17 NASA RESUPPLY READINESS ASSESSMENT

17.1 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.

17.2 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.

17.3 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 orbital vehicle into the Approach Ellipsoid (AE) which constitutes a delay in delivery.

17.4 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.20, Adjustments to Resupply 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.20 shall apply.

(End of clause)

II.A.18 NASA INSIGHT AND APPROVAL

18.1 NASA insight and approval includes insight into any corporation, corporate divisions, subsidiaries, joint ventures, partner(s) and/or any other business entity actually performing launch or orbital vehicle manufacturing, management, orbital-to-launch vehicle integration, testing and launch.

18.2 NASA will retain approval authority over portions of the resupply service that interface with ISS hardware and cargo. 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 ISS COTS Interface Requirements Document (IRD), and cargo environment constraints.

18.3 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 observation of manufacturing or tests, review of documentation, and attendance at meetings and reviews. NASA is limiting its insight into the launch service and will not participate in the final launch countdown.

While NASA insight will inform risk assessments pursuant to Clause II.A.17 above on both the Baseline vehicle and changes to that Baseline, the focus of NASA insight will be changes to that Baseline as covered in the reviews of SOW Section 2.1.1

Where NASA insight is required as defined in (A) through (H) below, the Contractor shall notify the COTR and the NASA Resident Office of meetings, reviews, or tests in sufficient time to permit NASA participation through the entire event. While insight into the orbital vehicle is largely achieved through the processes of ISS integration, other specific areas to be open to NASA insight are:

(A) Safety and Health Plan (DRD C1-4) and Mishap Notification, Investigation and Contingency Action Plan (DRD C1-2), Reliability Program and Quality Assurance Program at the time of proposal.

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

(B) Baseline, changes from the Baseline and Mission Unique vehicle design, analyses, and configuration management through design and qualification reviews.

(C) Narrowly focused reviews of the Contractor's Test Like You Fly and qualification rationale of the propulsion, flight controls, software and separation systems. 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.

Vehicle Production Insight – recurring

(D) Preflight predictions of flight performance.

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

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

(G) Problems and deviations to the design through production and test Material Review Boards, major or critical problems, anomaly resolutions, nonconformances, failure analysis, post test results, and acceptance and preship reviews.

(H) Safety & Mission Assurance compliance evaluations if not AS9100-certified (prime and subcontractors); updates to the Safety and Health Plan (DRD C1-4) and Mishap Notification, Investigation and Contingency Action Plan (DRD C1-2).

18.4 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.

18.5 Notwithstanding the insight and approvals set forth in Clause II.A.18 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 final acceptance or rejection of the resupply service.

(End of clause)

II.A.19 MISSION SUCCESS DETERMINATION, INVESTIGATION, AND CORRECTIVE ACTIONS

19.1 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 initial mission success criteria and specific percentage of the final payment earned for mission performance, at the Vehicle Baseline Review. The final payment is defined in Clause II.A.6, Resupply Mission Payments, Milestone Events and Completion Criteria, sub-Clause 6.4 B. The final criteria and percentage of the final payment will be agreed to at the CIR. If an agreement cannot be reached, the Contracting Officer will establish the criteria and payment percentage by the time of the Launch Readiness Assessment. The final criteria will be incorporated into a Task Order revision.

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

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

(ii) Criteria will be established that only reflect the Contractor's performance, independent of NASA's.
(iii) Damage to the ISS due to the Contractor's fault is a failure.
(iv) If the ISS has a hardware failure post-launch that requires the berthing to be aborted, the mission will be declared a Success.

19.2 Mission Success Determination

(a) Mission Success Determination will be made using the mission success criteria and the corresponding data and parameters that are jointly agreed to by NASA and the Contractor.

(b) The Contractor shall submit the relevant data and parameters that provide the most accurate information on performance of the mission success criteria, at the MIR. The types of data NASA would consider as relevant information include:
(i) Vehicle data that represents critical systems for approach and berthing.
(ii) Available launch and orbital vehicle data verifying Vehicle Interface Definition Document (IDD) environments.
(iii) Successful delivery of NASA cargo.
(iv) Closeout photos both on the ground and on orbit documenting cargo configuration at launch and prior to landing.
(v) 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.

19.3 Procedures

(a) The Contracting Officer determines whether a mission is considered a Mission Success, Partial Mission Success, or a Failed Mission, based on the agreed-to criteria and corresponding data. Within fifteen (15) calendar days from receipt of the Preliminary Post-Flight Assessment (DRD C7-1), the Contracting Officer will either determine the delivery a Mission Success or inform the Contractor of NASA's intent to withhold final payment and mission determination. In the event of a failed mission, the final payment shall be forfeited by the Contractor and is not recoupable. The Contractor will not be obligated to return prior progress payments upon reaching last payment considerations as detailed in Clause II.A.6 Resupply Mission Payments, Milestone Events and Completion Criteria.

This clause will take precedence over paragraph (e) of FAR 52.246-4, in that NASA will not require reperformance of the flight. The rights contained in this clause are in lieu of the of the right to terminate for cause found in paragraph (m) of FAR 52.212.-4. The liability of cargo as detailed in Clause II.A.26 is superseded by this clause during and

after launch. The Contractor is not liable for damage to cargo during and after launch and is limited to forfeiture of the last payment milestone only as detailed in this clause.

(b) If NASA informs the Contractor it will withhold the final payment, NASA will utilize the Final Post-Flight Assessment (DRD C7-2), 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 a final determination of either Partial Mission Success or Failed Mission within one (1) week of the hardware or payload functionality assessment.

19.4 Final Payment for Final Mission Success Determination

Final payment will be based on mission success determination per the agreed criteria and percentage of final payment.

19.5 Investigation and Corrective Action

In the event of an anomaly or failed mission, a Contractor-chaired FRB will determine the cause of anomaly or failure, if activated. The FRB will evaluate all available data from the launch vehicle, orbital 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.

19.6 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.20 ADJUSTMENTS TO MISSION SCHEDULE

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

20.2 Task orders issued to Contractors are intended to fulfill annual demand amounts but not specific delivery dates. To provide flexibility to both the Contractor and NASA, a standard delivery window will be established for each planned resupply mission. 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 work plan (DRD C1-8). 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 90 day window for each mission at ATP. Thereafter, with mutual agreement between the Contractor and NASA, the delivery window will reduce from 90 days to 1 day according to the table below.

Table II.A.20-1: Cargo Delivery Windows

Months Prior to Delivery Date –	Standard Delivery

First Day to Last Day	Window (Days)
ATP through L-13	90
L-13 through L-4	30
L-4 through L-2	14
L-2 through L-1	4
L-1 through Launch	1

20.3 At the VBR (NLT L-18 months), NASA and Contractor shall review the 90 day window established at ATP and mutually agree that delivery should remain scheduled during that period. At the MIR (NLT L-13 months), NASA and Contractor shall jointly agree on a reduced delivery window of 30 days (within the previous 90 day window). At the CIR (NLT L-4 months), NASA and Contractor shall jointly agree on a reduced delivery window of 14 days (within the previous 30 day window). Not later than 2 months prior to launch, the Contractor shall reduce the delivery window to 4 days (within the previous 14 day window) and notify NASA in writing of the window dates. Not later than 1 month prior to launch, the Contractor shall identify in writing to NASA the date for planned cargo delivery to ISS.

20.4 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 request a maximum of 30 calendar days delay per mission. 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. 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 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.

20.5 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. This may result in any of the following: an equitable adjustment to the price of all affected CLINs in the task order (if any), change in the delivery schedule, and change in the period of performance. 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 as extended.

(End of clause)

II.A.21 SAFETY AND HEALTH (NFS 1852.223-70) (APR 2002)

(a) Safety is the freedom from those conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment. NASA's safety priority is to protect:
(1) the public,
(2) astronauts and pilots,
(3) the NASA workforce (including Contractor employees working on NASA contracts), and
(4) high-value equipment and property.

(b) The Contractor shall take all reasonable safety and occupational health measures in performing this contract. The Contractor shall comply with all Federal, State, and local laws applicable to safety and occupational health and with the safety and occupational health standards, specifications, reporting requirements, and any other relevant requirements of this contract.

(c) The Contractor shall take, or cause to be taken, any other safety, and occupational health measures the Contracting Officer may reasonably direct. To the extent that the Contractor may be entitled to an equitable adjustment for those measures under the terms and conditions of this contract, the equitable adjustment shall be determined pursuant to the procedures of the changes clause of this contract; provided, that no adjustment shall be made under this Safety and Health clause for any change for which an equitable adjustment is expressly provided under any other clause of the contract.

(d) The Contractor shall immediately notify and promptly report to the Contracting Officer or a designee any accident, incident, or exposure resulting in fatality, lost-time occupational injury, occupational disease, contamination of property beyond any stated acceptable limits set forth in the contract Schedule; or property loss of $25,000 or more, or Close Call (a situation or occurrence with no injury, no damage or only minor damage (less than $1,000) but possesses the potential to cause any type mishap, or any injury, damage, or negative mission impact) that may be of immediate interest to NASA, arising out of work performed under this contract. The Contractor is not required to include in any report an expression of opinion as to the fault or negligence of any employee. In addition, service contractors (excluding construction contracts) shall provide quarterly reports specifying lost-time frequency rate, number of lost-time injuries, exposure, and accident/incident dollar losses as specified in the contract Schedule.

(e) The Contractor shall investigate all work-related incidents, accidents, and Close Calls, to the extent necessary to determine their causes and furnish the Contracting Officer a report, in such form as the Contracting Officer may require, of the investigative findings and proposed or completed corrective actions.

(f) Reserved.
(1) The Contracting Officer may notify the Contractor in writing of any noncompliance with this clause and specify corrective actions to be taken. When the Contracting Officer becomes aware of noncompliance that may pose a serious or imminent danger to safety and health of the public, astronauts and pilots, the NASA workforce (including Contractor employees working on NASA contracts), or high value mission critical equipment or property, the Contracting Officer shall

notify the Contractor orally, with written confirmation. The Contractor shall promptly take and report any necessary corrective action.

(2) If the Contractor fails or refuses to institute prompt corrective action in accordance with subparagraph (f)(1) of this clause, the Contracting Officer may invoke the stop-work order clause in this contract or any other remedy available to the Government in the event of such failure or refusal.

(g) The Contractor (or subcontractor or supplier) shall insert the substance of this clause, including this paragraph (g) and any applicable Schedule provisions and clauses, with appropriate changes of designations of the parties, in all solicitations and subcontracts of every tier, when one or more of the following conditions exist:

(1) The work will be conducted completely or partly on premises owned or controlled by the Government.

(2) The work includes construction, alteration, or repair of facilities in excess of the simplified acquisition threshold.

(3) The work, regardless of place of performance, involves hazards that could endanger the public, astronauts and pilots, the NASA workforce (including Contractor employees working on NASA contracts), or high value equipment or property, and the hazards are not adequately addressed by Occupational Safety and Health Administration (OSHA) or Department of Transportation (DOT) regulations (if applicable).

(4) When the Contractor (or subcontractor or supplier) determines that the assessed risk and consequences of a failure to properly manage and control the hazard(s) warrants use of the clause.

(h) The Contractor (or subcontractor or supplier) may exclude the provisions of paragraph (g) from its solicitation(s) and subcontract(s) of every tier when it determines that the clause is not necessary because the application of the OSHA and DOT (if applicable) regulations constitute adequate safety and occupational health protection. When a determination is made to exclude the provisions of paragraph (g) from a solicitation and subcontract, the Contractor must notify and provide the basis for the determination to the Contracting Officer. In subcontracts of every tier above the micro-purchase threshold for which paragraph (g) does not apply, the Contractor (or subcontractor or supplier) shall insert the substance of paragraphs (a), (b), (c), and (f) of this clause).

(i) Authorized Government representatives of the Contracting Officer shall have access to and the right to examine the sites or areas where work under this contract is being performed in order to determine the adequacy of the Contractor's safety and occupational health measures under this clause.

(j) The Contractor shall continually update the safety and health plan when necessary, providing updates to NASA at Program Reviews. In particular, the Contractor shall furnish a list of all hazardous operations to be performed, and a list of other major or key operations required or planned in the performance of the contract, even though not deemed hazardous by the Contractor. NASA and the Contractor shall jointly decide which operations are to be considered hazardous, with NASA as the final authority. Before hazardous operations commence, the Contractor shall submit for NASA concurrence —

(1) Written hazardous operating procedures for all hazardous operations; and/or
(2) Qualification standards for personnel involved in hazardous operations.

(End of clause)

II.A.22 CROSS-WAIVER OF LIABILITY FOR SPACE STATION ACTIVITIES (NFS 1852.228-76) (DEC 1994) (DEVIATION)

1. The Intergovernmental Agreement for the International Space Station (ISS) contains a broad 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 establish a cross-waiver of liability in the interest of encouraging participation in the exploration, exploitation, and use of outer space through the International Space Station (ISS). The Parties intend that the cross-waiver of liability be broadly construed to achieve this objective

2. For the purposes of this clause:

   a. The term "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.

   b. The term "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.

   c. The term "Partner State" includes each Contracting Party for which the 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) 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.

   d. The term "Payload" means all property to be flown or used on or in a Launch Vehicle or the ISS.

   e. The term "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 performed under this contract, or in implementation of the IGA, MOUs concluded pursuant to the IGA, and implementing arrangements. 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.

f. The term "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.

The term "Related Entity" may also apply to a State, or an agency or institution of a State, having the same relationship to a Partner State as described in paragraphs (2)(f)(i) through (2)(f)(iii) of this clause or otherwise engaged in the implementation of Protected Space Operations as defined in paragraph (2)(e) above.

g. The term "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.

h. The term "Party" means a party to this contract.

3. Cross-waiver of liability:

a. Each Party agrees to a cross-waiver of liability pursuant to which each Party waives all claims against any of the entities or persons listed in paragraphs (3)(a)(i) through (3)(a)(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) The other Party;

(ii) A Partner State other than the United States of America;

(iii)A Related Entity of any entity identified in paragraph (3)(a)(i) or (3)(a)(ii) of this clause; or

(iv)The employees of any of the entities identified in paragraphs (3)(a)(i) through (3)(a)(iii) of this clause.

b. In addition, each Party shall, by contract or otherwise, extend the cross-waiver of liability, as set forth in paragraph (3)(a) of this clause, to its Related Entities by requiring them, by contract or otherwise, to:

(i) Waive all claims against the entities or persons identified in paragraphs (3)(a)(i) through (3)(a)(iv) of this clause; and

(ii) Require that their Related Entities waive all claims against the entities or persons identified in paragraphs (3)(a)(i) through (3)(a)(iv) of this clause.

c. 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.

d. Notwithstanding the other provisions of this clause, this cross-waiver of liability shall not be applicable to:

(i) Claims between a Party and its own Related Entity or between its own Related Entities;

(ii) Claims made by a natural person, his/her estate, survivors or subrogees (except when a subrogee is a Party to this 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 a Party to extend the cross-waiver of liability to its Related Entities, pursuant to paragraph (3)(b) of this clause;

(vi)Claims by a Party arising out of or relating to the other Party's failure to perform its obligations under this Contractor.

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

f. This cross-waiver shall not be applicable when 49 U.S.C. Subtitle IX, Chapter. 701 is applicable.

g. In addition, this clause provides for a reciprocal waiver of claims between NASA and the Contractor as described in paragraph 3 above. This reciprocal waiver of claims between NASA and the Contractor, however, 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.

(End of clause)

II.A.23 SMALL DISADVANTAGED BUSINESS (SDB) PARTICIPATION – CONTRACT TARGETS

(This clause does not apply to SDB offerors unless the SDB offeror has waived the price evaluation adjustment factor by completing paragraph I of FAR clause 52.219-23, *Notice of*

Price Evaluation Adjustment for Small Disadvantaged Business Concerns in Section I of this solicitation.)

(a) FAR 19.1202-4(a) requires that SDB subcontracting targets be incorporated in the Contract. Targets for this contract are as follows:

*NAICS Industry

*North American Industry Classification System (NAICS) Industry Subsectors as determined by the Department of Commerce

(b) FAR 19.1202-4(b) requires that SDB concerns that are specifically identified by the offeror be listed in the contract when the extent of the identification of such subcontractors was part of the subfactor on Small Business Utilization. SDB concerns (subcontractors) specifically identified by the offeror are as follows:

Name of Concern(s): Kenig Aerospace, Martinez & Turek, Coast Aerospace Mfg, Tech. Specialists, Futron, Electro Plate Circuitry, RJR Circuits, CEC Electronics, BG Electronics, Booker Electronics, Falcon Electronics, Watring Technologies, CFD Research Corp., Qualis Corp., Andrews Space Inc., Engineering Science Analysis, LZ Technology Inc., MTS Global, Special Aerospace Services

The Contractor shall notify the Contracting Officer of any substitutions of the firms listed in paragraph (a) if the replacement contractor is not an SDB concern.

(c) If the prime offeror is an SDB that has waived the price evaluation adjustment, the target for the work it intends to perform as a prime Contractor is as follows:

Dollars	Percent of Contract Value
N/A	N/A

(End of clause)

II.A.24 MINIMUM REQUIREMENTS

The Contractor shall maintain compliance with all conditions throughout the period of performance of this contract, as certified to in Clause IV.A.1, Minimum Requirements.

(End of clause)

II.A.25 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 . The small business percentage goal, includes the following goals expressed as a percent of total contract value:

(End of clause)

II.A.26 LIABILITY FOR GOVERNMENT PROPERTY FURNISHED FOR REPAIR OR OTHER SERVICES (DEVIATION) (SEPTEMBER 2007) (NFS 1852.245-72)

a. This clause shall govern with respect to any Government property furnished to the Contractor for repair or other services that is to be returned to the Government. Such property, hereinafter referred to as "Government property furnished for servicing," shall not be subject to FAR 52.245-1, Government Property.
b. The official accountable recordkeeping and financial control and reporting of the property subject to this clause shall be retained by the Government. The Contractor shall maintain adequate records and procedures to ensure that the Government property furnished for servicing can be readily accounted for and identified at all times while in its custody or possession or in the custody or possession of any subcontractor.
c. The Contractor shall be liable for any loss, damage, or destruction of the Government property furnished for servicing when caused by the Contractor's failure to exercise such care and diligence as a reasonable prudent owner of similar property would exercise under similar

circumstances, or when sustained while the property is being worked upon and directly resulting from that work, including, but not limited to, any repairing, adjusting, inspecting, servicing, or maintenance operation. The Contractor shall not be liable for loss, damage, or destruction of Government property furnished for servicing resulting from any other cause except to the extent that the loss, damage, or destruction is covered by insurance (including self-insurance funds or reserves).

d. In addition to any insurance (including self-insurance funds or reserves) carried by the Contractor and in effect on the date of this contract affording protection in whole or in part against loss, damage, or destruction of such Government property furnished for servicing, the amount and coverage of which the Contractor agrees to maintain, the Contractor further agrees to obtain any additional insurance covering such loss, damage, or destruction that the Contracting Officer may from time to time require. The requirements for this additional insurance shall be effected under the procedures established by the Changes Clause II.A.10.

e. The Contractor shall hold the Government harmless and shall indemnify the Government against all claims for injury to persons or damage to property of the Contractor or others arising from the Contractor's possession or use of the Government property furnished for servicing or arising from the presence of that property on the Contractor's premises or property.

(End of clause)

II.A.27 CONTRACTING OFFICER TECHNICAL REPRESENTATIVE DELEGATION

(a) The COTR shall be specifically appointed by the Contracting Officer in writing in accordance with NASA FAR Supplement 1842.270.

(b) The Contractor will be provided a copy of the NASA Form 1634, Contracting Officer Technical Representative (COTR) Delegation, which will appoint the COTR and establish the COTR's duties and responsibilities. The NASA Form 1634 will be provided to the Contractor at contract award.

(End of clause)

II.A.28 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.acqnet.gov/far/
http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm

Federal Acquisition Regulation (48 CFR Chapter 1)

Clause Number	*Date*	*Title*
NONE INCORPORATED BY REFERENCE		

NASA FAR Supplement (48 CFR Chapter 18) Clauses

Clause Number	*Date*	*Title*
1852.215-84	OCT 2003	OMBUDSMAN –ALTERNATE I (JUN 2000). The installation Ombudsman shall be: Melanie W. Saunders Attn: Mail Code AC 2101 NASA Parkway Houston, TX 77058-3696 281-483-0490 facsimile 281-483-2200 email: melanie.saunders-1@nasa.gov
1852.219-75	MAY 1999	SMALL BUSINESS SUBCONTRACTING REPORTING
1852.219-76	JUL 1997	NASA 8 PERCENT GOAL
1852.223-75	FEB 2002	MAJOR BREACH OF SAFETY OR SECURITY

(End of clause)

II.A.29 USE OF GOVERNMENT PROPERTY, FACILITIES AND ASSETS

(a) The Contractor shall obtain and maintain any necessary agreements between the Contractor and any Government Agency authorizing the use of Government property, facilities, assets or services required in performance of this contract. All such use of NASA facilities, equipment, and services shall be governed by negotiated Reimbursable Space Act Agreements between the Contractor/Subcontractor and the NASA Centers. All remedies to disputes or performance issues shall be resolved in accordance with the terms and conditions of the executed Reimbursable Space Act Agreements.

(b) NASA under this contract makes no warranty whatsoever as to the suitability for use of Government property, facilities and other assets made available under the terms and conditions of any Government use agreements or contracts. Any costs necessary to maintain, restore, refurbish, and/or replace any assets, for use under this contract, shall result in no increase in the price of this contract.

(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 under any contract 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.30 RIGHTS IN DATA—GENERAL (FAR 52.227-14) (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. 403(8)).
"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. 253d, 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. NNJ09GA02B (and subcontract N/A, 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:

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

(ii) Use (except for manufacture) by other contractors (with the exception of other ISS CRS contractors) participating in the government's program of which the specific contract is a part, for information and use in connection with the work performed under each contract, provided Orbital has consented in advance in writing to such use.

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

(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. NNJ09GA02B (and subcontract N/A, 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.

(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.31 KEY PERSONNEL AND FACILITIES (NFS 1852.235-71) (MARCH 1989)

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

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

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

Key Personnel

Key Facilities

(End of clause)

II.A.32 SUBCONTRACTING WITH RUSSIAN ENTITIES FOR GOODS AND SERVICES

(a) Definitions: In this provision:

(1) The term "Russian entities" means:
(A) Russian persons, or
(B) Entities created under Russian law or owned, in whole or in part, by Russian persons or companies including, but not limited to, the following:
(i) The Russian Federal Space Agency (Roscosmos),
(ii) Any organization or entity under the jurisdiction or control of Roscosmos, or
(iii) 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 July 1, 2016, 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 . The provisions of this clause are without prejudice to the question of whether the Contractor or its subcontractor(s) are making extraordinary payments under section 6(a) or fall within the exceptions in section 7(1)(B) of the Act. NASA has applied the restrictions in the Act 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 CO. In order to obtain this written approval to subcontract with any Russian entity as defined in paragraphs (a), the Contractor shall provide the CO 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):
(A) 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 made under the subcontract.
(B) 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/dpl/Default.shtm)

OFAC's List of Specially Designated Nationals *(Adobe® PDF format)* (see http://www.treas.gov/offices/enforcement/ofac/sdn/t11sdn.pdf)

List of Unverified Persons in Foreign Countries (see http://www.bis.doc.gov/Enforcement/UnverifiedList/unverified_parties.html)

State Department's List of Parties Statutorily Debarred for Arms Export Control Act Convictions (see http://www.pmddtc.state.gov/debar059.htm)

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

(2) Unless relief is granted by the CO, the information necessary to obtain approval to subcontract shall be provided to the CO 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 CO with a report every six 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 CO may direct the Contractor to provide additional information for any other prospective or existing subcontract at any tier. The CO may direct the Contractor to terminate for the convenience of the Government any subcontract at any tier with an entity described in paragraph (a), subject to an equitable adjustment.

(f) Notwithstanding FAR 52.216-7, "Allowable Cost and Payments," on or after June 30, 2016 the Contractor shall be responsible to make payments to entities defined in paragraph (a) of this provision. Any subcontract with entities defined in paragraph (a), therefore, shall be completed in sufficient time to permit the U.S. Government to make extraordinary payments on subcontracts with Russian entities on or before June 30, 2016.

(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 CO to enter into any tier subcontract that involves entities defined in paragraph (a).

(End of Clause)

(END OF SECTION)

III. CONTRACT TERMS AND CONDITIONS REQUIRED TO IMPLEMENT STATUS OR EXECUTIVE ORDERS – COMMERCIAL ITEMS (FAR 52.212-5) (OCT 2008)

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

(2) 52.233-4, Applicable Law for Breach of Contract Claim (OCT 2004) (Pub. L. 108-77, 108-78)

(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:

X (1) 52.203-6, Restrictions on Subcontractor Sales to the Government (Sept 2006), with Alternate I (Oct 1995) (41 U.S.C. 253g and 10 U.S.C. 2402).

__ (2) 52.219-3, Notice of Total HUBZone Set-Aside (Jan 1999) (15 U.S.C. 657a).

__ (3) 52.219-4, Notice of Price Evaluation Preference for HUBZone Small Business Concerns (JULY 2005) (if the offeror elects to waive the preference, it shall so indicate in its offer) (15 U.S.C. 657a).

__ (4) [Reserved]

__ (5)(i) 52.219-6, Notice of Total Small Business Set-Aside (June 2003) (15 U.S.C. 644).

__ (ii) Alternate I (Oct 1995) of 52.219-6.

__ (iii) Alternate II (Mar 2004) of 52.219-6.

__ (6)(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 (7) 52.219-8, Utilization of Small Business Concerns (May 2004) (15 U.S.C. 637(d)(2) and (3)).

X (8)(i) 52.219-9, Small Business Subcontracting Plan (Apr 2008) (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.

__ (9) 52.219-14, Limitations on Subcontracting (Dec 1996) (15 U.S.C. 637(a)(14)).

X (10) 52.219-16, Liquidated Damages—Subcon-tracting Plan (Jan 1999) (15 U.S.C. 637(d)(4)(F)(i)).

X (11)(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.

__ (12) 52.219-25, Small Disadvantaged Business Participation Program—Disadvantaged Status and Reporting (Apr 2008) (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).

__ (13) 52.219-26, Small Disadvantaged Business Participation Program—Incentive Subcontracting (Oct 2000) (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).

__ (14) 52.219-27, Notice of Total Service-Disabled Veteran-Owned Small Business Set-Aside (May 2004) (15 U.S.C. 657 f).

__ (15) 52.219-28, Post Award Small Business Program Rerepresentation (June 2007) (15 U.S.C. 632(a)(2)).

__ (16) 52.222-3, Convict Labor (June 2003) (E.O. 11755).

X (17) 52.222-19, Child Labor—Cooperation with Authorities and Remedies (Feb 2008) (E.O. 13126).

X (18) 52.222-21, Prohibition of Segregated Facilities (Feb 1999).

X (19) 52.222-26, Equal Opportunity (Mar 2007) (E.O. 11246).

X (20) 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (Sept 2006) (38 U.S.C. 4212).

X (21) 52.222-36, Affirmative Action for Workers with Disabilities (Jun 1998) (29 U.S.C. 793).

__ (22) 52.222-37, Employment Reports on Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (Sept 2006) (38 U.S.C. 4212).

__ (23) 52.222-39, Notification of Employee Rights Concerning Payment of Union Dues or Fees (Dec 2004) (E.O. 13201).

X (24)(i) 52.222-50, Combating Trafficking in Persons (Aug 2007) (Applies to all contracts).

__ (ii) Alternate I (Aug 2007) of 52.222-50.

__ (25)(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)).

__ (ii) Alternate I (May 2008) of 52.223-9 (42 U.S.C. 6962(i)(2)(C)).

__ (26) 52.223-15, Energy Efficiency in Energy-Consuming Products (DEC 2007) (42 U.S.C. 8259b).

__ (27)(i) 52.223-16, IEEE 1680 Standard for the Environmental Assessment of Personal Computer Products (DEC 2007) (E.O. 13423).

__ (ii) Alternate I (DEC 2007) of 52.223-16.

__ (28) 52.225-1, Buy American Act—Supplies (June 2003) (41 U.S.C. 10a-10d).

__ (29)(i) 52.225-3, Buy American Act—Free Trade Agreements—Israeli Trade Act (Aug 2007) (41 U.S.C. 10a-10d, 19 U.S.C. 3301 note, 19 U.S.C. 2112 note, Pub. L 108-77, 108-78, 108-286, 109-53 and 109-169).

__ (ii) Alternate I (Jan 2004) of 52.225-3.

__ (iii) Alternate II (Jan 2004) of 52.225-3.

__ (30) 52.225-5, Trade Agreements (NOV 2007) (19 U.S.C. 2501, *et seq.*, 19 U.S.C. 3301 note).

X (31) 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).

__ (32) 52.226-4, Notice of Disaster or Emergency Area Set-Aside (Nov 2007) (42 U.S.C. 5150).

__ (33) 52.226-5, Restrictions on Subcontracting Outside Disaster or Emergency Area (Nov 2007) (42 U.S.C. 5150).

X (34) 52.232-29, Terms for Financing of Purchases of Commercial Items (Feb 2002) (41 U.S.C. 255(f), 10 U.S.C. 2307(f)).

__ (35) 52.232-30, Installment Payments for Commercial Items (Oct 1995) (41 U.S.C. 255(f), 10 U.S.C. 2307(f)).

X (36) 52.232-33, Payment by Electronic Funds Transfer—Central Contractor Registration (Oct 2003) (31 U.S.C. 3332).

__ (37) 52.232-34, Payment by Electronic Funds Transfer—Other than Central Contractor Registration (May 1999) (31 U.S.C. 3332).

__ (38) 52.232-36, Payment by Third Party (May 1999) (31 U.S.C. 3332).
__ (39) 52.239-1, Privacy or Security Safeguards (Aug 1996) (5 U.S.C. 552a).
__ (40)(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:

__ (1) 52.222-41, Service Contract Act of 1965 (Nov 2007) (41 U.S.C. 351, *et seq.*).
__ (2) 52.222-42, Statement of Equivalent Rates for Federal Hires (May 1989) (29 U.S.C. 206 and 41 U.S.C. 351, *et seq.*).
__ (3) 52.222-43, Fair Labor Standards Act and Service Contract Act—Price Adjustment (Multiple Year and Option Contracts) (Nov 2006) (29 U.S.C. 206 and 41 U.S.C. 351, *et seq.*).
__ (4) 52.222-44, Fair Labor Standards Act and Service Contract Act—Price Adjustment (Feb 2002) (29 U.S.C. 206 and 41 U.S.C. 351, *et seq.*).
__ (5) 52.222-51, Exemption from Application of the Service Contract Act to Contracts for Maintenance, Calibration, or Repair of Certain Equipment—Requirements (Nov 2007) (41 U.S.C. 351, *et seq.*).
__ (6) 52.222-53, Exemption from Application of the Service Contract Act to Contracts for Certain Services—Requirements (Nov 2007) (41 U.S.C. 351, *et seq.*).
__ (7) 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 settelement. 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 paragraphs (i) through (vii) of this paragraph in a subcontract for commercial items. Unless otherwise indicated below, the extent of the flow down shall be as required by the clause—

(i) 52.219-8, Utilization of Small Business Concerns (May 2004) (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 $550,000 ($1,000,000 for construction of any public facility), the subcontractor must include 52.219-8 in lower tier subcontracts that offer subcontracting opportunities.

(ii) 52.222-26, Equal Opportunity (Mar 2007) (E.O. 11246).

(iii) 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (Sept 2006) (38 U.S.C. 4212).

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

(v) 52.222-39, Notification of Employee Rights Concerning Payment of Union Dues or Fees (Dec 2004) (E.O. 13201).

(vi) 52.222-41, Service Contract Act of 1965 (Nov 2007) (41 U.S.C. 351, *et seq.*).

(vii) 52.222-50, Combating Trafficking in Persons (Aug 2007) (22 U.S.C. 7104(g)). Flow down required in accordance with paragraph (f) of FAR clause 52.222-50.

(viii) 52.222-51, Exemption from Application of the Service Contract Act to Contracts for Maintenance, Calibration, or Repair of Certain Equipment-Requirements (Nov 2007) (41 U.S.C. 351, *et seq.*).

(ix) 52.222-53, Exemption from Application of the Service Contract Act to Contracts for Certain Services-Requirements (Nov 2007) (41 U.S.C. 351, *et seq.*).

(x) 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. ADDENDUM TO FAR 52.212-3

MINIMUM REQUIREMENTS COMPLIANCE

The National Space Policy signed by President Bush on December 21, 2004, specifies that U.S. Government payloads must be launched on space launch vehicles manufactured in the United States (Section V, para. (1) a.). The policy further states that the "use of foreign components or technologies, and the participation of foreign governments and entities, in current and future US space transportation systems is permitted consistent with US law and regulations, as well as nonproliferation, national security, and foreign policy goals and commitments and US obligations under START, INF and MTCR. Such use or participation will not be permitted where it could result in critical national security or civil space launches being jeopardized by delays or disruptions in receipt of foreign-produced systems, components, technology or expertise." Pursuant to these sections of the National Space Policy, from 2005 through 2007 Orbital provided materials and briefings to the White House Office of Science and Technology Policy (OSTP)-led interagency group tasked with reviewing Taurus II compliance. The interagency group completed its policy compliance review in July 2007 and notified Orbital that Taurus II would be treated as a launch vehicle manufactured in the United States and be eligible to launch US Government payloads.

Orbital's review of the Iran, North Korea, and Syria Non-Proliferation Act indicates that, to the best of Orbital's knowledge and belief, that the engagement of Orbital for the CRS Program will not result in a violation of the Act. Orbital intends to procure from Aerojet-General Corporation AJ-26 liquid rocket engines for the Taurus II launch vehicle to perform the missions for CRS. The AJ-26 is a modified version of the Russian engine, NK-33, purchased by Aerojet from ND Kuznetsov STC of Samara, Russia (NDK) under the terms of agreements executed in 1995, as modified subsequently. ND Kuznetsov is an entity that is defined by the law as being under the jurisdiction and control of the Russian Aviation and Space Agency (RASA); however, NASA will not be required to make any payments directly to NDK as proscribed by the Act. Assuming *arguendo*, that the Act were interpreted bar such payments by contractors and subcontractors, the fact that the fundamental agreements between Aerojet and NDK pre-date the January 1, 1999 should warrant the exemption of any payments flowing to NDK from the scope of the bar.

(End of clause)

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 clause)

(END OF SECTION)

V. ATTACHMENTS

The following eight 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 and Small Disadvantaged Business Subcontracting Plan

Attachment V.E. Safety and Health Plan (Orbital Safety Manual, #TM-1617 REV T, dated 08 February 2008, Incorporated By Reference)

Attachment V.F. Standard Resupply Service – Standard External Cargo Complement

Attachment V.G. Personal Identity Verification (PIV) of Contractor Personnel

Attachment V.H. Acronyms and Abbreviations

Attachment V.I. Glossary

Attachment V.J. Non-Standard Services

Attachment V.K: Government-Supplied Hardware

Attachment V.L: Applicable and References Documents

Attachment V.M: Other Contract Items

(END OF SECTION)

VI. STATEMENT OF WORK

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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 resupply service to the International Space Station (ISS), dispose of unneeded cargo, and to return cargo from the ISS back to NASA. Cargo includes both NASA cargo and NASA-sponsored cargo (hereinafter referred to as "cargo"). Cargo includes both pressurized and unpressurized payloads. Contracts may include missions for pressurized or unpressurized delivery, disposal, return, or any combination thereof. NASA will provide internal cargo to the Contractor including packing materials (bags, foam, flight support equipment). Cargo combined with packing materials and/or flight support equipment is referred to as "customer cargo". NASA will provide external cargo to the Contractor without flight support equipment, referred to as "usable cargo". NASA will provide access to detailed design information, developed by or delivered to NASA, for components associated with ISS and orbital vehicle interfaces, such as the Common Berthing Mechanism and Flight Support Equipment (FRAM or direct mount), necessary to fulfill this Statement of Work. This includes hardware drawings, acceptance test procedures, test equipment designs and data for the contractor's use in acquiring or procuring these items. The Contractor shall perform all tasks necessary to ensure safe and reliable cargo integration and transportation to and from the ISS.

NASA will only have unlimited rights to data first produced in the performance of the services procured under this contract.

2.0 STANDARD RESUPPLY MISSION (CLIN 0001)

The Contractor shall perform the tasks necessary to execute all phases of the resupply mission per this SOW. The Standard Resupply Mission may consist of pressurized upmass delivery, unpressurized upmass delivery, cargo disposal or cargo return. 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 perform the required tasks to accomplish the resupply missions to and from the ISS. The Contractor shall provide the required cargo de-integration and return services, where applicable, to deliver cargo back to NASA. The standard external (unpressurized) upmass complement is identified in Attachment V.F.

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-supplied property described in Attachment V.K, 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-Supplied Property").

2.1. 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 C1-7.

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 orbital vehicle readiness prior to receipt of NASA late stow cargo.

2.1.1. 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 provide minutes and action items resulting from each review to NASA within one week after the review. A copy of the presentation material shall be available at the review for all NASA attendees (DRD C2-1).

2.1.1.1. 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 and SSP 50808 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 and mission dates of other flights utilizing the same launch and orbital vehicles.
d) Schedule Risks and Technical Risks, including risk statements, mitigation plans and mitigation schedules.
e) Action items from previous program and technical reviews, including their status, closure plan, closure rationale.
f) Minutes shall be published within one week of the meeting.

The intent of the Program Review 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. NASA will provide status of program direction at the reviews.

NASA and Contractor shall jointly agree to the current delivery window at Program 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 shall be provided but do not need to be briefed.

2.1.1.2. TECHNICAL REVIEWS

The Contractor shall conduct technical reviews to status the end-to-end integration of the launch and orbital vehicles. Technical Reviews shall be held in serial with Program Reviews. 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.

2.1.1.2.1. 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 orbital 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.

(A) MISSION BASELINE VEHICLE

The Contractor shall, at this review:

a) Establish a baseline launch and orbital vehicle configuration so that subsequent mission integration efforts have definite launch and orbital environments and performance capabilities identified.
b) With NASA approval, reconfirm the 90-day delivery window.
c) Provide the instrumentation plan as defined in the Vehicle IDD (DRD C3-1).

(B) DESIGN CHANGES FROM PRIOR MISSION BASELINE VEHICLE

The Contractor shall also, at this review, identify any design changes from the previous mission baseline vehicle (launch and orbital vehicle).

For the orbital vehicle, the Contractor shall:

a) Identify all SSP 50808 requirements that are impacted by the change and show how the have been allocated to the appropriate system, subsystem and/or component level. Also show how the requirements flow down is adequate to verify compliance with SSP 50808.
b) 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.
c) Show how these changes affect performance, reliability and environments.
d) Present the status or results of any mission unique or special study task assessments requested by NASA for complex manifest options.
e) Provide a schedule to complete all work required to accomplish the design changes and close requirement verifications prior to CIR.

For the launch vehicle, the Contractor, for the launch vehicle, shall:

a) Identify 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.
b) Provide updates to DRD C3-5 when qualification margins in those systems decrease or new qualification tests are executed.
c) 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.

d) The design solutions to be implemented are expected to meet the performance and functional requirements with applicable and acceptable margins.
e) The design does not pose major problems that may cause schedule delays.
f) Overall system architecture has been established.
g) The design solution can be produced based on existing processes and techniques; if not, risk areas, which require unique and unproven processes, are identified and risk mitigation plans are established.
h) An acceptable operations concept has been developed.
i) Preliminary plans are established for end-to-end testing methodologies.

2.1.1.2.2. MISSION INTEGRATION REVIEW

At not later than L-13 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.

(A) MISSION BASELINE VEHICLE

The Contractor shall, at this review:

a) Establish a 30 day window for cargo delivery to ISS.
b) Provide updates to the instrumentation plan as defined in the Vehicle IDD (DRD C3-1).
c) Provide initial data and parameters for Mission Success Determination.
d) Present the external cargo carrier layout for approval by NASA, if applicable.

(B) DESIGN CHANGES FROM PRIOR MISSION BASELINE VEHICLE

For the orbital vehicle, the Contractor shall:

a) Present designs and their supporting analyses that implement mission unique requirements.
b) Present progress in manufacturing and lay out remaining milestones and risks to accomplishing them.
c) Present progress in ISS integration, including progress toward closure of SSP 50808 requirements, and lay out remaining milestones and risks to accomplishing them.
d) Present progress of ISS integrated safety hazard assessments. Integrated safety analysis identifying any remaining hazards and proposed resolution per Section 2.5.2, Safety Assessments.

For the launch vehicle, the Contractor shall demonstrate the following to NASA:

a) Designs and their supporting analyses that implement mission unique requirements.
b) Progress in manufacturing and lay out remaining milestones and risks to accomplishing them.
c) Technical problems and design anomalies have been resolved and effects of design changes on system performance, reliability and safety have been identified.
d) The detailed design will meet performance, functional requirements, and schedule.
e) Software simulations and prototyping results do not present any potential mission risks.
f) Test plans have been defined.

2.1.1.2.3. CARGO INTEGRATION REVIEW

At not later than L-4 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-3 months. 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 testing, unless no-test factors of safety are used, shall have been accomplished. For open items, low schedule risk plans for completion shall be presented. All milestones to this point shall have been met.

The Contractor shall, at this review:

a) At this review, the Contractor and NASA shall mutually agree on a delivery window of 14 days.
b) Provide the final instrumentation plan as defined in the Vehicle IDD (DRD C3-1).
c) Present evidence of verification closures for mission unique designs and requirements.
d) Present evidence of verification closures for all open SSP 50808 requirements.
e) Provide all analytical assessments that show the compatibility of NASA cargo with the launch and orbital vehicle such as integrated loads, Launch to Activation thermal assessments, electromagnetic interference (EMI), and power.
f) Present evidence that all Safety Assessments have been approved by NASA.
g) Provide final data and parameters for mission success determination.

ISS Integration shall be complete prior to the first CIR. The post-flight data review shall be complete; and all anomalies are identified with corrective actions and low-risk closure plans in place.

2.1.1.2.4. POST-FLIGHT REVIEW

The Contractor shall conduct a post flight review after each mission to assess mission success and provide supporting data. The Contractor shall be responsible for providing telemetry data confirming the required launch and orbit conditions and cargo environments were met as stated in the IDD (DRD C3-1). The Preliminary Post Flight Assessment (DRD C7-1) shall contain the data necessary to verify these conditions. The Contractor shall measure and provide telemetry data to the extent required by Section 2.2.2 below. NASA will be responsible for providing data supporting cargo status.

Mission success will be determined based on the criteria set forth in Contract Section II.A.19, Mission Success Determination, Investigation and Corrective Action.

2.1.2. CONFIGURATION MANAGEMENT

The Contractor shall operate in compliance with the configuration management plan submitted with the request for proposal (DRD C1-4).

2.1.3. EXPORT CONTROL MANAGEMENT

The Contractor shall operate in compliance with the Export Control Plan submitted in accordance with DRD C1-5.

2.1.4. 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 C2-2 (Integrated Schedules); identify critical milestones; and provide the schedule for each mission electronically to the ISS Program.

2.2. VEHICLE INTEGRATION

The Contractor shall build, process, integrate and operate the launch and orbital 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.

2.2.1. 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, orbital vehicle (OV) and launch vehicle system operations including payload-to-OV and OV-to-LV system integration and launch operations.

2.2.2. TELEMETRY DATA

The Contractor shall provide vehicle telemetry, in electronic and upon request hard copy form, according to the Vehicle IDD (DRD C3-1) and the Preliminary Post Flight Assessment (DRD C7-1). This shall include a detailed listing and description of all measurements and calibration coefficients.

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 60 seconds after stage shutdown. For cargo return missions, the Contractor shall receive and record the full-rate vehicle telemetry from unberthing to landing in accordance with DRD C7-1, as finalized under Clause II.A.19.

2.2.3. 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 sites to ensure users are aware of facility, launch 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, orbital vehicle, launch vehicle or storage facilities. The Contractor shall provide security for cargo and personnel as required in cargo-specific or facility-specific documents.

2.2.4. 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 C-band beacon (radar) coverage, telemetry coverage, camera coverage of launch, and tracking and telemetry station acquisition

predictions. The Contractor shall coordinate and ensure all tracking and data recovery support meets mission requirements. If requested, NASA will provide Tracking and Data Relay Satellite System (TDRSS) and NASA Integrated Services Network (NISN) support over existing assets for commanding, tracking and data recovery.

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

2.2.5. 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:

(i) All critical items required to proceed into final launch countdown are ready.
(ii) All vehicle systems have been verified for launch.
(iii) All previously held Contractor readiness review actions have been closed or resolved.
(iv) Launch Site and Range support organizations have committed to launch.
(v) Tracking and data support resources have committed to launch.
(vi) Any open work or constraints to launch are identified and closeout plans and schedules are in place and supportable.
(vii) Mission risks are known and documented.

2.3. MISSION INTEGRATION SERVICES

The Contractor shall ensure the safe integration and transport of NASA-provided cargo, as well as Contractor-provided non-NASA cargo, 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 to ISS.

2.3.1. MISSION INTEGRATION MANAGEMENT

The Contractor shall perform mission integration tasks in accordance with the MIOMP (DRD C1-7). The Contractor shall submit updates to the MIOMP prior to the MIR for those missions which the changes affect.

The Contractor shall develop and submit a Work Plan (DRD C1-8) for each mission. 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) Conduct mission integration meetings as proposed in the MIOMP (DRD C1-7) to successfully plan, schedule, and manage mission analyses required to define and verify compatibility of the cargo with the interface requirements and environments.

c) Track development status of and resolve issues associated with mission specific hardware and software.
d) Manage the design, development, qualification, testing and integration of mission unique requirements.

2.3.2. ON-ORBIT ANALYSIS

NASA will provide the Contractor with the external cargo complement prior to the VBR. NASA will submit a cargo complement for each mission to the Contractor at approximately L-12 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 orbital 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 (in accordance with DRD C4-2) an Initial Mission Resource Allocation Document (MRAD) at L-10 months. The Initial MRAD shall contain current analytical data related to: electrical power and energy, command and data requirements, orbital vehicle dynamics and mass properties, robotics and berthing requirements, orbital vehicle Computer-Aided Design (CAD) models, orbital vehicle structural math model, plume history, thruster firing history, propellant types, launch to activation (LTA) analysis for external cargo. The Contractor shall also submit orbital vehicle CAD models for each mission per DRD C4-1, Engineering Computer Aided Design Models.

2.3.3. MISSION OPERATIONS

The Contractor shall perform all functions necessary to provide end-to-end flight control operations for the orbital vehicle including ground segment interfaces, cargo operating procedures, malfunction procedures, timelines, simulation support, real-time support and crew training plans.

2.3.3.1. GROUND SEGMENT OPERATIONS

The Contractor shall provide all facilities and services necessary to accomplish the end-to-end ISS resupply mission. As a part of this technical support, the Contractor shall support two Technical Interchange Meetings per year. The Contractor shall generate the required documentation per the required NASA ground system specifications and standards interfaces for the Mission Control Center.

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

2.3.3.1.1. 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, Security Management Plan, 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.

2.3.3.2. IMAGERY

The Contractor shall provide imagery of required crew interfaces, connectors, berthing interfaces, Extravehicular Activity (EVA) and Extravehicular Robotics (EVR) interfaces of the orbital vehicle in accordance with DRD C4-3. A Pre-Flight Imagery Plan (PFIP) shall be submitted to NASA for approval at L-6 months for pressurized and unpressurized cargo per DRD C4-3.

2.3.3.3. MISSION FLIGHT PROCEDURES

At approximately L-7 months NASA will provide to the Contractor the initial flight products (crew procedures and flight rules). NASA will develop these procedures and flight rules based on the Initial MRAD (DRD C4-2). The Contractor shall provide inputs to these flight products at L-5 months in accordance with DRD C5-1 to support the Flight Operations Review. These procedures will cover robotics operations and checklists, vestibule operations, rendezvous operations and checklist, and off-nominal systems operations and maintenance. In addition, the Contractor shall provide technical assistance and available data to NASA in the development of transfer lists and procedures, for pressurized cargo transferred to and from the ISS. NASA will provide Final Flight Products for review at L-4 weeks. The Contractor shall provide any updates to the Final Flight Products in accordance with DRD C6-2 at L-2 weeks.

2.3.3.4. MISSION TRAINING

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

2.3.3.4.1. FLIGHT CREW AND GROUND SUPPORT PERSONNEL TRAINING

The Contractor shall provide a mission specific crew training plan as outlined in the Initial MRAD (DRD C4-2) at L-10 months. The Contractor shall provide a minimum of two flight crew and ground personnel training sessions at the Contractor facility. The Contractor shall propose acceptable dates for the training briefings in accordance with DRD C4-2.

The Contractor shall provide the following module systems training functions:

a) Systems familiarization briefings in the classroom covering nominal and off-nominal systems operations and maintenance.
b) Hands-on instruction in orbital vehicle systems operations and maintenance using mockups or actual vehicles as appropriate to the training task. This hands-on training shall include orbital vehicle systems up to ISS interfaces, as well as, orbital vehicle interactions with ISS systems (e.g. hatch, vestibule operations, etc.)
c) Instructional training documentation and material as appropriate to the training task.

d) Coordination of integrated training plans and schedules with NASA to avoid schedule conflicts and assure proper lesson content, consistent with the Flight Products DRD C5-1.
e) Updates to orbital vehicle data and Contractor-provided training hardware as required to maintain a mission specific training environment for each of the training aids and mockups.

2.3.3.4.2. MISSION SIMULATION SUPPORT

The Contractor shall participate in two Joint Multi-Segment Simulation Training (JMSTs). NASA will conduct the JMSTs from the NASA-Johnson Space Center (JSC) Mission Control Center (MCC) and the ISS Management Center (IMC) to perform integrated mission training for each mission. Each of these simulations may last up to 48 hours.

2.3.3.5. 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 at JSC during rendezvous, berthing, unpressurized cargo retrieval, translation and integration, cargo transfer and unberthing.

The Contractor shall perform operations per the MIOMP with personnel residing at the Contractor control center and/or on-site at JSC. 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 system.

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

NASA will be responsible for on-orbit integrated operations once the orbital vehicle has safely arrived within the approach ellipsoid.

2.4. CARGO INTEGRATION

The Contractor shall safely integrate NASA cargo into the cargo module and or external carrier. NASA will provide pressurized cargo already packed to the Contractor. NASA will provide unpressurized (external) cargo without flight support equipment to the Contractor.

2.4.1. UNPRESSURIZED CARGO ANALYSIS AND INTEGRATION

The Contractor shall perform the analysis and integration tasks required to safely integrate unpressurized (external) orbital replacement units (ORUs) for delivery to the ISS. These tasks include cargo integration and analysis, and on-orbit operations analysis.

The Contractor shall submit a Vehicle IDD (DRD C3-1) which will provide the launch and orbital vehicle environments. NASA will use this data to assess the compatibility of NASA cargo with the launch vehicle. NASA will provide the Contractor with the external cargo manifest, including associated environments and models, hardware interfaces, ground processing requirements, interface verification requirements, and operational requirements prior to the VBR.

The Contractor shall deliver the analysis documentation in accordance with DRD C4-2 to provide evidence that the environments the ORU will be exposed to on the Contractor's integrated carrier assembly meet the required ORU environments. The Contractor shall perform the following tasks for the NASA-provided cargo:

a) External cargo Interface Control Agreement (ICA) for items hard-mounted on the external carrier as identified in the Initial MRAD. The external cargo ICA shall be submitted in accordance with DRD C3-2 at L-14 months as required. A preliminary external carrier layout shall be presented per DRD C3-2 and reviewed at the MIR. The final layout will be delivered with the Initial MRAD.

b) Perform mission specific structural, thermal, and functional assessments to ensure the feasibility of the configuration for a mission. The assessment shall include a Design Couple Load Analysis (DLA) of mission specific cargo, flight support equipment, and carrier in accordance with DRD C4-2 at L-10 months. The sensitivity of ORU response to cargo configuration (location, mass, etc.) shall be analyzed and the preferred configuration provided. The expected ORU environments during all phases of flight shall be delivered in accordance with DRD C4-2. If hardware requirements cannot be met, the Contractor shall coordinate resolution with the ISS Program or International Partner (IP) hardware provider or NASA-designated representative prior to submission of the initial MRAD (DRD C4-2).

c) Provide external carrier integrated assembly data in accordance with DRD C3-2 to NASA for EVA/EVR analysis. The EVR assessment includes kinematics and reach and access analysis of the Space Station Remote Manipulator System (SSRMS) or Special Purpose Dexterous Manipulator (SPDM). The EVA analysis includes EVA crew reach and access and assesses translation corridors.

d) 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 in accordance with SSP 42003, Space Station Manned Base (SSMB) to Mobile Servicing System (MSS) ICD.

e) Develop mass property data and finite element math models of the mission specific carrier in accordance with DRD C3-2.

2.4.2. PRESSURIZED CARGO ANALYSIS AND INTEGRATION

The Contractor shall perform the analysis and integration tasks required to safely integrate pressurized cargo for delivery to the ISS. NASA will provide a preliminary pressurized cargo complement after the MIR, and NLT L-12 months. The pressurized cargo complement will define a specified number of high, medium, and low density bags; bag sizes; any internal ORUs or payloads that need to be hard mounted; and preliminary late stow and early destow requirements. For cargo requiring hard mounting, the associated resource, operational, interface verification, and ground processing requirements, and orientation constraints will also be provided at this time. The Contractor shall perform the following:

a) Develop an internal cargo ICA in accordance with DRD C4-4 for items planned to be hard-mounted in the orbital vehicle pressurized module volume per Initial MRAD (DRD C4-2).

b) Provide a orbital vehicle pressurized module physical configuration per Initial MRAD (DRD C4-2) with margins (+/-) for each bag from a mass and cg perspective.

c) Perform 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 orbital vehicle. The Contractor shall perform mission specific structural, thermal, and functional assessments 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 orbital vehicle per the Initial MRAD (DRD C4-2). The Contractor shall coordinate resolution with NASA on any exceedances of the NASA-provided cargo environments.

d) Provide updated analysis and products per the Final MRAD (DRD C6-1). NASA will provide the Contractor an updated cargo complement prior to the CIR and NLT 5 months prior to launch. The updated cargo complement will identify updated late stow and early destow requirements and bag serial numbers with their required locations in the orbital vehicle per the Contractor-provided constraints detailed in the Initial MRAD.

2.4.3. CARGO PHYSICAL PROCESSING

The Contractor shall process cargo in accordance with SSP 50833, Cargo IRD. The Contractor shall provide Flight Support Equipment (FSE), Orbital Support Equipment (OSE), Ground Support Equipment (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 external ORUs or internal hard mount items in accordance with DRD C3-2 or C4-4 as applicable.

2.4.3.1. STANDARD CARGO

NASA will turn over the standard cargo, which includes both external and internal cargo, to the Contractor at the Contractor's payload processing facility in accordance with the MIOMP (DRD C1-7). The Contractor shall perform all functions required to safeguard, stow, track and integrate the standard cargo into the orbital vehicle. These functions shall be applied to the cargo at the level delivered by NASA (at the ORU or bag level).

2.4.3.2. LATE STOW CARGO

NASA will turn over the late stow cargo in accordance with the MIOMP (DRD C1-7). The Contractor shall perform all functions required to safeguard, stow, track and integrate the late stow cargo into the orbital vehicle. The Contractor shall document the late stow cargo for each mission within DRD C4-2 and DRD C6-1.

2.4.3.3. 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.

2.4.4. FACILITIES

The Contractor shall provide and maintain payload processing facilities at the cleanliness levels required in SN-C-0005, Space Shuttle Contamination Control Requirements, to process NASA flight hardware. The facilities used to process NASA flight hardware shall also meet the environmental requirements contained in 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.

2.4.5. CARGO LABELING

The Contractor shall provide labeling requirements for any non-NASA cargo in the Initial MRAD (DRD C4-2). NASA will provide the appropriate labels to the Contractor prior to integration of the cargo into the vehicle. The Contractor will not be responsible for labeling or verification of labeling of NASA cargo. Contractor-manifested cargo that will not transfer to the ISS once on-orbit does not require labels from NASA.

The Contractor shall accomplish the following tasks:

a) The Contractor shall affix Inventory Management System (IMS) bar code labels to Commercial payloads that will be transferred from the orbital vehicle to the ISS.
b) The Contractor will not be responsible for labeling or verification of labeling of NASA cargo. However, the Contractor shall correlate IMS bar code numbers to stowage location data for all cargo flown and provide this data to NASA in accordance with the Final MRAD (DRD C6-1).
c) The Contractor shall provide the locations of packed cargo per the Final MRAD (DRD C6-1) at L-3 months.

2.4.6. CREW & EQUIPMENT INTERFACE TEST (CEIT)

The Contractor shall support a CEIT, as defined in its MIOMP, and scheduled per DRD C4-2. The CEIT is to ensure that the crew interfaces for internal and external cargo meet the crew interface requirements as defined in SSP 50808 and SSP 50833. For each mission, the Contractor shall provide assistance to disposition discrepancies found during the CEIT inspections that are related to this SOW.

2.4.7. CARGO RETURN AND/OR DISPOSAL

The Contractor shall return or dispose cargo per the return cargo complement identified prior to CIR or NLT L-5 months. The Contractor shall identify constraints to the on-orbit packing of cargo for return per the Final MRAD (DRD C6-1). NASA will maintain the capability to adjust the return cargo complement within the identified constraints while the orbital vehicle remains berthed to the ISS.

The Contractor shall provide the cargo handling/shipping container(s) for use from cargo removal from Return Cargo Module to return of cargo to NASA. These container(s) shall include power and/or cooling services if needed to maintain the required cargo temperature environment during cargo transport to NASA. Container requirements shall be established as part of DRD C4-2.

2.4.7.1. CARGO RETURN CONFIGURATION

The Contractor shall deliver at L-1 month, per DRD C6-1, the return cargo configuration layout and analytical products required for un-berthing.

2.4.7.2. ACCOMMODATE EARLY DESTOW CARGO

The Contractor shall return early destow cargo in accordance with the MIOMP (DRD C1-7). The Contractor shall document the early destow cargo for each mission within DRD C4-2 and DRD C6-1.

The Contractor shall provide the cargo handling/shipping container(s) for use from cargo removal from Return Cargo Module to return of cargo to NASA. These container(s) shall include power and/or cooling services if needed to maintain the required cargo temperature environment during cargo transport to NASA. Container requirements shall be established as part of DRD C4-2.

2.4.7.3. CARGO DE-INTEGRATION

The Contractor shall safely remove cargo from the entry vehicle once it returns from the ISS. The cargo not removed in accordance with SOW Section 2.4.7.2 shall be removed by the Contractor and transported to the Contractor's payload processing facility. 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 orbital vehicle. The Contractor shall coordinate with NASA to schedule shipments of flight hardware and integrated bags and trays.

NASA will provide transportation for returned cargo from the Contractor's payload processing facility back to NASA, providing the facility is within the continental United States.

2.5. SAFETY AND MISSION ASSURANCE

The Contractor shall establish, implement, and maintain comprehensive safety and health, reliability and quality assurance programs covering program management, mission integration management, and the design, development, production, test, integration, launch and flight of the cargo delivery system.

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

2.5.1. RISK MANAGEMENT

The Contractor shall implement risk management 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 critical items.

2.5.2. ORBITAL VEHICLE SAFETY ASSESSMENTS AND REVIEWS

For all changes from the previous ISS mission, the Contractor shall perform the following safety assessments and reviews in accordance with SSP 30599, Safety Review Process (SRP) and SSP 50808 for each flight to ensure hazards are adequately controlled. The Contractor shall ensure credible failure modes are included.

2.5.2.1. INTEGRATED CARGO SAFETY ASSESSMENT

Based on the information reported to NASA in the Initial MRAD (DRD C4-2), NASA will provide the Contractor with a copy of its initial cargo safety assessment at L-5 months for each mission. The Contractor shall submit an integrated cargo Phase III hazard report (DRD C5-2) per SSP 30599 at L-4 months, to ensure that the packaging of the cargo complement does not include hazards with insufficient controls. The Contractor shall submit a delta integrated cargo hazard report at L-6 weeks according to DRD C6-3 that represents the final integrated cargo hazard assessment provided to NASA.

2.5.2.2. PROXIMITY OPERATIONS AND ISS BERTHED SAFETY ASSESSMENTS

The Contractor shall perform a baseline assessment for the initial orbital vehicle mission that shall be approved by the ISS Program in accordance with SSP 30599. For subsequent missions, the baselined 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 in accordance with SSP 30599. If no updates are warranted, the ISS SRP will be sent confirmation from the Contractor that the existing flight safety assessments remains applicable.

2.5.3. GROUND SAFETY REVIEWS

If required by the ground site, the Contractor shall develop and deliver integrated ground safety data packages 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 to the appropriate authority in support of each mission and provide a copy to NASA (DRD C1-10).

2.5.4. SAFETY AND HEALTH PROGRAM

The Contractor's Safety 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 (NPR 8715.3, NASA General Safety Requirements, tailored) shall be adhered to.

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 Mishap Notification, Investigation and Contingency Action Plan (DRD C1-2).

2.5.5. QUALITY ASSURANCE PROGRAM

The Contractor shall implement a quality assurance program that meets pertinent NASA and industry standards as described below.

2.5.5.1. QUALITY ASSURANCE MANAGEMENT

The Contractor shall maintain a quality management system that is AS9100 compliant. 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. If the Contractor is not AS9100-certified, the Contractor shall accommodate an annual AS9100 compliance audit by NASA.

The Contractor shall allow attendance of two personnel, performing insight for this contract, from NASA, other supporting federal agencies, or NASA support contractors at flight hardware acceptance reviews and make available all documentation associated with those reviews.

The Contractor shall provide access to all quality information such as: audit schedules, audit reports, Material Review Board (MRB) actions and minutes, problem failure reports, discrepancy reports, test failure reports, system failure reports, anomalies, deviations and waivers, and data to support NASA insight. This may take the form of read-only access to Quality Assurance on-line

(via remote terminal) or paper 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.

2.5.5.2. SOFTWARE QUALITY ASSURANCE SYSTEM

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 Standards. For the orbital vehicle, the Contractor shall define and implement a Quality Assurance System in accordance with SSP 50808.

2.6. 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.18, NASA Insight and Approval. The Contractor shall provide this information for launch and orbital vehicle systems, subsystems, materials, processes, and test equipment including, upon request, those used on non-NASA missions.

The Contractor shall grant NASA insight into Launch Vehicle (LV) processing and integrated Payload/OV/LV processing.

Prior to the first CRS mission, at or before its Vehicle Baseline Review, the Contractor shall provide to NASA key vehicle design data in accordance with DRDs C3-3, C3-4, and C3-5. Concurrently, in accordance with DRD C7-2, the Contractor shall provide to NASA one set of flight data and reports from the mission that fully demonstrated compliance with SSP 50808. If that mission is yet to be accomplished, the Contractor shall provide DRD C7-2 within 60 days of completion of that mission.

The Contractor shall provide NASA with full-rate data and reports in accordance with DRD C7-1 and C7-2, for each mission flown by the launch vehicle or orbital vehicle regardless of the ultimate customer, to the limit that other flight data may be government classified or customer proprietary.

The Contractor shall notify NASA of qualification or test anomalies involving ISS Commercial Resupply launch and orbital vehicles, systems, subassemblies, components, software and similar launch and orbital 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 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, viewgraph, 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.

3.0 NON-STANDARD SERVICES (CLIN 0002)

The Contractor shall provide the non-standard services identified in Attachment V.J as directed by the Contracting Officer. Implementation of all non-standard services shall be fully compliant with this SOW.

4.0 SPECIAL TASK ASSIGNMENTS (CLIN 0003)

The Contractor shall perform special studies and analyses, provide materials, 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; analyses in support of change requirements to authorized missions; development, fabrication, and test of hardware/software to support planning studies or special tests; mission unique studies; material provision; and hardware fabrication in support of potential missions prior to mission authorization.

ATTACHMENT V.E. 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 through V.B-7.

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 Data Management System (EDMS) work flow. The number of copies listed in Table D2-A represents the number of hard copies to be delivered to NASA only if the DRD data is not available electronically. Hard copies should be delivered to the COTR. The Contractor shall notify the Contracting Officer in writing 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 in writing prior to the due date that the product of the previous mission is still valid and need not produce a new one.

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.

TABLE V.B-1 DRDS REQUIRED NEAR RFP RESPONSE

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference
C1-1	Reserved				
C1-2	Mishap Notification, Investigation and Contingency Action Plan	Review	With Proposal	Updates at Program Reviews	SOW 2.5.4
C1-3	Reserved				
C1-4	Configuration Management Plan	Review	With Proposal	Updates at Program Reviews	SOW 2.1.2
C1-5	Export Control Plan	Approve	Contract Award +30 days	Updates at Program Reviews	SOW 2.1.3, 2.3.3.3.1
C1-6	Reserved				
C1-7	Mission Integration & Operations Management Plan	Approve	With Proposal	Updates at Program Reviews	SOW 2.1, 2.3.1, 2.4.3.1, 2.4.3.2, 2.4.7.2
C1-8	Work Plan	Approve	With Proposal	T.O. Award +30 days	SOW 2.3.1
C1-9	Reserved				
C-10	Safety Data Package	Review	When delivered to Range	Each mission	SOW 2.5.3

TABLE V.B-2 RECURRING DRDS

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference
C2-1	Formal Review Documentation	Review	First formal review	At every review	SOW 2.1.1
C2-2	Integrated Schedules	Review	T.O. Award +30 days	Updates only, monthly	SOW 2.1.4

TABLE V.B-3 DRDS REQUIRED NEAR VBR

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference
C3-1	Vehicle Interface Definition Document (IDD)	Approve	VBR for first mission	Updates only, at later VBRs	SOW 2.1.1.2, 2.2.2, 2.4.1
C3-2	External Cargo Interface Control Agreement	Approve	L-14 months	Each mission	SOW 2.4.1, 2.4.3
C3-3	Launch Vehicle Flight Software Input for IV&V Review	Review	VBR for first mission	Updates only, at later VBRs	SOW 2.1.1.2.1
C3-4	Launch Vehicle Guidance, Navigation and Controls Input for IV&V	Review	VBR for first mission	Updates only, at later VBRs	SOW 2.1.1.2.1
C3-5	Launch Vehicle Key Systems Qualification Data	Review	VBR for first mission	Updates only, at later VBRs	SOW 2.1.1.2.1

TABLE V.B-4 DRDS REQUIRED NEAR MIR

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference
C4-1	Engineering Computer-Aided Design (CAD) Models	Review	MIR for first mission	Within 7 days of any updated drawing release	SOW 2.3.2
C4-2	Initial Mission Resource Allocation Document	Approve	L-10 months	Each mission	SOW 2.3, 2.4, 2.5.2.1
C4-3	Imagery Plan	Review			SOW 2.3.3.2
C4-4	Internal Cargo Interface Control Agreement	Approve	L-8 months	Each mission	SOW 2.4

TABLE V.B-5 DRDS REQUIRED NEAR CIR

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference
C5-1	Initial Flight Products	Review	L-5 months	Each mission	SOW 2.3.3.3
C5-2	Integrated Cargo Phase III Hazard Report	Approve	L-4 months	Each mission	SOW 2.5.2.1

TABLE V.B-6 DRDS REQUIRED NEAR LAUNCH

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference
C6-1	Final Mission Resource Allocation Document	Approve	L-3 months	Each mission	SOW 2.4
C6-2	Final Flight Products	Review	L-2 weeks	Each mission	SOW 2.3.3.3
C6-3	Delta Integrated Cargo Hazard Report	Approve	L-6 weeks	Each mission	SOW 2.5.2.1

TABLE V.B-7 DRDS REQUIRED POST FLIGHT

Item	Document	Approve/ Review	Initial Due Date	Recurrence	Reference
C7-1	Preliminary Post Flight Assessment	Review	EOM+ 7 days	Per mission (telemetry only, on non-CRS missions)	SOW 2.1.1.2.4, 2.2.2, 2.6
C7-2	Final Post Flight Assessment	Review	EOM+ 60 days	Per mission including non-CRS missions	SOW 2.1.1.2.1, 2.6

ATTACHMENT V.F. DATA REQUIREMENTS DESCRIPTIONS (DRDS)

DATA REQUIREMENT DESCRIPTION Number: C1-1

RESERVED

DESCRIPTION/PURPOSE:

DATA REQUIREMENTS:

DATA REQUIREMENT DESCRIPTION Number: C1-2

C1-2: MISHAP NOTIFICATION, INVESTIGATION AND CONTINGENCY ACTION PLAN

DESCRIPTION/PURPOSE:

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. Contingency Action Planning involves planning and coordination between NASA and the Contractor before a mishap occurs and addresses responses.

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: Any unplanned occurrence, event, or anomaly involving NASA personnel, equipment, or facilities that meet one of the mishap classifications as defined in NPR 8621.1, Mishap and Close Call Reporting, Investigating and Recordkeeping. Aircraft or space hardware mishaps meeting the mishap criteria described are included if the mishap is not classified as a mission failure. Test failures which result in unexpected or unanticipated injury or damage are also included.

2.1 Mishap classification shall occur as documented in NPR 8621.1.

3. ONSITE MISHAPS OCCURRING ON NASA PROPERTY:

3.1 Immediate Notification and Reporting of Mishaps Occurring on NASA Property.

a) Telephonic Report. 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, such as fires, paramedical assistance, etc., shall be reported immediately by telephone in accordance with local emergency reporting requirements.

c) 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 Mishap Investigation and Corrective Action for Mishaps Occurring During Integrated Operations.

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.

DATA REQUIREMENT DESCRIPTION Number: C1-3

RESERVED
DESCRIPTION/PURPOSE:

DATA REQUIREMENTS:

DATA REQUIREMENT DESCRIPTION Number: C1-4

C1-4: CONFIGURATION MANAGEMENT PLAN

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.

DATA REQUIREMENT DESCRIPTION Number: C1-5

C1-5: EXPORT CONTROL PLAN

DESCRIPTION/PURPOSE:

The plan shall describe all export control activities related to the performance of 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.

The ECP shall be submitted within 30 days after contract start in draft form. It will be reviewed by the Center Export Administrator (CEA) for Johnson Space Center. Any comments from the Center will be submitted to the contractor through the Contracting Officer. The final plan, incorporating changes as necessary, shall be submitted within 120 days after contract start. The contractor shall review their plan at least annually thereafter and update it as required.

DATA REQUIREMENT DESCRIPTION Number: C1-6

RESERVED

DESCRIPTION/PURPOSE:

DATA REQUIREMENTS:

DATA REQUIREMENT DESCRIPTION Number: C1-7

C1-7: MISSION INTEGRATION AND OPERATIONS MANAGEMENT PLAN (MIOMP)

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:

- Cargo capabilities including:
  - Standard cargo turn over for internal and external cargo
  - Late stow cargo capacity and turn over timeframe
  - Early destow cargo capacity and return timeframe
- Cargo manifesting and integration support
- Contractor to ISS Program Mission Integration support
- Vehicle flight operations documentation preparation
- Vehicle and external systems operations training
- Simulations and mission operations support
- Ground facility interfaces
- Data Management

The Contractor will keep this document current with established processes, schedules, and interfaces 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, etc.

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

Cargo Type	Maximum Mass	Maximum Volume	Turnover Schedule
Standard Internal or External	**TBP**	**TBP**	L-**TBP**
Late Stow	**TBP**	**TBP**	L-**TBP**
Early Destow	**TBP**	**TBP**	Landing+**TBP**

2. Cargo Manifesting and Integration Support:
Presents a functional breakdown and description of how the Contractor works with the ISS Program Office, the COTR, and hardware developers to establish a mission manifest within the capability of the vehicle and identify candidate commercial experiments. 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 external carrier of the orbital vehicle.

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. Orbital Vehicle and Resupply Mission Operations Documentation Preparation:
Presents a functional breakdown and description of how the Contractor manages the preparation of flight procedures for the vehicle and cargo flown in the orbital vehicle pressurized module or external carrier. This includes Contractor procedures development, control, validation, and publication.

5. Vehicle Systems and Commercial Payload Operations Training:
Presents a functional breakdown and description of how the Contractor manages the orbital vehicle, external 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 postflight phases of resupply mission operations.

7. Data Management:
Presents a functional breakdown and description of how the Contractor manages the orbital 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.

8. Simulations and Mission Operations Support:
Presents a functional breakdown and description of how the Contractor will manage vehicle and external carrier systems support within the JSC MCC , ISS Management Center, and ISS Mission Evaluation Room (MER) facilities during all Joint Integrated Simulations, as well as, during real-time mission operations.

DATA REQUIREMENT DESCRIPTION Number: C1-8

C1-8: WORK PLAN

DESCRIPTION/PURPOSE:

The Work Plan will establish the schedule milestones, payment milestones and completion criteria for each mission.

DATA REQUIREMENTS:

For each mission scheduled to deliver cargo to ISS, the Contractor shall submit a work plan that contains:

a) Milestone events, by name and description of the milestone event, corresponding to the payment number

b) Number of months before (L-) launch

c) An accomplishment criteria narrative (i.e., describe accomplishments and progress in terms of activities completed prior to the payment event).

DATA REQUIREMENT DESCRIPTION Number: C1-9

RESERVED
DESCRIPTION/PURPOSE:

DATA REQUIREMENTS:

DATA REQUIREMENT DESCRIPTION Number: C1-10

C1-10: SAFETY DATA PACKAGE

DESCRIPTION/PURPOSE:

This item covers the submission of System Safety-related data required to be delivered to the applicable Federal or Range Safety Organizations. This includes United States Air Force (USAF) Eastern, Western Range, Kwajalein, Kodiak Island, Wallops Island, Commercial, and International ranges. Contactor shall submit copies of all Federal or range-required documentation to NASA.

DATA REQUIREMENTS

Contactor shall submit copies of all Federal or range safety-required documentation to NASA. Time of submission shall be as specified in the applicable Federal or range safety requirements.

Submittals shall also include all agreements, determinations, interpretations, waivers, deviations, mishaps and close calls obtained with and/or delivered to any Federal or Range Safety Organizations: Eastern, Western, Kwajalein, Kodiak Island, Wallops Island, Commercial, International ranges or any other ranges.

DATA REQUIREMENT DESCRIPTION Number: C2-1

C2-1: FORMAL REVIEW DOCUMENTATION

DESCRIPTION/PURPOSE:

To provide presentation and handout material, minutes, and accompanying action items lists from each formal review

DATA REQUIREMENTS:

Formal review documentation shall include:

a) Presentation packages and hand-out materials provided at the review for NASA attendees.
b) Minutes from each formal review
c) List of attendees
d) Agreements from each formal review
e) An action item list maintained and updated by the Contractor. The list shall include:
    1) Due Date
    2) Subject
    3) Assigned tracking number for each action item
    4) Person or organization responsible for completing the action
    5) Status of action (i.e., open, closed, or deleted)

DATA REQUIREMENT DESCRIPTION Number: C2-2

C2-2: INTEGRATED SCHEDULES

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.

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. The schedules shall be easily auditable by NASA.

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.

DATA REQUIREMENT DESCRIPTION Number: C3-1

C3-1: VEHICLE INTERFACE DEFINITION DOCUMENT (IDD)

DESCRIPTION/PURPOSE:

To provide NASA with an understanding of the Contractor's launch vehicle environments (launch, on-orbit, and landing) so that NASA can perform end item certification on individual cargo and payload items to ensure survivability.

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 orbital vehicle

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.

Launch and landing load factors and rotational accelerations shall be provided in the following reference frame: $N_x(g)$, $N_y(g)$, $N_z(g)$,
$R_x(rad/sec^2)$, $R_y(rad/sec^2)$, $R_z(rad/sec^2)$

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 orbital 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 $2x10^{-5}$ N/m^2 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) 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 orbital vehicle shall be provided.

DATA REQUIREMENT DESCRIPTION Number: C3-2

C3-2: EXTERNAL CARGO INTERFACE CONTROL AGREEMENT

DESCRIPTION/PURPOSE:

The External Cargo Interface Control Agreement (ICA) is designed to provide the Integrated Cargo Carrier requirements definition and interface details. This is required for complex external 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, as well as a preliminary carrier physical layout. The ICA will evolve as mission requirements are identified.

DATA REQUIREMENTS:

The cargo ICA 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.

Format/Contents

INTERFACE CONTROL DOCUMENT

For external payloads or ORUs, an ICD shall be developed as part of the ICA. Each ICD shall include crew operation, power, cooling, command, data, and other requirements. 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.

Maintenance

Cargo-specific ICAs shall be maintained throughout the mission preparation period and flight as complete, updated ICAs.

DATA REQUIREMENT DESCRIPTION Number: C3-3

C3-3: LAUNCH VEHICLE FLIGHT SOFTWARE INPUT FOR IV&V

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:

- Organization documents – Org chart, product team, software quality assurance (SQA), Office of the Chief Engineer (OCE), and analysis role and responsibility documents.
- Vehicle system description – Vehicle overview, Avionics component ICDs, flight computer specification.
- Development process – Software development plan and process, change review board charter, and change tracking data base.
- 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.
- Design assessment – Program flow diagrams or equivalent. Algorithm derivation documents. Source code table top review.
- Implementation – As built code products include unit testing plan and results, build scripts, compiler options file, build library description.
- Qualification test – system integration lab (SIL) test facilities capability documentation, test plan, data management plan, test review process, requirements to test closure, data if specific areas of concern are found.
- Release process – Configuration management plan, pedigree review plan, media release process.
- Development Tools – Input parameter processing and code generation scripts.
- Models – Simulation code used for developmental test.
- Kickoff, Midterm and Close-out technical interchange meetings (TIMs) sessions may be scheduled with the Contractor team to answer questions.

DATA REQUIREMENT DESCRIPTION Number: C3-4

C3-4: LAUNCH VEHICLE GUIDANCE, NAVIGATION AND CONTROLS (GN&C) INPUT FOR IV&V

DESCRIPTION/PURPOSE:

NASA will perform independent analyses to assess adequacy and robustness of the Contractor's 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. NASA has been able to convert data in their native form from several contractors.

DATA REQUIREMENTS:

- Flight software code and/or flight software documentation (preferred), if not provided above. NASA can also build a model using contractor's flight software algorithm description documentation.
- Flight software parameters
- Vehicle characteristics
  - Propulsion characteristics
  - Aerodynamics parameters
  - Mass properties
  - Bending mode parameters
  - Propellant slosh characteristics (or tank geometry description)
  - GN&C sensor and actuator dynamics parameters
- Flight data, if selected mission has flown. Data, in nearly all cases, can be transmitted electronically and in formats already in use by the contractor.
- Contractor linear stability and nonlinear simulation analysis results and reports.
- 2 or 3 TIMs with Contractor GN&C analysts as needed for NASA understanding of contractor-provided data and analysis results. These meetings will occur approximately every 3-4 months over the course of about a year.

DATA REQUIREMENT DESCRIPTION Number: C3-5

C3-5: LAUNCH VEHICLE KEY SYSTEMS QUALIFICATION DATA

DESCRIPTION/PURPOSE:

The Contractor shall provide qualification rationale and data for Propulsion, Flight Controls and Separation systems, subsystems and components. The Contractor shall provide systems and component specifications. 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.

DATA REQUIREMENTS:

Component and systems specifications (design requirements documents) for Propulsion, Flight Controls and Separation.

Test Readiness Review packages

Rationale and data would typically be formal qualification test plans and reports if the methods and results are clearly enumerated. Test apparatus configuration drawings and schematics are also. If formal reports do not exist, the Contractor may provide copies of procedures and data sheets. Test deviations, anomalies and their resolutions shall also be provided.

DATA REQUIREMENT DESCRIPTION Number: C4-1

C4-1: ENGINEERING COMPUTER-AIDED DESIGN (CAD) MODELS

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 external and internal geometry shows an accurate depiction of the vehicle. CAD models are required of the end items up to the major assembly.

Exterior CAD models
Examples of the required detail (but not limited to) for exterior CAD models are docking aids, antennae, cables, cable clamps, debris shields, EVA aids, sensors, thrusters, handrails, vents, cameras, lights, targets. 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:

- Models shall be full scale in English (inches) units.
- Models shall be constructed to nominal dimensions.
- Models should be built with respect to element local coordinate system.
- Use a format that is compatible with ISS Program.
- 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).
- Solid Models Only—Models may be unparameterized "dumb solids" meaning tolerance data; model history, material properties, etc. need not be included.
- Model parts should be individual entities and not fused together. This will allow CAD team to update the model based on hardware measurements. Assembly structure, part names and part numbers would be helpful. However, for controlling file size growth and having redundant geometry, all identical components (i.e., handrails, connectors, etc) will be nested

in detail/ditto space/assemblies. For example if 20 identical handrails are used, only one detail is required and the rest should be in ditto space/assembly.

- Description on movement limits for any articulating items should be provided.
- As-designed and as-built (validated and final) models shall be validated to release engineering drawings.
- Interior models shall be delivered either separate from exterior models or as an appropriately documented assembly such that interior models can easily be separated leaving both interior and exterior features intact. If supplied as separate models, information to associate interior to exterior shall be provided.
- Where interior subassemblies are supplied as separate models, sufficient documentation shall be provided to support correct geometrical integration of each subassembly into its larger interior element.
- A model tree shall be provided which documents the element model assembly architecture as well as model and subassembly titles.
- Models shall be under configuration management so that the pedigree and source of models are documented and retained.
- Models and associated assembly trees and configuration data shall be delivered electronically.

Maintenance
Updates to CAD models shall be delivered to NASA within 7 days of drawing release.

DATA REQUIREMENT DESCRIPTION Number: C4-2

C4-2: INITIAL MISSION RESOURCE ALLOCATION DOCUMENT (MRAD #1)

DESCRIPTION/PURPOSE:

To establish the allocation of resources and the technical requirements for integration of the cargo elements and their support hardware with the orbital vehicle pressurized module and external carrier system 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.

DATA REQUIREMENTS:

a) The Contractor's format will be acceptable, except for those sections concerned with stowage and labeling data for payloads on ISS logistics missions.

b) The report shall be in response to an initial NASA cargo complement delivered at L-12 months. The Contractor's response (this MRAD) shall address specific technical and operational issues pertaining to each proposed cargo item and contain recommendations for combining the proposed cargo items into an optimized internal and external configuration based on the priorities of the proposed cargo item and overall resource allocation.

c) The MRAD shall be the source of accurate data pertaining to the mission-unique mass, volume and other resources allocated to each cargo item, and its supporting hardware, assigned to the Contractor.

d) The following categories of requirements shall be included in this DRD:
   1) Mission physical configuration of the orbital vehicle pressurized module and external carrier, including ascent, on-orbit, and return stowage configurations (cargo layouts)
   2) Mass and volume allocations for each bag or individual cargo item and its support hardware
   3) Mission complement electrical power and energy all mission phases (as applicable)
   4) Command and data requirements
   5) Experiment/ORU thermal/environmental assessment
   6) Orbital vehicle dynamics and mass properties
   7) Robotic and berthing requirements
   8) Orbital vehicle structural math model
   9) Orbital vehicle thruster plume and firing history, propellant types
   10) Launch to Activation Analysis for external cargo and flight profile
   11) Initial Design Coupled Loads Analysis (1 or more)
      i) Report shall include sensitivity of ORU response to cargo configuration (location and mass)
      ii) Report shall include expected ORU environment during all phases of flight and associated margins against NASA-provided environmental limits
   12) Initial Verification Loads Analysis (VLA)
      i) Report shall include expected ORU environment during all phases of flight and associated margins against NASA-provided environmental limits
      ii) Report shall include guaranteed environment during flight
   13) Crew utilization

14) Late access and/or early retrieval
15) Flight operations support
16) Mission-unique hardware and government furnished equipment (GFE)
17) Crew Equipment Interface Test Dates
18) Intact Return Packing Location
19) Any vehicle design changes that may affect the requirements in SSP 50808 and associated analytical products necessary for the berthing of the Contractor's on-orbit vehicle.
20) A Mission Training Plan which addresses all training requirements for the flight crew with respect to the orbital vehicle and any necessary payloads. This plan shall define a series of lessons to meet the training objectives with associated training locations, lesson hours, required attendees, and training materials. This must be negotiated with the JSC training flight lead.
21) A minimum of two systems familiarization briefings for the orbital vehicle to the mission specific crew representatives at the Contractor facility.

DATA REQUIREMENT DESCRIPTION Number: C4-3

C4-3: IMAGERY AND ASSOCIATED CATALOGING

DESCRIPTION/PURPOSE:

The Contractor shall provide imagery of berthing interfaces, crew interfaces, connectors, Extravehicular Activity (EVA) and Extravehicular Robotic (EVR) interfaces of the orbital vehicle. This imagery shall capture all ISS interfaces on the orbital vehicle and cargo transported to the ISS.

DATA REQUIREMENTS:

The three categories of imagery that comprise this task are:
1) Orbital Vehicle Imagery
2) Pressurized Cargo Imagery
3) Cargo Carrier 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. NASA will answer any questions the Contractor has on development of the PFIP.

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. The PFIP will also be used for evaluation purposes to approve Contractor imagery submittals. For the orbital vehicle pressurized module and the cargo carrier, the PFIP shall be submitted to NASA at L-6 months.

Complex payload hardware, installed or mounted in the orbital vehicle pressurized module, shall require imagery of ISS 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 module and/or carrier).

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 pallet or sidewall carrier. Imagery shall capture crew and EVA/EVR interfaces, guides, connectors and labels. Before integration imagery is only required for hardware mounted on the FSE such as a cargo carrier. 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 view points 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 the FSE cargo carrier, post-integration imagery shall include all sides of the carrier be imaged.

ORBITAL VEHICLE IMAGERY

Potential problems during on-orbit robotic or EVA berthing operations require imagery of all orbital vehicle ISS interfaces. For berthing 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 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 Contractor shall submit the PFIP to NASA at L-6 months. The PFIP shall define imagery requirements for the "before integration", "during integration", and "after integration" phases of the integration.

EXTERNAL CARGO CARRIER IMAGERY

External cargo carrier imagery shall be taken to support EVA and EVR operations on each ISS mission that transports external cargo. All FSE attach points, EVA/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 Contractor shall submit the PFIP to NASA at L-6 months. The PFIP shall define imagery requirements for the "before integration", "during integration", and "after integration" phases of the integration. Examples of the external cargo carrier imagery requirements include:

EVA/EVR interfaces – Defined as imagery documenting the mechanisms that either an EVA crewperson or 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 EVA/EVR release mechanisms.

Crew Aids – 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 PFIP digital still imagery shall be no less than 6 megapixel. Images downloaded from the camera shall be in a ".TIF" format for maximum image resolution. Imagery will be submitted to NASA at L-2 months. 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 on Compact Disk – Read Only Memory (CD-ROM) or Digital Video Disc (DVD).

DATA REQUIREMENT DESCRIPTION Number: C4-4

C4-4: INTERNAL CARGO INTERFACE CONTROL AGREEMENT

DESCRIPTION/PURPOSE:

The Internal Cargo Interface Control Agreement (ICA) is designed to provide the orbital vehicle pressurized module to cargo item requirements definition and interface details. This is required for complex internal 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 ICA will evolve as mission requirements are identified.

DATA REQUIREMENTS:

The cargo ICA 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.

Format/Contents

Depending on the complexity of the payload and its interfaces two types of ICAs shall be available:

1. INTERFACE CONTROL DOCUMENT (ICD)
Active payloads or hardmounted 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.

Maintenance

Cargo-specific ICAs shall be maintained throughout the mission preparation period and flight as complete, updated ICAs.

DATA REQUIREMENT DESCRIPTION Number: C5-1

C5-1: INITIAL FLIGHT PRODUCTS

DESCRIPTION/PURPOSE:

NASA will use hardware and analytical data provided by the Contractor in the Initial MRAD to develop the preliminary flight products, crew procedures, and flight rules. This DRD provides a mechanism for the Contractor to provide technical input and comments to the NASA developed procedures. These procedures include maintenance, malfunction, timelines, and crew training plans for both the orbital vehicle and cargo.

These products will ultimately be used by NASA as flight documents for flight crew and ground personnel.

DATA REQUIREMENTS:

The Contractor shall provide updates to NASA-provided draft flight procedures and flight rules. These procedures and timelines shall address all orbital vehicle procedures and sequences, as well as any required cargo mission unique procedures.

Flight procedures the Contractor shall review include:

a) Nominal and off-nominal operations of the orbital vehicle and payloads. The areas to be covered include Robotics Operations/Checklists, Contingency Operations, Vestibule Operations, Rendezvous Operations/Checklist, On-Orbit Maintenance, Flight Rule Inputs Portable Computer System (PCS) Displays, On-orbit checkout (berthing).
b) Vehicle updates to Guidance and Trajectory
   1) Vehicle trajectory data and 3-sigma dispersions analysis
   2) Vehicle navigational sensor data (performance, accuracy, limitations and constraints)

DATA REQUIREMENT DESCRIPTION Number: C5-2

C5-2: INTEGRATED CARGO PHASE III HAZARD REPORT

DESCRIPTION/PURPOSE:

The ISS SRP will use the Integrated Hazard Reports and System Description to assess the design and operation of ISS element hardware configuration for preflight assessments.

DATA REQUIREMENTS:

Submittals shall consist of Integrated Hazard Reports and System Descriptions for all cargo that will be integrated into the orbital vehicle pressurized module and the integrated assembly on the external carrier.

Hazard Reports and System Descriptions shall be provided in accordance with SSP 30309, Safety Analysis and Risk Assessment Requirements.

System Description: The Contractor shall provide a description of the launch and on-orbit configuration of the hardware in accordance with SSP 30599. Functional diagrams shall be submitted and supplemented with descriptions of interfaces and operations.

DATA REQUIREMENT DESCRIPTION Number: C6-1

C6-1: FINAL MISSION RESOURCE ALLOCATION DOCUMENT (MRAD #2)

DESCRIPTION/PURPOSE:

To establish the allocation of resources and the technical requirements for integration of the cargo elements and their support hardware with the orbital vehicle pressurized module and external carrier system 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.

The Contractor shall provide an Final MRAD that contains the analytical data required for the initial MRAD but for the final cargo complement and configuration.

DATA REQUIREMENTS:

a) The Contractor's format will be acceptable, except for those sections concerned with stowage and labeling data for payloads on ISS logistics missions.

b) The report shall be in response to a final set of NASA cargo complement delivered at L-6 months. The Contractor's response shall contain the an optimized internal and external 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 associated analytical products necessary for the berthing of the Contractor's on-orbit vehicle.

c) The MRAD shall be the source of accurate data pertaining to the mission-unique mass, volume and other resources allocated to each cargo item, and its supporting hardware, assigned to the Contractor. All data shall be updated with the latest cargo complement.

d) The following categories of requirements shall be included in this DRD with updates or final configuration data:
   1) Mission physical configuration of the orbital vehicle pressurized module and external carrier, including ascent, on-orbit, and return stowage configurations (cargo layouts)
   2) Mass and volume allocations for each bag or individual cargo item and its support hardware
   3) Mission complement electrical power and energy all mission phases (as applicable)
   4) Command and data requirements
   5) Experiment/ORU thermal/environmental assessment
   6) Orbital vehicle dynamics and mass properties
   7) Robotic/berthing requirements
   8) Orbital vehicle structural math model
   9) Orbital vehicle thruster plume and firing history, propellant types
   10) Launch to Activation Analysis for external cargo and flight profile
   11) Final Design Coupled Loads Analysis (1 or more)
      i) Report shall include sensitivity of ORU response to cargo configuration (location and mass)

ii) Report shall include expected ORU environment during all phases of flight and associated margins against NASA-provided environmental limits

12) Verification Loads Analysis (VLA)
   i) Report shall include expected ORU environment during all phases of flight and associated margins against NASA-provided environmental limits
   ii) Report shall include guaranteed environment during flight
13) Updates to Crew utilization
14) Final plan for late access and/or early retrieval
15) Final Flight operations support plan
16) Mission-unique hardware and GFE
17) Final Crew Equipment Interface Test Dates
18) Final Intact Return Packing Location
19) Transfer Bag or Item Name (from label), serial number, IMS bar code label and size
20) Any updates to the Mission Training Plan which addresses all training requirements for the flight crew with respect to the orbital vehicle and any necessary payloads.

The Final MRAD shall also identify the cargo return and/or disposal content and layout per the return manifest complement.

DATA REQUIREMENT DESCRIPTION Number: C6-2

C6-2: FINAL FLIGHT PRODUCTS

DESCRIPTION/PURPOSE:

NASA will use hardware and analytical data provided by the Contractor in the Initial MRAD to develop the preliminary flight products, crew procedures, and flight rules. This DRD provides a mechanism for the Contractor to provide technical input and comments to the NASA developed procedures. These procedures include maintenance, malfunction, timelines, and crew training plans for both the orbital vehicle and cargo.

These products will ultimately be used by NASA as flight documents for flight crew and ground personnel.

The Contractor shall review and provide updates to the final set of flight products delivered at L-2 weeks.

DATA REQUIREMENTS:

The Contractor shall provide updates to NASA-provided final flight procedures and flight rules. These procedures and timelines shall address all orbital vehicle procedures and sequences, as well as any required cargo mission unique procedures.

Flight procedures the Contractor shall review and provide technical input into include:

a) Nominal and off-nominal operations of the orbital vehicle and payloads. The areas to be covered include Robotics Operations/Checklists, Contingency Operations, Vestibule Operations, Rendezvous Operations/Checklist, On-Orbit Maintenance, Flight Rule Inputs PCS Displays, On-orbit checkout (berthing).
b) Vehicle updates to Guidance and Trajectory
    1) Vehicle trajectory data and 3-sigma dispersions analysis
    2) Vehicle navigational sensor data (performance, accuracy, limitations and constraints)

DATA REQUIREMENT DESCRIPTION Number: C6-3

C6-3: DELTA INTEGRATED CARGO HAZARD REPORT

DESCRIPTION/PURPOSE:

The Contractor shall provide updates to integrated cargo hazard reports.

DATA REQUIREMENTS:

Any updates to DRD C5-2 Integrated Cargo Hazard Report, utilizing the same data requirements.

DATA REQUIREMENT DESCRIPTION Number: C7-1

C7-1: PRELIMINARY POST FLIGHT ASSESSMENT

DESCRIPTION/PURPOSE:

After each launch, a preliminary post-flight report shall be provided that addresses Mission Success Criteria. Sufficient detail and evidence shall be provided for NASA to make a Mission Success Determination. This report shall provide an initial post-flight summary of the performance of the launch and orbital vehicles. Preliminary notification and investigation status of any anomalies cited to this point shall be provided in the report. Any data required from NASA, such as on-orbit telemetry or photos (agreed to at CIR), will be delivered within fourteen (14) days of CRS Visiting Vehicle (CVV) berthing.

DATA REQUIREMENTS:

a) Full-rate flight data in accordance with the instrumentation plan in the Vehicle IDD (DRD C3-1) and SOW Section 2.2.2.
b) Complete full-rate telemetry stream for launch vehicle systems.
c) Contractor's Flight or Launch Readiness Review package
d) Pre-flight prediction of
    1) expected flight environments (i.e., acoustic/vibration, quasi-static acceleration, thermal, and pressure)
    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) Generic vehicle environmental data may be submitted unless mission unique environmental requirements are identified in the ICD
e) Presentation and analysis of the Mission Success Criteria, which are determined in accordance with Clause II.A.19 Mission Success Determination, Investigation, and Corrective Actions at the Cargo Integration Review.

DATA REQUIREMENT DESCRIPTION Number: C7-2

C7-2: FINAL POST FLIGHT ASSESSMENT

DESCRIPTION/PURPOSE:

After each launch, a final post-flight report shall be provided. This report shall provide a comprehensive post-flight summary of the performance of the launch and orbital vehicles. This report will support the NASA Contracting Officer's mission success determination.

This requirement shall also apply to utilization of the launch vehicle fleet or delivery vehicle fleet on non-NASA missions.

DATA REQUIREMENTS:

After each mission, this report shall be provided the following data as it pertains to the launch and orbital vehicles:

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
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.
g) Assess the adequacy of training, both for flight and ground personnel