



SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24 & 30				1. REQUISITION NUMBER		PAGE 1 OF 1	
2. CONTRACT NO. NNK10LB02B		3. AWARD/EFFECTIVE DATE		4. ORDER NUMBER		5. SOLICITATION NUMBER RFP10-99-0021 Rev D	
7. FOR SOLICITATION INFORMATION CALL:		a. NAME Steven B. Peterson		b. TELEPHONE NUMBER (No collect calls) 321-867-5632		8. OFFER DUE DATE/LOCAL TIME October 18, 1999	
9. ISSUED BY NASA John F. Kennedy Space Center Procurement Office, Mail Code: OP-LS Attn: Steven B. Peterson, Room 3144C Kennedy Space Center, Florida 32899				10. THIS ACQUISITION IS <input checked="" type="checkbox"/> UNRESTRICTED SET ASIDE: % FOR SMALL BUSINESS SMALL DISADVANTAGED BUSINESS 8(A) SIC: 3761 SIZE STANDARD: 1000		11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED <input type="checkbox"/> SEE SCHEDULE	
14. METHOD OF SOLICITATION <input type="checkbox"/> RFQ <input type="checkbox"/> IFB <input checked="" type="checkbox"/> RFP <input type="checkbox"/> RFO				12. OFFER ACCEPTANCE PERIOD 180 Days from Date in Block 8		13A. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700) <input checked="" type="checkbox"/>	
15. DELIVER TO Same as Block 9.				16. ADMINISTERED BY Same as Block 9.		13B. RATING DO-C9	
17a. CONTRACTOR/ OFFEROR Space Exploration Technologies 1 Rocket Road Hawthorne California 90250 TELEPHONE NO. (310) 363-6229		PPC/STATE CODE () ()		FACILITY CODE 3VBL8 DUNS—120406462		18a. PAYMENT WILL BE MADE BY NASA Shared Services Center (NSSC) Financial Management Division (FMD) – Accounts Payable Bldg 1111, C. Road Stennis Space Center, MS 39529 Email: NSSC-AccountsPayable@nasa.gov Fax: 866-209-5415	
17b. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER				18b. SUBMIT INVOICES TO ADDRESS SHOWN IN BLOCK 18a. UNLESS BLOCK BELOW IS CHECKED SEE ADDENDUM			
19. ITEM NO.		20. SCHEDULE OF SUPPLIES/SERVICES		21. QUANTITY		22. UNIT	
		NASA LAUNCH SERVICES IN ACCORDANCE WITH SECTION B, C AND D.				23. UNIT PRICE	
						24. AMOUNT	
(Attach Additional Sheets as Necessary)							
25. ACCOUNTING AND APPROPRIATION DATA				26. TOTAL AWARD AMOUNT (For Govt. Use Only)			
<input checked="" type="checkbox"/> 27a. SOLICITATION INCORPORATES IN FULL TEXT FAR 52.212-1, 52.212-4, FAR 52.212-3 & 52.212-5 ARE ATTACHED. ADDENDA <input checked="" type="checkbox"/> ARE <input type="checkbox"/> ARE NOT ATTACHED				<input checked="" type="checkbox"/> 27b. CONTRACT/PURCHASE ORDER INCORPORATES IN FULL TEXT FAR 52.212-4, FAR 52.212-5 IS ATTACHED. ADDENDA <input checked="" type="checkbox"/> ARE <input type="checkbox"/> ARE NOT ATTACHED			
<input checked="" type="checkbox"/> 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				<input type="checkbox"/> 29. AWARD OF CONTRACT: REFERENCE OFFER DATED THE 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) 			
30b. NAME AND TITLE OF SIGNER (Type or print) Julie A. Jiru, Contracts Officer		30c. DATE SIGNED 24 Sep 10		31b. NAME OF CONTRACTING OFFICER (Type or print) Michael S. McCarty		31c. DATE SIGNED 9/24/10	
32a. QUANTITY IN COLUMN 21 HAS BEEN <input type="checkbox"/> RECEIVED <input type="checkbox"/> INSPECTED <input type="checkbox"/> ACCEPTED, AND CONFORMS TO THE CONTRACT, EXCEPT AS NOTED				33. SHIP NUMBER <input type="checkbox"/> PARTIAL <input type="checkbox"/> FINAL		34. VOUCHER NUMBER	
32b. SIGNATURE OF AUTHORIZED GOVT. REPRESENTATIVE				32c. DATE		35. AMOUNT VERIFIED CORRECT FOR	
36. PAYMENT <input type="checkbox"/> COMPLETE <input type="checkbox"/> PARTIAL <input type="checkbox"/> FINAL				37. CHECK NUMBER		38. S/R ACCOUNT NO.	
38. S/R VOUCHER NO.				40. PAID BY		42a. RECEIVED BY (Print)	
41a. I CERTIFY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT				42b. RECEIVED AT (Location)		42c. DATE REC'D (YY/MM/DD)	
41b. SIGNATURE AND TITLE OF CERTIFYING OFFICER				41c. DATE		42d. TOT. CONTAINERS	

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1.0 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 the Government) necessary to furnish the Contract Line Item Number (CLIN) items (Tables B-4 through B-10) in accordance with (IAW) the Statement of Work (SOW), Exhibits, and Documents attached hereto.

1.1 Reserved

Table B-1: Reserved

1.2 Reserved

Table B-2: Reserved

1.3 Reserved

Table B-3: Reserved

1.4 Reserved

Table B-4: Reserved

1.5 Special Task Assignments (Studies and Analyses)

CLIN	Description of Supplies and Service	Qty	Unit	Unit Price (\$)	Total Amount (\$)
10	Special Task Assignments – Firm Fixed-Price Composite Labor Hours	A/R	Labor Hour	See Table B-6	See Table B-6

Table B-5: Special Task Assignments (Studies and Analyses)

B4

Table B-7: Reserved

1.6 IDIQ Launch Service Task Order (LSTO)

The Government reserves the unilateral right to order launch services at any time from contract award through the second quarter of CY 2020 in accordance with contract Section C, Clause 14.0, Launch Service Task Ordering Procedures. These launch services are identified in Tables B-9 and B-10 and described in Exhibits 2 and 3 to the Statement of Work. Launch dates will be mutually agreed upon prior to issuance of an LSTO.

NTE prices for launch services for IDIQ missions will be part of the price evaluation and best value selection for award of an IDIQ task order contract.

In no event shall the Government be obligated to pay for any launch service prior to Authority To Proceed and obligation of funds for that launch service. The minimum order amount for each NLS IDIQ contract awarded in accordance with Section C, Clause 2.0, On-Ramp and Technology Insertion, is \$20,000. The maximum potential quantity for this IDIQ contract portion for all NLS contracts combined is seventy (70) Launch Service Task Orders and associated non-standard services/mission unique services.

Once payment begins on a qualified standard launch service and NASA insight commences, the Government reserves the right to approve any Contractor initiated substitution of the launch vehicle or reallocation of launch vehicle hardware designated for a NASA mission under this contract, in accordance with Section C, Clause 25.0, Government Insight and Approval.

CLIN	Description of Supplies and Services	Contract Mod ⁴	Qty	Unit	Unit Price (\$)	Total Amount (\$)
X ¹	IDIQ Launch Service Task Order (LSTO) Launch Vehicle Configuration ____TBD____ for Mission ____TBD____ Launch Date ____TBD____ Launch Period, if applicable ____TBD____	TBD	TBD ²	Service	TBD	TBD
SubCLIN						
X ¹ A	Standard Launch Services and Standard Mission Integration in accordance with the SOW and Exhibit 2 Launch Vehicle Configuration ____TBD____		TBD ³	Lot	See Table B-9	
X ¹ B	Non-Standard Services in accordance with the SOW and Exhibit 3 Nonstandard Services ____TBD____		TBD	Lot	See Table B-10	
X ¹ C	Known Mission Unique Hardware and Software Non-recurring Items in accordance with SOW Exhibit 6 Mission Unique Services ____TBD____		TBD	Lot	TBD	

1 The Contracting Officer shall determine the CLIN number to be assigned.

² The actual number of LSTOs to be awarded is TBD.

³ The actual number of missions to be included in each LSTO is TBD.

4 As various Contract Modifications are issued for services ordered, their respective number will be listed in this table.

Table B-8: IDIQ Launch Service Task Order

1.7 NTE Prices - Standard Launch Services for IDIQ Missions

The Government shall have the right to order the standard launch services at the prices and for the launch vehicle configurations identified in Table B-9. Nothing in this clause precludes the Contractor from proposing more favorable prices or discount terms in response to specific requests for launch service proposals in accordance with contract Section C, Clause 14.0.

B4

1.8 NTE Prices – Non-Standard Services for IDIQ Missions

The Government shall have the right to order the following non-standard services at the prices and for the launch vehicle configurations identified in Table B-10. Nothing in this clause precludes the Contractor from proposing more favorable prices or discount terms in response to specific requests for launch service proposals in accordance with contract Section C, Clause 14.0. For non-standard services which have non-recurring costs the offeror shall also propose "Subsequent purchase" pricing. "Subsequent purchase" pricing shall apply in the event the Government orders a non-standard service more than once from a provider, regardless of the mission specific implementation and/or repetitive nature of the mission.

Launch Vehicle Configuration Falcon 1 & Falcon 1e From Table B-9

NON-STANDARD SERVICE ITEM (Falcon 1 & 1e)		NOT TO EXCEED (NTE) PRICE (\$) IN CALENDAR YEAR ORDERED*						
# from Exhibit 3	Item description	2010 (Jul-Dec)	2011	2012	2013	2014	2015	2016-2022
1	Alternate Vehicle configurations or Performance Enhancements							TBP
2	Alternate Fairing Configurations and/or Modifications							
2.1	Alternate Configurations							TBP
2.2	Additional access doors in excess of 2 included in standard service							TBP
2.3	Access doors of non-standard size							TBP
2.4	Mounting provisions, cabling and antenna systems for reradiating signals from the payload to remote sites							TBP
2.5	S, C, X, and Ku-band Reradiating equipment							TBP
2.6	RF Transparent Doors							TBP
3	Alternate Payload Adapters							
3.1	Different size or different payload interface Pas							TBP
3.2	Low tip-off rate Pas							TBP
4	Upper stage hardware							
4.1	Motor							TBP
4.2	PA							TBP
4.3	Spin system with enhanced capability							TBP

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B4
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B4
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NON-STANDARD SERVICE ITEM (Falcon 1 & 1e)		NOT TO EXCEED (NTE) PRICE (\$) IN CALENDAR YEAR ORDERED*						
# from Exhibit 3	Item description	2010 (Jul-Dec)	2011	2012	2013	2014	2015	2016-2022
4.4	Despin system with enhanced capability							TBP
4.5	Improved insertion accuracy options							TBP
5	Multiple PA, including Related Mission Integration Support							TBP
6	Secondary PA for Non-Separating Secondary Payload							TBP
7	Secondary PA/Sep systems for Separating Secondary Payload							
7.1	Secondary Payload Adapter (with S/C-provided separation system)							TBP
7.2	Secondary Payload Adapter (with contractor-provided separation system)							TBP
8	RF Through-the-Fairing Transmission Capability							TBP
9	Enhanced electrical interface							
9.1	Increased capacity payload-to-GSE interface							TBP
9.2	LV command and control of payload							TBP
9.3	LV supplied payload power capability							TBP
9.4	Enhanced (1Mbps) Telemetry capabilities including interleaving/deinterleaving of payload telemetry data							TBP
9.5	Additional LV environmental instrumentation							TBP
10	LV mounted cameras (see Exhibit 3, paragraph 10.0)							TBP
11	Special contamination control options							
11.1	Enhanced Fairing environment							TBP
11.2	Enhanced fairing internal surface cleaning (IEST-STD-CC1246D level 500A)							TBP
11.3	Optional payload/vehicle integration environments							TBP
11.4	Additional instrument purge systems up to T-0 (IEST-STD-CC1246D level 100A)							TBP
11.5	Grade B Nitrogen (GN2) IAW MIL-PRF-27401F or conditioned air cooling supply for spot cooling of payload components from payload mate or							TBP

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NON-STANDARD SERVICE ITEM (Falcon 1 & 1e)		NOT TO EXCEED (NTE) PRICE (\$) IN CALENDAR YEAR ORDERED*						
# from Exhibit 3	Item description	2010 (Jul-Dec)	2011	2012	2013	2014	2015	2016-2022
	encapsulation up to T-0							
11.6	S/C Grade C Nitrogen (GN2) IAW MIL-PRF-27401F Purge System							TBP
11.7	Enhanced PLF and PLA Cleaning IAW IEST-STD-CC1246D level 500A							TBP
11.8	Certified Portable Class 7 Clean Enclosure(s) for Open PLF Access Doors							TBP
12	Reserved							
13	Co manifested Payload mission service							TBP
14	NASA Secondary Payload Mission Service							TBP
15	Payload Compatibility Assessment							TBP
16	Secondary Payload Mission Feasibility Study							TBP
17	Secondary Payload accommodation study							TBP
18	Secondary Payload Mass simulator							TBP
19	Payload Processing facilities							
19.1	Contractor shall provide capability to provide ground processing facilities for payloads at the Eastern Range							TBP
19.2	Contractor shall provide capability to provide ground processing facilities for payloads at the Western Range							TBP
19.3	Contractor shall provide capability to provide ground processing facilities for payloads at the Wallops Flight Facility							TBP
19.4	Contractor shall provide capability to provide ground processing facilities for payloads at the Reagan Test Site (USAKA-Kwajalein)							TBP
20	Additional Mission Analysis and Support							
20.1	Reserved							TBP
20.2	Support for additional mission integration working group meetings in excess of four per calendar year							TBP
20.3	Reserved							
20.4	Performance and Guidance Accuracy Analysis							TBP

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NON-STANDARD SERVICE ITEM (Falcon 1 & 1e)		NOT TO EXCEED (NTE) PRICE (\$) IN CALENDAR YEAR ORDERED*						
# from Exhibit 3	Item description	2010 (Jul-Dec)	2011	2012	2013	2014	2015	2016-2022
20.5	Coupled Dynamic Loads Analysis							TBP
20.6	Pre-Flight Controls and Stability Analysis							TBP
20.7	Integrated Thermal Analysis							TBP
20.8	RF Link Analysis	← B4 →						TBP
20.9	Payload Fairing Clearance Analysis							TBP
20.10	Payload/ Expended Stage Separation Analysis							TBP
20.11	Analysis of ECS flow impingement on payload surfaces							TBP
20.12	RF Resonance Analysis to determine maximum RF field strengths that payload and launch vehicle avionics would be exposed to if spacecraft RF transmission systems were activated while encapsulated within the fairing							TBP
20.13	Advanced mission performance analysis support (limited feasibility assessments in response to new mission concepts)	← B4 →						TBP
20.14	Launch Vehicle Collision Avoidance (COLA) trajectory and covariance data	← B4 →						TBP
20.15	Launch vehicle flight software code and associated documentation							TBP
21	Reserved							
22	NASA Public Affairs Office Support	← B4 →						TBP
23	Launch Service Contractor (LSC) provided Telemetry							TBP
24	Launch Service Contractor (LSC) provided Telemetry Acquisition Assistance Message (AAM)	← B4 →						TBP
25	TDRSS Compatible Telemetry System							TBP
26	Extended Integration Periods (assumes extended mis)							
26.1	Three Month Extended Integration Period	← B4 →						TBP

NON-STANDARD SERVICE ITEM (Falcon 1 & 1e)		NOT TO EXCEED (NTE) PRICE (\$) IN CALENDAR YEAR ORDERED*						
# from Exhibit 3	Item description	2010 (Jul-Dec)	2011	2012	2013	2014	2015	2016-2022
26.2	Six Month Extended Integration Period							TBP
26.3	Nine Month Extended Integration Period							TBP
26.4	Twelve Month Extended Integration Period							TBP
27	Contractor Defined Non-Standard Services							
27.1	Kwajalein launch							TBP

* Pricing may be offered for any or all of the order years remaining on the NLS contract, i.e., order years 2010 (Jul-Dec) through 2020. At minimum, the Contractor shall provide pricing through 2015. The Contractor shall submit pricing for order years beyond 2015 not yet proposed, no later than the CY 2014 On-Ramp period. Pricing is based on the standard integration period of L-30 plus or minus 3 months.

Table B-10a: NTE Price List – Falcon 1 & 1e Non-Standard Services for IDIQ Missions

Launch Vehicle Configuration Falcon 9 Blk 1 & 2 From Table B-9

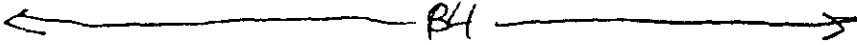
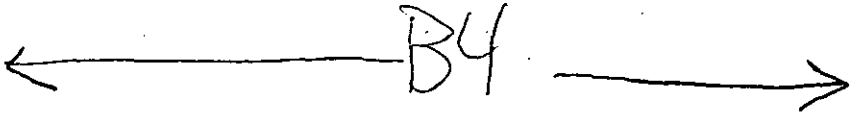


NON-STANDARD SERVICE ITEM (Falcon 9 Blk 1 & 2)		NOT TO EXCEED (NTE) PRICE (\$) IN CALENDAR YEAR ORDERED*						
# from Exhibit 3	Item description	2010 (Jul-Dec)	2011	2012	2013	2014	2015	2016-2022
1	Alternate Vehicle configurations or Performance Enhancements							N/A
2	Alternate Fairing Configurations and/or Modifications							
2.1	Alternate Configurations							TBP
2.2	Additional access doors in excess of 3 included in standard service							TBP
2.3	Access doors of non-standard size							TBP
2.4	Mounting provisions, cabling and antenna systems for reradiating signals from the payload to remote sites							TBP
2.5	S, C, X, and Ku-band Reradiating equipment							TBP
2.6	RF Transparent Doors							TBP
3	Alternate Payload Adapters							

NON-STANDARD SERVICE ITEM (Falcon 9 B1k 1 & 2)		NOT TO EXCEED (NTE) PRICE (\$) IN CALENDAR YEAR ORDERED*						
# from Exhibit 3	Item description	2010 (Jul-Dec)	2011	2012	2013	2014	2015	2016-2022
3.1	Different size or different payload interface Pas							TBP
3.2	Low tip-off rate PAs							TBP
4	Upper stage hardware							
4.1	Motor							TBP
4.2	PA							TBP
4.3	Spin system with enhanced capability							TBP
4.4	Despin system with enhanced capability							TBP
4.5	Improved insertion accuracy options							TBP
5	Multiple PA, including Related Mission Integration Support							TBP
6	Secondary PA for Non-Separating Secondary Payload							TBP
7	Secondary PA/Sep systems for Separating Secondary Payload							
7.1	Secondary Payload Adapter (with S/C-provided separation system)							TBP
7.2	Secondary Payload Adapter (with contractor-provided separation system)							TBP
8	RF Through-the-Fairing Transmission Capability							TBP
9	Enhanced electrical interface							
9.1	Increased capacity payload-to-GSE interface							TBP
9.2	LV command and control of payload							TBP
9.3	LV supplied payload power capability							TBP
9.4	Enhanced (1Mbps) Telemetry capabilities including interleaving/deinterleaving of payload telemetry data							TBP
9.5	Additional LV environmental instrumentation							TBP
10	LV mounted cameras (see Exhibit 3, paragraph 10.0)							TBP
11	Special contamination control options							
11.1	Enhanced Fairing environment							TBP
11.2	Enhanced fairing internal surface cleaning (IEST-STD-CC1246D level 500A)							TBP
11.3	Optional payload/vehicle integration environments							TBP
11.4	Additional instrument purge systems up to T-0 (IEST-STD-CC1246D level 100A)							TBP

NON-STANDARD SERVICE ITEM (Falcon 9 Blk 1 & 2)		NOT TO EXCEED (NTE) PRICE (\$) IN CALENDAR YEAR ORDERED*						
# from Exhibit 3	Item description	2010 (Jul-Dec)	2011	2012	2013	2014	2015	2016-2022
11.5	Grade B Nitrogen (GN ₂) IAW MIL-PRF-27401F or conditioned air cooling supply for spot cooling of payload components from payload mate or encapsulation up to T-0	← B4 →						TBP
11.6	S/C Grade C Nitrogen (GN ₂) IAW MIL-PRF-27401F Purge System	← B4 →						TBP
11.7	Enhanced PLF and PLA Cleaning IAW IEST-STD-CC1246D level 500A	← B4 →						TBP
11.8	Certified Portable Class 7 Clean Enclosure(s) for Open PLF Access Doors							TBP
12	Reserved							
13	Co manifested Payload mission service	← B4 →						TBP
14	NASA Secondary Payload Mission Service							TBP
15	Payload Compatibility Assessment							TBP
16	Secondary Payload Mission Feasibility Study	← B4 →						TBP
17	Secondary Payload accommodation study							TBP
18	Secondary Payload Mass simulator							TBP
19	Payload Processing facilities							
19.1	Contractor shall provide capability to provide ground processing facilities for payloads at the Eastern Range	← B4 →						TBP
19.2	Contractor shall provide capability to provide ground processing facilities for payloads at the Western Range							TBP
19.3	Contractor shall provide capability to provide ground processing facilities for payloads at the Wallops Flight Facility							TBP
19.4	Contractor shall provide capability to provide ground processing facilities for payloads at the Reagan Test Site (USAKA- Kwajalein)	← B4 →						TBP
20	Additional Mission Analysis and Support							
20.1	Reserved							

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NON-STANDARD SERVICE ITEM (Falcon 9 B1k 1 & 2)		NOT TO EXCEED (NTE) PRICE (\$) IN CALENDAR YEAR ORDERED*							
# from Exhibit 3	Item description	2010 (Jul-Dec)	2011	2012	2013	2014	2015	2016-2022	
20.2	Support for additional mission integration working group meetings in excess of four per calendar year								TBP
20.3	Reserved								
20.4	Performance and Guidance Accuracy Analysis								TBP
20.5	Coupled Dynamic Loads Analysis								
20.6	Pre-Flight Controls and Stability Analysis								
20.7	Integrated Thermal Analysis								
20.8	RF Link Analysis								
20.9	Payload Fairing Clearance Analysis								
20.10	Payload/ Expended Stage Separation Analysis								TBP
20.11	Analysis of ECS flow impingement on payload surfaces								
20.12	RF Resonance Analysis to determine maximum RF field strengths that payload and launch vehicle avionics would be exposed to if spacecraft RF transmission systems were activated while encapsulated within the fairing								
20.13	Advanced mission performance analysis support (limited feasibility assessments in response to new mission concepts)								
20.14	Launch Vehicle Collision Avoidance (COLA) trajectory and covariance data								
20.15	Launch vehicle flight software code and associated documentation								TBP
21	Reserved								
22	NASA Public Affairs Office Support								
23	Launch Service Contractor (LSC) provided Telemetry								TBP
24	Launch Service Contractor (LSC) provided Telemetry Acquisition Assistance Message (AAM)								
25	TDRSS Compatible Telemetry System								

NON-STANDARD SERVICE ITEM (Falcon 9 Blk 1 & 2)		NOT TO EXCEED (NTE) PRICE (\$) IN CALENDAR YEAR ORDERED*						
# from Exhibit 3	Item description	2010 (Jul-Dec)	2011	2012	2013	2014	2015	2016-2022
26	Extended Integration Periods (assumes extended mission integration period as noted, not extended payload processing integration period)							
26.1	Three Month Extended Integration Period							TBP
26.2	Six Month Extended Integration Period							TBP
26.3	Nine Month Extended Integration Period							TBP
26.4	Twelve Month Extended Integration Period							TBP
27	Contractor Defined Non-Standard Services							
27.1	Kwajalein launch							TBP

* Pricing may be offered for any or all of the calendar years remaining on the NLS contract, i.e., calendar years 2010 (Jul-Dec) through 2022. At a minimum, the Contractor shall provide pricing through 2015. The Contractor shall submit pricing for order years beyond 2015 not yet proposed, no later than the CY 2014 On-Ramp period. Pricing is based on the standard integration period of L-30 plus or minus 3 months.

Table B-10b: NTE Price List – Falcon 9 Blk 1 & 2 Non-Standard Services for IDIQ Missions

2.0 TOTAL AWARD AMOUNT

The guaranteed minimum value of this contract is \$20,000. The maximum potential value of contract number NNK10LB02B is \$15,000,000,000. The total maximum potential value of all NLS contracts combined is \$15,000,000,000.

3.0 RESERVED

3.1 Reserved

3.2 Reserved

Table B-11: Reserved

3.3 Reserved

Table B-12: Reserved

4.0 MOST FAVORED CUSTOMER

The Contractor hereby certifies the CLIN prices for standard launch services (including standard mission integration) under this contract are no higher than the lowest price charged to any other commercial or U.S. Government customer for an equivalent launch service during the twelve (12) months both preceding and following contract award, or placement of a launch service task order. The Government shall be entitled to a one-time reduction in contract price for each standard launch service failing to meet this certification. The price credit will be equal to the difference between the standard launch service price under this contract and the lower price awarded for an equivalent launch service.

5.0 IDIQ LAUNCH SERVICE AND PRICE UPDATES

Successful Offerors who receive NLS IDIQ contract awards may propose additional IDIQ NTE launch services and prices via the On-Ramp and Technology Insertion clause, Section C, Clause 2.0. IDIQ contract holders will *not be entitled to unilaterally adjust NTE prices or delete launch services already in the contract*. Contractor initiated changes to the launch vehicle configuration, vendor, or design shall be subject to the launch vehicle certification requirements of Section C, Clause 3.0. Contractor initiated changes to the launch vehicle configuration, vendor, or design, after mission ATP, shall be at no increase to the contract price and subject to the written approval of the Contracting Officer. New launch vehicle certification plans and revisions to existing certification plans may be proposed for inclusion into the contract when submitting Launch Service

proposals pursuant to Section C, Clause 14.0, and shall be subject to the written approval of the Contracting Officer.

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SECTION C

CONTRACT TERMS AND CONDITIONS

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CONTRACT TERMS AND CONDITIONS

1.0 FAR 52.212-4 CONTRACT TERMS AND CONDITIONS--COMMERCIAL ITEMS (MAR 2009) (TAILORED)

- (a) *Inspection/Acceptance.* Pursuant to FAR Subpart 12.402(b), FAR clause 52.246-11 Higher-Level Contract Quality Requirement (Feb 1999) shall govern and apply to this contract and is provided in full text in Section C, Clause 16.0. For launch service Contract Line Item Numbers (CLINs) prior to launch, the provisions of FAR clause 52.246-4 Inspection of Services—Fixed-Price (Aug 1996) shall govern and apply to this contract and is incorporated by reference under contract Section C, Clause 36.0. The Government reserves the right to perform in-process inspection or testing of any supplies or launch services tendered for acceptance prior to launch.

The Government will accept only those launch services that successfully deliver a separated and undamaged payload to the proper orbit conditions and insertion accuracies and do not exceed the environmental parameters stated in the Interface Control Document (ICD) except as otherwise provided in this contract. Acceptance of launch service CLINs, and remedies for partial or failed missions shall be in accordance with contract Section C, Clause 24.0, Mission Success Determination, Investigation, and Corrective Actions. The Contractor shall only tender for acceptance those items conforming to the contract requirements. For supplies or services other than launch services, the Government will require repair or replacement of nonconforming supplies or re-performance of nonconforming services at no increase in contract price. For launch services, the Government must exercise its post-acceptance rights within the time specified in contract Section C, Clause 24.0, Mission Success Determination, Investigation, and Corrective Actions. For supplies or services other than launch services, the Government must exercise its post-acceptance rights:

- (1) Within a reasonable time after the defect was discovered or should have been discovered; and
 - (2) Before any substantial change occurs in the condition of the item, unless the change is due to the defect in the item.
- (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.* FAR clause 52.243-1 Changes - Fixed-Price (Aug 1987) Alt I (Apr 1984) is hereby incorporated by reference under contract Section C, Clause 36.0. The time requirement for proposal submission is increased from thirty (30) days to (60) sixty days.
- (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 under contract Section C, Clause 36.0.
- (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. Excusable delays for launch delays by either party are identified and shall be resolved in accordance with contract Section C, Clause 19.0, Adjustments to Launch Schedule.
- (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 thirty (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 thirty (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.* Risk of loss of or damage to Government property under this contract will be governed by FAR clause 52.246-25 Limitation of Liability-- Services (Feb 1997) and is hereby incorporated by reference under contract Section C, Clause 36.0.
- (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 subject to the terms of this contract specified in contract Section C, Clause 28.0, Advance Understanding Regarding Termination Settlement under FAR Clause 52.212-4(l).
- (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, including failure to meet launch dates, certify or maintain certified launch vehicles, 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, including all launch service payments previously paid and all launch service payments remaining to be paid, 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 otherwise specified in a Task Assignment, title to items furnished in conjunction with services under this contract shall remain with the Contractor. In accordance with 42 U.S.C. 2465d, NASA shall not take title to launch vehicles under contracts for launch services.

- (o) *Warranty.* Unless otherwise specified in a Task Assignment, the Contractor makes no warranty, express or implied, with respect to the services delivered or performed hereunder.
- (p) *Limitation of liability.* Except as provided for in paragraphs (a) and (j) above, 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; Section 1553 of the American Recovery and Reinvestment Act of 2009 relating to whistleblower protections for contracts funded under that Act; 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 and description of supplies/services (Section B, C, and Statement of Work, excluding contract clauses incorporated by reference).
 - (2) The Assignments, Disputes, Payments, Invoice, Other Compliances, and Compliance with Laws Unique to Government Contracts paragraphs of this clause.
 - (3) The clause at FAR 52.212-5 (Section C, Clause 34.0).
 - (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) Contract clauses incorporated by reference.

(9) Other documents, exhibits, and attachments.

(10) 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 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 of the FAR;

(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 FAR 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.

2.0 ON-RAMP AND TECHNOLOGY INSERTION

- 2.1 The purpose of the IDIQ On-Ramp is to create an opportunity for qualified new, emerging launch service providers and for incumbent launch service providers to introduce launch vehicles not available at the time of the award of the initial contract and to compete for additional requirements not identified as firm or option requirements under the basic contract. The intent of the On-Ramp is to foster competition for future requirements for launch services.

The minimum IDIQ On-Ramp qualification criteria are:

- (A) The Launch Service Contractor (LSC) shall be a domestic LSC pursuant to Section 201 of Public Law 105-303, Commercial Space Act of 1998.
- (B) The LSC must obtain an ISO 9001/2000 third party certification (ISO 9001/2008 third party certification after November 2010), from a registrar accredited by either the International Registrar of Certified Auditors (IRCA) or the Registrar Accreditation Board (RAB), for any corporation, corporate divisions, subsidiaries, joint ventures, partner(s) and/or other business entity actually performing launch vehicle manufacturing, management, payload/launch vehicle integration, testing and launch.

- 2.2 The parties mutually agree that the original solicitation, as revised, shall remain open during the life of this contract and that at any time the Government may award additional contracts for IDIQ requirements. Each August during the life of this contract, or at any other time established via synopsis, the Government, will accept proposals from new launch service providers for IDIQ contracts and proposals from existing IDIQ contractors for additional launch services. A special On-Ramp Period will be held no later than 2014 to obtain pricing for order years beyond 2015, not yet proposed. If the Government issues a solicitation notice, new launch service providers and current IDIQ contractors will be allowed to submit proposals, within the notice's stated response time.

The minimum contract requirements (as revised), the technical acceptability standards, evaluation factors, solicitation terms and conditions, price reasonableness, and basis for award shall remain in full force and effect for each new proposal. Upon award of each additional contract, the Government 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. A new launch vehicle orientation may be requested by the Government when appropriate as referenced in Attachment D1, Paragraph 2.2.5.

2.3 Expansion of Performance Capabilities

NASA reserves the right to consider, in the future, expansion of the performance capabilities covered by the IDIQ portion of the NLS contract, by properly soliciting offers from all interested sources capable of meeting the requirements in the expanded performance capabilities.

2.4 Additional Launch Services Requirements

- A) Prior to proposal submittal for a Launch Services Task Order (LSTO), the proposed launch vehicle must have one successful flight, as established in contract Section C, Clause 14.0, Launch Service Task Ordering Procedures.
- B) Launch vehicles will be certified based on the requirements established by NPD 8610.7, ELV Risk Mitigation Policy for NASA-Owned and NASA-Sponsored Payloads, and contract Section C, Clause 3.0, Launch Vehicle Certification, prior to launch of a NASA mission.
- C) Launch services must comply with all the conditions and requirements of contract Attachment D1, Statement of Work (SOW).

- 2.5 The minimum order amount for IDIQ contracts awarded in accordance with this On-Ramp Clause is \$20,000.

3.0 LAUNCH VEHICLE CERTIFICATION

3.1 Any common launch vehicle configuration utilized by the Contractor to provide launch services under this contract must be certified by NASA in accordance with NPD 8610.7, ELV Risk Mitigation Policy for NASA-Owned or NASA-Sponsored Payloads. Common launch vehicle configuration certification will be performed in accordance with LSP-PLN-324.01, Expendable Launch Vehicle Certification.

3.2 Certification Criteria:

- (A) Reserved
- (B) Reserved
- (C) For contract award of IDIQ launch services, the Contractor must provide a detailed, viable plan, subject to Government assessment and acceptance, to achieve all certification requirements prior to launch. If a certification plan (Attachment D1, Exhibit 7) is submitted, it shall be exempt from disclosure as provided under the FOIA.
- (D) Services under this contract will only include launch vehicles certified to risk mitigation Category 2 and 3 in accordance with NPD 8610.7. The Contractor shall submit all required documentation for NASA evaluation and determination of certification category. NASA shall not bear any cost associated with the development of any LSC documentation required for the certification of a common launch vehicle configuration.
- (E) The proposed common launch vehicle configuration shall achieve one successful flight prior to submittal of a proposal for a Launch Service Task Order (LSTO).
- (F) Prior to launch of the NASA payload, the proposed common launch vehicle configuration shall be certified to the required payload risk category.
- (G) NASA reserves the right to require a specific launch vehicle certification category and alternative for selected payloads, regardless of the payload risk classification. This determination will be made prior to the Launch Services Task Order (LSTO) competition.
- (H) A launch vehicle certified to a higher category is inherently qualified to launch payloads designated as a lower risk classification (i.e., launch vehicles certified to launch vehicle risk category 3 are also certified to launch vehicle risk category 1 and 2).
- (I) *If no certified launch vehicle configurations exist to meet specific mission requirements solicited under a NASA request for contract proposal, the*

Launch Service Program (LSP) may elect to award a mission contingent on the launch vehicle configuration achieving certification requirements tailored by NASA.

- 3.3 For new launch vehicles and major modifications to certified launch vehicles that do not require a new certification, NASA may require additional technical insight into the design, manufacturing, testing, integration, and first launch of the effected systems and launch vehicle.
- 3.4 In the event of a launch failure of a certified common launch vehicle configuration, LSP may participate in or perform a failure investigation/return-to-flight board to approve the cause and corrective action for the launch vehicle configuration to maintain a particular risk mitigation certification category.

4.0 OFF-RAMP CLAUSE

4.1 Notification of Discontinued Launch Service Availability

The Contractor may determine, during the life of this contract, that launch services contracted hereunder are no longer economically viable in the marketplace. In such event, the Contractor shall provide written notification to the Government at least 12 months prior to the proposed discontinuation of any launch service available under this contract. The Contractor's notification shall include a brief explanation for the discontinuation and a request for a contract modification to remove the launch service. If the launch service is the only launch service available under the contract, the Contractor shall submit a request for a contract modification to terminate the contract at no cost to either party after the completion of all current contracted orders for the discontinued launch service. In any event, Launch Service Task Orders existing at the time of notification shall not be affected.

4.2 Reserved

4.3 Reserved

4.4 Reserved

(A) Reserved

(B) Reserved

(C) Reserved

(D) Reserved

5.0 LAUNCH SERVICE PAYMENTS, MILESTONE EVENTS AND COMPLETION CRITERIA

- 5.1 The Contracting Officer will notify the Contractor of ATP of the launch service via award of the task order.
- 5.2 Upon successful completion of a milestone event and submission of a properly certified invoice, the Contractor may request commercial interim payments. The commercial interim payments will be paid in accordance with the payment schedule shown in Table C-1 and based on the milestone events identified in the contract Work Plan (Attachment D8).
- 5.3 Commercial 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 default. 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 under contract for launch services.
- 5.4 In the event an LSTO is issued at twenty-four (24) months or less prior to launch, the initial payment for such launch service will be the cumulative total of all payments that would have been paid if the LSTO had been issued at L-30 months. If a non-standard service is ordered when an LSTO is issued, the initial payment shall include the catalog price adjustment.
- 5.5 Scheduled dates in Table C-1 are tentative and represent invoice submission dates. Payment schedules may be deferred or canceled by the Government if *the Contractor fails to make substantial progress in accomplishing the major launch service milestone events in the attached contract Work Plan*. Payments falling due in the first quarter of each fiscal year (October - December) shall be paid promptly to the maximum extent practicable, but shall not be considered late until January 31 of the following calendar year. In the event the contractor completes a milestone ahead of the milestone completion date, the contractor may submit a proper invoice and the Government will consider on a case-by-case basis, the early payment of the milestone.
- 5.6 In the event launch service SubCLINs are terminated independently of standard launch service CLINs, the parties mutually agree the same termination refund schedule percentage(s) shall be used and applied against the price for the terminated SubCLINs. Table C-1 milestone events shall apply to each IDIQ LSTO issued under this contract.
- 5.7 This paragraph will apply to any postponement declared by the Government or the Contractor for any reason, including launch schedule adjustments and

Contractor failure to make substantial progress in accordance with launch service milestone events (as determined by the Government under this clause). In the event of a launch schedule adjustment by the Government or Contractor in accordance with contract Section C, Clause 19.0, Adjustments to Launch Schedule, the payment schedule for the applicable launch service CLINs and SubCLINs shall be postponed for the length of the delay, if necessary, by the Government to correspond with the new launch date and the milestone events in the attached Work Plan. The requirement to make substantial progress in general conformance with the attached Work Plan, however, is not waived for any postponed launch service. In the event of a launch schedule adjustment by the Government or Contractor, the Government or Contractor shall be entitled to an equitable adjustment as determined by the contract Section C, Clause 19.0, Adjustments to Launch Schedule.

- 5.8 The Contractor agrees in the event of a termination of this contract pursuant to contract Section C, Clause 28.0, Advance Understanding Regarding Termination Settlement Under FAR Clause 52.212-4(I), the Government shall not be obligated in any event to pay or reimburse the Contractor any amount in excess of the amount already obligated to the contract. The Contractor shall not be obligated to continue performance of the work beyond such point. The Government shall not be obligated in any event to pay or reimburse the Contractor in excess of the amount obligated to the contract on a quarterly basis, notwithstanding anything to the contrary in contract Section C, Clause 28.0, Advance Understanding Regarding Termination Settlement Under FAR 52.212-4(I) and NFS 1852.232-77 Limitation of Funds (Fixed-Price Contract) (Mar 1989).

Launch Service Payment Schedule				
Milestone/ Commercial Interim Payment No.	Payment(s) Months Before / After Launch ¹ <i>Offerors to insert additional column to the left containing invoice submission dates.</i>	Amount (% of Launch Service CLIN Price)	Cumulative Amount of Launch Service Payments (\$) <i>Offerors to insert addition column to the left containing individual dollar amounts</i>	Termination for Convenience of the Government Repayment Schedule – Percentage (%) of Cumulative Payments Made to Date to be Returned to Government
1	L-"X" ² / L-30	10	TBD	TBD (50-100) / 50
2	L-27	5	TBD	50
3	L-24	5	TBD	50
4	L-21	10	TBD	50
5	L-18	10	TBD	50
6	L-15	10	TBD	50
7	L-12	10	TBD	50
8	L-09	5	TBD	50
9	L-05	5	TBD	50
10	L-02	10	TBD	50
11	Launch ³	10 ³	TBD	--
12	Launch +03 ³	10 ³	TBD	--

Table C-1: Launch Service Payment Schedule

- ¹ The Government reserves the right to extend or shorten the above payment schedule by plus or minus three months (i.e., L-33M or L-27M) at no increase in contract value to accommodate mission specific requirements.
- ² In the event that a mission requires an integration period greater than L-30M plus 3 months, the Government shall have the right to order the Extended Integration non-standard services at the prices and for the launch vehicle configurations identified in Table B-10. The payment numbers for L-"X"M through launch shall be adjusted as specified in the RLSP. The cumulative amount of the payments for the extended integration periods (L-"X"M) combined with the L-30M payment shall not exceed 10% of the total launch service price unless specified in the RLSP.
- ³ The Contracting Officer will either approve the final payment (Launch+ 03M) within thirty (30) days after receipt of the Final Flight Report, (CDRL C4-13) or withhold the final payment in accordance with the provisions of contract Section C, Clause 24.0, Mission Success Determination, Investigation, and Corrective Actions.

The final payment (Launch + 03M) shall not be made in event of partial mission success or failed mission determination by the Government in accordance with contract Section C, Clause 24.0. In the event of a partial mission success or failed mission, the final payment shall be forfeited by the Contractor and is not recoupable. In the event of a failed mission determination, an additional 15% of the launch service price shall be applied as a credit to another launch service or be returned to the Government if it cannot be applied to a subsequent launch service at the Government's discretion. If funds are not credited or returned within thirty (30) days of a failed mission determination, the funds shall be subject to interest penalties at the prevailing U.S. Treasury interest rate established for Prompt Payment.

- 5.9 The Contracting Officer will unilaterally determine the Contractor's accomplishment and successful completion of each milestone event. The Contracting Officer's determination of milestone event completion will include, but is not limited to, the accomplishment criteria listed for the major milestone events set forth in Attachment D8, Work Plan. In addition, the Contracting Officer will determine if the following are complete for each payment requested: all Contract Data Requirements List (CDRL) data item deliverables for which delivery is required prior to the requested payment and all previous events have been met. Approval of the final payment will be made in accordance with contract Section C, Clause 24.0, Mission Success Determination, Investigation, and Corrective Actions.

**6.0 NFS 1852.232-77 LIMITATION OF FUNDS (FIXED-PRICE CONTRACT)
(MAR 1989)**

- (a) Of the total price of CLINs [TBD] through [TBD], the sum of \$TBD 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 contract Section C, Clause 5.0, Launch Service Payments, Milestone Events and Completion Criteria, 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 contract Section C, Clause 1.0(l) "Termination for the Government's convenience" of this contract, the total amount payable by the Government pursuant to contract Section C, Clause 1.0(l) would equal the amount retained by the Contractor pursuant to Section C, Clause 5.0 and Table C-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 C, Clause 1.0(l) "Termination for the Government's convenience" notwithstanding.

- (c) (1) It is contemplated that funds presently allotted to this contract will cover the work to be performed until [TBD].
- (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 C, Clause 1.0(I) "Termination for the Government's convenience" of this contract, the total amount payable by the Government pursuant to contract Section C, Clause 1.0(I) would equal the amount retained by the Contractor pursuant to contract Section C, Clause 5.0 and Table C-1.
- (3) (i) The notice shall state the estimate when the point referred to in paragraph (c)(2) of this clause will be reached and the estimated amount of additional funds required to continue performance to the date specified in paragraph (c)(1) of this clause, or an agreed date substituted for it.
- (ii) The Contractor shall, sixty (60) days in advance of the date specified in paragraph (c)(1) of this clause, or an agreed date substituted for it, advise the Contracting Officer in writing as to the estimated amount of additional funds required for the timely performance of the contract for a further period as may be specified in the contract or otherwise agreed to by the parties.
- (4) If, after the notification referred to in paragraph (c)(3)(ii) of this clause, additional funds are not allotted by the date specified in paragraph (c)(1) of this clause, or an agreed date substituted for it, the Contracting Officer shall, upon the Contractor's written request, terminate this contract on that date or on the date set forth in the request, whichever is later, pursuant to contract Section C, Clause 1.0(I) "Termination for the Government's convenience".
- (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 C, Clause 1.0(l) "Termination for the Government's convenience" of this contract.

7.0 SECURITY FOR LAUNCH SERVICE PAYMENT FINANCING

- 7.1 *Requirements for payment.* Payments will be made under this contract upon submission of properly certified invoices or vouchers by the Contractor, and approval by the administering office, NASA John F. Kennedy Space Center. The amount of all invoices or vouchers submitted shall not exceed the total contract price for all CLINs, authorized LSTOs issued under the IDIQ contract, and special task assignments (studies and analyses).
- 7.2 *Security.* 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. Adequate security for payments made under this contract shall be required in the form of a preferred creditor's lien. 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.
- 7.3 *Insurance.* 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.

7.4 *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) All information furnished by the Contractor to the administering office in connection with each request for payment is true and correct.
- (H) These representations and warranties shall be continuing and shall be considered to have been repeated by the submission of each invoice for payments.

7.5 *Work Plan Submission.* The Contractor shall comply with the Work Plan that identifies the major milestone events and a corresponding narrative of the work activity necessary to accomplish the major milestone events.

8.0 SCOPE OF WORK – SPECIAL TASK ASSIGNMENTS (STUDIES AND ANALYSES) (CLIN 10)

8.1 The Contractor shall perform specific task assignments that will be defined through the issuance of task orders in accordance with contract Section C, Clause 9.0, Ordering Procedure and Payment for Special Task Assignments (Studies and Analyses) (CLIN 10) and paragraphs 8.3 and 8.4 herein.

8.2 Reserved

8.3 Only hours expended against specific written task orders authorized by the Contracting Officer shall be paid under this contract. Task orders shall be performed on an FFP, completion-effort basis. The Government is under no obligation to reimburse the Contractor for any costs, which exceed the Firm-Fixed-Price authorized on each task order.

8.4 The Government may require Special Task Assignments (Studies and Analyses) in any calendar year from 2010 (Jul-Dec) through 2022 at the FFP composite labor rates identified in Section B, paragraph 1.5. Pricing may be offered for any or all of the calendar years remaining on the NLS contract, *i.e.*, calendar years 2010 (Jul-Dec) through 2022. At a minimum, the Contractor shall provide pricing through 2015. The Contractor shall submit pricing for calendar years beyond 2015 not yet proposed, no later than the CY 2014 On-Ramp period. The proposed labor rates shall be negotiated using the applicable procedures of FAR Part 15 and incorporated herein.

8.5 Reserved

9.0 ORDERING PROCEDURE AND PAYMENT FOR SPECIAL TASK ASSIGNMENTS (STUDIES AND ANALYSES) (CLIN 10)

9.1 The Contractor shall incur hours under CLIN 10 of this contract only in the performance of task orders and revisions to task orders issued in accordance with this ordering procedure. No other costs or hours under CLIN 10 are authorized. Special Task Assignments shall be performed on a Firm-Fixed-Price (FFP) completion basis unless specifically authorized otherwise by the Contracting Officer.

9.2 Special Task Assignments shall be subject to the following ordering procedure:

(A) The Contracting Officer shall request a Task Plan from the Contractor. The request shall include:

- (i) Statement of Work
- (ii) Required Completion Date
- (iii) Government Point of Contact

- (iv) Due date for Contractor's Task Plan
 - (B) The Contractor's Task Plan shall include:
 - (i) Discussion of the technical approach for performing the work and rationale for any proposed changes to the Statement of Work and required completion date.
 - (ii) Required authorization to proceed date.
 - (iii) Basis of Estimate (BOE) - The total price broken down by task with the following elements identified:
 - (a) The direct labor hours broken down by work element subject to the Hourly Labor Rates in Section B, Clause 1.5, Table B-6
 - (b) Other Direct Costs identified by element (Travel, Material, Subcontracts) if applicable.
 - (C) The Contracting Officer shall accept the Contractor's Task Plan within ten (10) working days of receipt or enter into negotiations with the Contractor. The parties shall execute a bi-lateral Special Task Assignment.
 - (D) The Special Task Assignment will contain, as a minimum, the following information:
 - (i) Signature of the Contracting Officer's Technical Representative and the Government's Contracting Officer
 - (ii) Contract number, Special Task Assignment number, effective date and completion date
 - (iii) Title and Statement of Work
 - (iv) Total firm fixed price, including the number of labor hours
 - (v) Quality assurance standards, as appropriate
 - (vi) Any other necessary information
 - (E) The Special Task Assignments may be revised in the same manner as they are executed via formal revisions.
- 9.3 Executed Special Task Assignments shall be incorporated by reference into the contract via contract modification to include the following: Special Task Assignment number, title, number of labor hours, and firm fixed price. The contract modification will reflect the firm fixed price of the Special Task Assignments with respect to the adjustment of the contract value and any other terms deemed pertinent.
- 9.4 Costs and/or labor hours incurred in excess of those authorized by the Contracting Officer shall be at the Contractor's own expense. Failure to agree to any adjustment shall be handled IAW the Contract's Disputes clause. However, nothing in this clause shall excuse the Contractor from proceeding with the Special Task Assignment as written.

- 9.5 The price for completion of special task assignments under CLIN 10 will be paid upon satisfactory completion of each individual Special Task Assignment.

10.0 RESERVED

11.0 FAR 52.216-18 ORDERING (OCT 1995) [Note: Applicable to IDIQ contract portion only]

- (a) Any supplies and services to be furnished under this contract shall be ordered by issuance of delivery orders or task orders by the individuals or activities designated in the Schedule. Such orders may be issued from the effective date of the contract through the second quarter of calendar year (June 30, 2020). Special task assignment and non-standard service task orders may be issued from the effective date of the contract through the completion of all LSTOs.
- (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.

12.0 FAR 52.216-19 ORDER LIMITATIONS (OCT 1995) [Note: Applicable to IDIQ contract portion only]

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

- (1) One Launch Service, or
- (2) One Special Task Assignment, or
- (3) One Non-Standard Service

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
12 Launch Services or;

36 Special Task Assignments or unlimited Non-Standard Services exceeding the amount identified in (2)

- (2) Any order for a combination of items in excess of \$1,000,000,000; 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) Reserved
- (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.

13.0 52.216-22 INDEFINITE QUANTITY (OCT 1995) [Note: Applicable to IDIQ contract portion only]

- (a) This is an indefinite-quantity contract for the supplies or services specified and effective for the period stated, in Section B and C of the Schedule. 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 contract Section C, Clause 11.0, 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 contract Section C, Clause 12.0, 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, 2022.

14.0 LAUNCH SERVICE TASK ORDERING PROCEDURES [Note: Applicable to IDIQ contract portion only]

14.1 *Requirements for Competition.* The intent of IDIQ is to support missions in addition to the awarded missions. The Government 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.

14.2 Types of Task Orders

There are two types of task orders that may be issued under this contract. The first type is an LSTO. Any required services related to a specific launch service will be included in the LSTO. All items other than launch services and items not related to a specific launch service will be obtained by task orders referred to herein as Special Task Assignments (Studies and Analyses).

14.3 Launch Service Task Orders

- (A) *Requests for Launch Service Proposals (RLSPs).* Prior to the issuance of an RLSP, exchanges and fact-finding may take place with multiple award Contractors. The RLSP will include specific information unique to the mission such as Mission Success risk posture (Section C, Clause 24.4, Table C-8); payload mass and volume; orbital requirements (such as altitude and/or inclination); target launch date and science window, if appropriate; and any unique payload design considerations.

The RLSP will provide any special instructions regarding the level of detail required in the proposal. The RLSP 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 RLSP unless stated otherwise. The Contractor shall submit one original and five copies of the proposal to the Contracting Officer at the address specified in the RLSP.

- (B) *LSTO Proposal*. The proposed common launch vehicle configuration shall achieve one successful flight prior to submission of a proposal in order to be considered for LSTO award. The Contractor, when submitting its firm-fixed price proposal, shall indicate the proposal is compliant with the contract terms, statement of work, and the specific requirements contained in the RLSP.

Firm-fixed pricing for all proposals shall not exceed the prices contained in the Schedule. The prices contained in the Schedule are prices, which can be adjusted downward by the Contractor for the specific launch service being proposed. Any Contractor proposed reduction will be applicable to the current proposal only and will not be deemed as a permanent reduction of the prices contained in the Schedule. Any mission unique modifications not priced in the non-standard services must be separately identified and individually priced, and are not limited by the unit price in the Schedule.

The proposed launch service price, including applicable priced non-standard services and mission uniques shall be totaled for a single firm-fixed price for all efforts required under the order for that launch service. The total firm fixed-price shall be applied to the percentages in contract Section C, Clause 5.0, Launch Service Payments, Milestone Events and Completion Criteria, for conversion to dollar amounts for each payment event; and shall identify any consideration being provided as a result of changes to the Mission Success risk posture, as applicable. In addition, the Work Plan milestones shall be appropriately modified to add any non-standard and/or mission unique services. The Launch Service Task Order Mission Solutions shall be incorporated in Exhibit 9.

- (C) *Mandatory LSTO Proposal Submission*. Unless otherwise agreed to by the Contracting Officer, it is mandatory for contract holders under multiple award NLS contracts to respond via a Proposal or Request for Waiver to each order for launch service requirements provided these requirements are identified in the schedule and do not conflict with the contract ordering limitations. The response shall include all common launch vehicle configurations that meet the requirements for a particular launch service task order. In the event there arises legitimate reasons for an awardee not to submit a proposal for a particular launch service task order (e.g., limited capacity to perform, excessive performance capability, lack of one successful flight, or launch service is no longer viable), the Contracting Officer may waive the requirement for proposal submission.

(D) *LSTO Proposal Evaluation/LSTO Selection Criteria.* All LSTO proposals shall be submitted by the date and time specified in the RLSP, or it will be treated as a late proposal in accordance with FAR 52.215-1, Instructions to Offerors – Competitive Acquisition. If this requirement is met, the Contracting Officer will consider the following three factors prior to award of an LSTO:

- (i) Technical capability/risk, including the following:
 - (a) Contractor's ability to meet SOW and specific payload requirements, including launch period and launch date
 - (b) Launch vehicle certification or reasonableness of the Offeror's plan to obtain certification prior to mission launch
 - (c) Information gained through Government insight and approval activities
 - (d) Status of significant baseline vehicle changes and resolution of anomalies
 - (e) *Unique terms and conditions contained in a contract, which may impact price, performance or risk*
 - (f) Proposed launch vehicle's demonstrated flight experience
- (ii) Reasonableness of proposed price, including any proposed quantity discounts.
- (iii) *Past performance, with emphasis given to the most recent and more relevant experience, including small business achievements.*

The Requests for Launch Service Proposals shall state, whether all evaluation factors other than cost or price, when combined, are—

- (i) Significantly more important than cost or price;
- (ii) Approximately equal to cost or price; or
- (iii) Significantly less important than cost or price.

The Government reserves the right to modify the evaluation criteria for individual LSTOs. The final evaluation criteria will be defined in the request for LSTO proposal. In any event, the Government intends to award an LSTO to the Contractor who provides the best value in launch services that meet the Government's requirements.

(E) *Award of an LSTO.*

- (i) The Contracting Officer will notify the Contractor of ATP of the launch service via award of the task order.
- (ii) Each of the IDIQ Contractors will be notified of the Government's award of an LSTO.
 - 1. Pursuant to FAR 16.505(a)(9), No protest under Subpart 33.1 is authorized in connection with the issuance or proposed issuance of an order under a task-order contract or delivery-order contract, except for—
 - (A) A protest on the grounds that the order increases the scope, period, or maximum value of the contract; or
 - (B) A protest of an order valued in excess of \$10 million. Protests of orders in excess of \$10 million may only be filed with the Government Accountability Office, in accordance with the procedures at 33.104.
 - 2. The authority to protest the placement of an order under FAR 16.505(a)(9) expires on May 27, 2011. (10 U.S.C. 2304a(d) and 2304c(d), and 41 U.S.C. 253h(d) and 253j(d)).
 - 3. Pursuant to FAR 16.505(b)(1)(iii), for task or delivery orders in excess of \$5 million, the requirement to provide all awardees a fair opportunity to be considered for each order shall include an opportunity for a post-award debriefing in accordance with FAR 16.505(b)(4).
- (iii) Launch service task order mission solutions will be attached to the contract (Exhibit 9) upon award of task order(s).

- (F) *Modifications to LSTOs.* After an LSTO is issued, it may be necessary to add priced non-standard services to the LSTO. These additions will be accomplished via modifications to the original LSTO. In addition, mission uniques that are not included in the priced non-standard services may be added to, or deleted from LSTOs via modification to the original LSTO. In this instance, the terms of the existing LSTO, such as price, milestone events, and Work Plan completion criteria, may be modified to reflect the change. The remainder of the price of the modification will be applied to the remaining payment milestone event amounts, as performance dictates.
- (G) *Task Order Authorization and Content.* The only persons authorized to issue task orders under this contract are the KSC Contracting Officers. 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
- (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
- (vii) Reserved
- (viii) Any other necessary information

15.0 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.

16.0 FAR 52.246-11 HIGHER LEVEL CONTRACT QUALITY REQUIREMENT (FEB 1999)

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

	Title	Number	Date	Tailoring
<input checked="" type="checkbox"/>	ISO	9001/2000	2000	Third Party Certification Required (ISO 9001/2008 after November 2010)
<input checked="" type="checkbox"/>	Aerospace QMS	AS9100 Rev C	2009	

17.0 INSPECTION SYSTEM RECORDS

The Contractor shall maintain records evidencing inspections in accordance with the Inspection clauses of this contract for one year after delivery of all items and/or completion of all services called for by the contract.

18.0 REQUIRED TIME OF DELIVERY FOR LAUNCH SERVICES

- 18.1 The Government requires launch service delivery to be made according to the schedule provided in Table C-4.

Table C-2: Reserved

Table C-3: Reserved

IDIQ LSTOs				
CLIN	Mission	Quantity	Limited Launch Period*	Launch Date/Launch Period
TBD	TBD	TBD	TBD	TBD

* Indicates whether or not the mission has a limited launch period due to specific Planetary, Lunar, Scientific, and/or Lunar Exclusion requirements

Table C-4: IDIQ LSTO Delivery Schedule

18.2 Reserved

19.0 ADJUSTMENTS TO LAUNCH SCHEDULE

- 19.1 NASA/Contractor will give written notice of any desired change in the launch schedule as soon as possible. In the case of a request for postponement of the launch date by NASA/Contractor, NASA/Contractor will propose a new launch date. Within two weeks of receipt of the written request of a launch schedule adjustment, the Contractor/NASA will inform NASA/Contractor whether a launch opportunity exists as requested or will propose an alternatively available launch date. NASA/Contractor will work to provide written agreement within thirty (30) days following receipt of the Contractor's/NASA's proposition, and will work together to deconflict and resolve any possible Range conflicts. If mutual agreement on the revised launch date cannot be reached due to launch vehicle or payload readiness, resolution between the parties shall be handled IAW the Contracts Disputes Clause.
- 19.2 The postponement periods for both NASA and the Contractor shall include the applicable grace period plus any excusable delay (e.g. a "No Fault" delay as described in section 19.9) plus an additional eighteen (18) months each. Postponements during this period shall be subject to the postponement fees pursuant to sections 19.3 through 19.6 and will be paid by the postponing party. In the event of a single postponement, or cumulative postponements for each launch service by NASA/Contractor exceeds eighteen (18) months in addition to any applicable grace period or excusable delay, the contract shall be subject to equitable adjustment for that portion of delay exceeding eighteen (18) months. Any amounts owed by the postponing party as equitable adjustment shall be in addition to the maximum postponement fees for the eighteen (18) month delay, and/or other available remedies provided for under contract Section C, Clause 28.0, Advance Understanding Regarding Termination Settlement Under FAR 52.212-4(l), and contract Section C, Clause 1.0(m), Termination for Cause. Alternatively any delay declared by NASA, which results in a launch date later than the contract period of performance shall be subject to an equitable adjustment.
- 19.3 If the Contractor requests a postponement of the launch date and NASA agrees to the postponement, the Parties agree that, in lieu of Termination for Cause and in place of actual damages, and as fixed, agreed, and liquidated damages, the price of each applicable launch service shall be reduced, dependent upon when receipt of the notification is received, for each calendar day of delay in excess of the grace period by the amount as shown in Table C-5. In this event, NASA shall have the right of approval of the revised launch date prior to its implementation. NASA shall also have the right of approval of the reallocation of launch vehicles if milestone payments have already been made towards a designated launch vehicle. Finally, NASA shall have the right of approval prior to any revision in its

position (i.e., the order in the Contractor's launch manifest queue sequence, if it results in the postponement of the NASA launch date).

- 19.4 If the Contractor fails to request a postponement and the major program milestone event designated as the launch is delayed (i.e., the launch service is not completed by the contractual launch date), for reasons other than those excusable delays described in paragraph 19.9, then the Contractor shall pay NASA for each day of delay in accordance with Table C-5. Alternatively, if delivery or performance is so delayed by the Contractor, NASA may terminate this contract in whole or in part under contract Section C, Clause 1.0(m), Termination for Cause, of this contract and in that event, the Contractor shall be liable for fixed, agreed, and liquidated damages accruing until the time NASA may reasonably obtain delivery or performance of similar supplies or services, up to the maximum specified in Clause 19.7. The liquidated damages shall be in addition to any other costs under contract Section C, Clause 1.0(m), Termination for Cause.

19.5

B4

B4

Table C-5: Contractor Liquidated Damages and Grace Periods

19.6

B4

B4

Table C-6: NASA Postponement Fees and Grace Periods

B4

- 19.7 The maximum amount paid for delays (in excess of the grace period) by the Contractor/NASA is **B4** and shall be the lesser amount of either 5% of the highest priced launch vehicle configuration at year of contract award or a total of **B4**. The maximum amount applies only to the Liquidated damages/Postponement fees shown in Tables C-5 and C-6. Both parties are entitled to recover additional monies for Equitable Adjustment as referenced in 19.2.

A grace period is defined as the number of days the Contractor/NASA may delay the launch date, without incurring liquidated damages/ postponement fees. The amount of grace available for any period is the smaller of the number of days in the grace period column in Table C-5 compared to the remaining available grace days from the previous period.

For example, if 100 days are used during the period L-X through L-24, there would be 50 days available during the period L-24 through L-12. If no further days are used through the period L-6 through L-3, there would be 30 days available during the period L-3 through L-11 days; with 20 days having expired.

19.8 In the event that NASA/Contractor postpones the launch date, the payment schedule shall be suspended for the length of the delay and then resumed with all remaining payments shifted by the amount (length) of the delay. For NASA delays only, the Contractor may elect to receive payments as major program milestone events are completed in lieu of the payment of postponement fees or the Contracting Officer may approve the addition of a new milestone payment event at the time of postponement, provided funding is available and obligated to the contract.

19.9 NASA/Contractor will not be charged with postponement fees/liquidated damages when the delay in delivery or performance arises solely out of causes beyond the control of NASA/Contractor and not due to the fault or negligence of NASA/Contractor. Such causes include, but are not limited to the following:

Delays resulting from Range Mission Rules and Range Launch Requirements (Mandatory and Required Assets), acts of God, acts (including delay or failure to act) of any Governmental authority (De Jure or De Facto), wars (declared or undeclared), riots, revolution, hijacking, fires, freight embargoes, sabotage, epidemics, strikes and interruptions of essential services such as electricity, natural gases, fuels and water, or any condition which jeopardizes the safety of the employees of the Contractor, NASA, or its subcontractors; or a launch vehicle failure investigation, provided NASA retains its original position in the order of the queue sequence and that all data related to the failure investigation is made available to NASA without restriction.

19.10 Once a specific launch date and time have been established, they may be changed by the cumulative amount of the grace period established above by NASA or the Contractor without consideration to the other party if the mission requirements can be met. The cumulative total of grace periods exercised by either NASA or the Contractor shall not exceed 150 days for either party.

19.11 The amount of postponement fees shall be added to/subtracted from (as applicable) the next milestone payment made pursuant to the contract Section C, Clause 5.0, Launch Service Payments, Milestone Events and Completion Criteria. In addition, the delivery schedule shall be adjusted to reflect the revised launch date.

- 19.12 In the event of an anomaly on any sub-orbital or orbital vehicle provided by the Contractor that involves hardware or software directly applicable to this launch service, NASA reserves the right to delay the launch service, until the next available launch opportunity, without accruing damages or providing an equitable adjustment to the Contractor until acceptable resolution of the anomaly.
- 19.13 This clause, including grace periods, shall not apply to missions with limited launch periods. Requests for launch adjustments for missions with limited launch periods shall be in accordance with the "Changes" clause of this contract. Contractor requests for launch adjustments for missions with limited launch periods are subject to equitable adjustment and require approval of NASA prior to implementation. If NASA approval is granted, the Contractor shall be obligated to launch at the next opportunity capable of meeting the mission's scientific requirements, irrespective of other launch commitments or customer's priorities.

20.0 PLACE OF PERFORMANCE

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

21.0 RESERVED

Table C-7: Reserved

22.0 RESERVED

23.0 USE OF GOVERNMENT PROPERTY, FACILITIES, AND ASSETS

- 23.1 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.
- 23.2 The Government 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.
- 23.3 The Contractor is responsible for determining the suitability for use of all materials, property, and facilities acquired or made available to the Contractor by the Government under any contract agreement. Any use of Government-Furnished Property (GFP), materials, or facilities and services shall not relieve the Contractor of full launch service performance responsibility.

24.0 MISSION SUCCESS DETERMINATION, INVESTIGATION, AND CORRECTIVE ACTIONS

24.1 Mission Success Criteria

(A) A mission will be determined a *Mission Success*, if:

- (i) The payload is placed into the required orbit by the launch vehicle, and
- (ii) Received telemetry data shows the Interface Control Document (ICD) environments and parameters were not exceeded, and
- (iii) The launch vehicle causes no damage to the payload during deployment or thereafter from collision or contamination products, or
- (iv) There is a violation of the criteria documented in Mission Success Criteria & Determination Methodology (CDRL C2-5) and reported in Final Flight Report (CDRL C4-13); however, there is no launch vehicle/service caused degradation of the payload's ability to perform its intended function as defined in the Payload Program Level Requirements.

(B) A mission will be determined a *Partial Mission Success* when there is a violation of the criteria documented in Mission Success Criteria & Determination Methodology (CDRL C2-5) and reported in Final Flight Report (CDRL C4-13) during launch/flight which results in degradation of the payload's ability to perform its intended function as defined in the Payload Program Level Requirements.

(C) A mission will be determined a *Failed Mission* when the payload:

- (i) Is destroyed during launch/flight, or
- (ii) Cannot be separated from the launch vehicle, or
- (iii) Experiences a violation of the criteria documented in Mission Success Criteria & Determination Methodology (CDRL C2-5) and reported in Final Flight Report (CDRL C4-13) during flight which results in degradation of the payload's ability to meet minimum success as defined in the Payload Program Level Requirements.

24.2 Mission Success Determination

- (A) NASA will provide the Contractor the Payload Program Level Requirements that establish payload mission success criteria.
- (B) The Contractor shall be responsible for providing telemetry data confirming the required orbit conditions and payload environments were met as documented in Mission Success Criteria & Determination Methodology (CDRL C2-5) and reported in Final Flight Report (CDRL C4-13). The Contractor shall measure and provide telemetry data to the extent required by the SOW.
- (C) The Contracting Officer has authority to determine whether a launched mission is a Mission Success, Partial Mission Success, or a Failed Mission in accordance with Section C, paragraph 24.1.

24.3 Procedures

- (A) Not less than two (2) months prior to launch of a payload, NASA will provide the Contractor the Payload Program Level Requirements that establish payload mission success criteria.
- (B) Within thirty (30) calendar days from submittal of the Final Flight Report (CDRL C4-13), the Contracting Officer will either determine the launch a Mission Success or inform the Contractor of the Government's intent to withhold final mission success payment(s) until a final determination of mission success is made.
- (C) In the event of a partial mission success or mission failure under paragraphs 24.1(B) or 24.1(C), the Contracting Officer will utilize all available data for the mission, in particular the focus will be on the Final Flight Report (CDRL C4-13), findings from the Contractor's investigation board, if activated, and findings from the NASA review board(s) if activated. The Contracting Officer will provide a final mission success determination within thirty (30) calendar days of the delivery of final reports for all applicable review board(s).

24.4 Performance-Based Payment for Final Mission Success Determination

- (A) In the event the Contracting Officer determines the launch service a Mission Success, the Contractor shall receive full payment of the final payment event for the launch service.
- (B) In the event the Contracting Officer determines the launch service a Partial Mission Success, the Government will pay no portion of the final payment in accordance with Table C-8.

change. The Government may establish an independent assessment team to assess the Contractor's investigative and corrective actions.

- (C) The Contractor shall present to the Government its findings resulting from the investigation and the proposed corrective actions (return to flight activities), if any. The Contractor shall be responsible for proving the corrective action is sufficient to return to flight. The Contracting Officer may either accept or reject any finding, root cause, or corrective action. If the Contracting Officer accepts a finding and the related corrective action, the Contractor shall be responsible for the cost of the corrective action including Contractor's cost for re-acceptance for NASA missions.

The Government may, at its option and its expense, conduct its own investigation of the anomaly or failure. The Contractor shall cooperate with and fully support the Government investigation, at the Contractor's expense. In the event the Government requires additional analyses or tests beyond those planned by the Contractor, the Contractor shall implement the Contracting Officer's written direction to perform the additional tests or analyses. The costs of implementing these additional tests or analyses may be the basis for an adjustment to this contract.

- (D) The Contractor shall report to NASA any flight anomalies from non-NASA missions. For non-NASA missions, the requirements of paragraphs 24.5(B) and (C) apply to these anomalies as the Contracting Officer finds them to be related to NASA missions. Rights under the Default clause and the right to require corrective action before return to flight shall also apply.

24.6 Finality of Contracting Officer's Determination

- (A) Each of the Contracting Officer's Determinations, under paragraph 24.2, are subject to FAR 52.233-1, Disputes.
- (B) Reserved
- (C) In the event the Contractor appeals the Contracting Officer's determination under the Disputes clause in accordance with FAR subpart 33.2 and submits a claim under the Contract Disputes Act, the parties hereby agree the burden of proof shall rest on the Contractor to prove the failure was not due to the LV. The Contractor assumes the responsibility for providing confirming data. The Government will be responsible for providing proof of payload degradation or reduction in operational capacity or longevity.

24.7 Acceptance

Final acceptance of the launch service will be accomplished following the Contracting Officer's mission success determination.

25.0 GOVERNMENT INSIGHT AND APPROVAL

- 25.1 The Contractor shall provide NASA an adequate level of insight into and/or approval of certain Contractor tasks and milestones in order to ensure all reasonable steps have been taken that result in the highest probability of mission success. This includes insight into any corporation, corporate divisions, subsidiaries, joint ventures, partner(s), and/or any other business entity actually performing launch vehicle manufacturing, management, payload/launch vehicle integration, testing and launch. This also includes insight into certain major sub-contractor tasks and milestones (i.e., those sub-contractors that perform major portions of manufacturing or integration of the launch vehicle system).
- 25.2 The Government's monitoring of launch services provided by the private sector has two elements: approval and insight. Government approval is defined as providing authority to proceed and/or formal acceptance of requirements, plans, tests, or success criteria in specified areas. Where Government approval is required, the Contractor shall submit the necessary documentation to the Contracting Officer and copies to the Contracting Officer's Technical Representative (COTR).
- 25.3 Government insight is defined as gaining an understanding necessary to knowledgeably concur/non-concur with the Contractor's actions through interaction, watchful observation, documentation review, meeting attendance, reviews, tests and compliance evaluations. Where Government insight is required, the Contractor shall notify the Contracting Officer, the Government Resident Office or the appropriate Government operations organization of meetings, reviews, or tests in sufficient time to permit meaningful Government participation.
- 25.4 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, the Government will take appropriate action within the terms of the contract to ensure compliance via written direction to the Contractor.
- 25.5 NASA shall have insight into any Contractor initiated fleet changes or any changes that may affect NASA missions. This insight shall be accommodated with no increase in contract price.
- 25.6 Specific areas where the Government requires approval and/or insight are listed in paragraphs 25.7 and 25.8 respectively. The paragraphs document requirements specified in NPD 8610.23 Launch Vehicle Technical Oversight Policy.
- 25.7 Specific areas requiring Government approval are:

- (A) Spacecraft-to-launch vehicle interface control documents/drawings.
- (B) Decisions/resolutions of action items as determined by joint NASA/Contractor mission integration teams.
- (C) Mission unique hardware design, analysis, manufacture, and test.
- (D) Mission unique software design, analysis, and test.
- (E) Baseline and changes to the Contractor's Risk Management, Reliability, Safety and Health, and Quality Management Plans, consistent with the intent of NPD 1280.1, NPR 7120.5, and NPR 8715.3.
- (F) Top-level test plans, requirements, and success criteria for integrated vehicle systems and for tests that verify the integrated vehicle interfaces.
- (G) Launch commit criteria.
- (H) Closeout of actions from NASA-Chaired Mission and Flight Readiness Reviews.
- (I) Spacecraft handling procedures and deviations.
- (J) Integrated spacecraft/vehicle mate, test, and closeout procedures and deviations.
- (K) Integrated spacecraft/vehicle mate, test, and closeout as performed procedures and deviations.
- (L) Launch countdown procedures and deviations that affect spacecraft/vehicle integrated assembly.
- (M) Anomaly resolutions that affect the integrated assembly.
- (N) Launch Go/No-Go.
- (O) Reserved

25.8 Specific areas to be open to Government insight are:

- (A) Baseline vehicle design, analyses, models, and configuration management.
- (B) Production program reviews, plans, and schedules.
- (C) Production and systems test, and Material Review Boards.

- (D) Critical flight hardware pedigree.
 - (E) Safety and Mission Assurance compliance evaluations (prime and subcontractors).
 - (F) Pre-ship reviews.
 - (G) Design and qualification reviews.
 - (H) Major/critical problems.
 - (I) Major system and integrated systems tests.
 - (J) Post-test data.
 - (K) Anomaly resolutions.
 - (L) Failure analysis.
 - (M) Vehicle/ground support equipment procedures.
 - (N) Launch site support work schedules and plans.
 - (O) Launch site vehicle preparations and closeout data.
 - (P) Vehicle walkdown inspections.
 - (Q) Operations and procedure discipline.
 - (R) Work practices and documentation.
 - (S) Conduct of Contractor-chaired Mission, Launch, and Flight Readiness Reviews.
 - (T) Post-flight vehicle, tracking, and Range data.
 - (U) Post-flight anomaly investigations/close-outs.
- 25.9 Notwithstanding the insight and approvals set forth in Clause 25.0 herein, the Contractor assumes full performance responsibility as set forth in this contract, and neither the Government's insight nor its approval under this paragraph 25 shall be construed as a defense to any finding of mission success or final acceptance / rejection of the launch service.

26.0 GOVERNMENT LAUNCH READINESS ASSESSMENT

- 26.1 The Contractor shall participate in a NASA-chaired Launch Readiness Review (LRR) (reference 2.2.1.3(E) of the SOW). At the LRR, the Contractor shall summarize the status of its launch vehicle and all supporting elements and attest to readiness to launch the mission. If, after due consideration of the status of the launch vehicle, payload and other launch support systems, NASA does not agree that the total mission is ready for launch, NASA has the right to delay the launch.
- 26.2 The Contractor shall poll NASA in the final launch countdown and any re-cycle procedure during status checks for their approval of the final launch readiness assessment. NASA may declare a "HOLD" and delay the launch at any time during the final launch countdown.
- 26.3 In the event NASA delays the launch, as a result of exercising its rights under 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 Section C, Clause 19.0, Adjustments to Launch 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 launch beyond the grace period established in Section C, Clause 19.0 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 Section C, Clause 19.0, Adjustments to Launch Schedule shall apply.

27.0 LICENSES AND PERMITS FOR A LAUNCH 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 services under this contract. No Federal Aviation Administration commercial launch license is required under this contract. All costs and fees associated with obtaining licenses, permits and clearances are included in the standard launch service price. Approvals required by the payload are the responsibility of NASA.

28.0 ADVANCE UNDERSTANDING REGARDING TERMINATION SETTLEMENT UNDER FAR 52.212-4(I)

- 28.1 In the event the Government decides to exercise its right to terminate all or part of this contract under Section C, Clause 1.0(I), Termination for the Government's convenience, it is agreed in advance that the Contractor, after receipt of a written notice of termination, will have satisfied all obligations and discharged all duties required by Section C, Clause 1.0(I), Termination for the Government's convenience, when the Contractor has refunded that portion of the milestone-

based payment(s) for each launch service affected by the termination, in accordance with Table C-1.

- 28.2 The parties agree that by virtue of the refund specified in Table C-1, any and all claims for equitable adjustment as a result of the termination are fully satisfied and discharged. The parties agree that this settlement represents fair compensation for Contractor effort accomplished for the terminated portions of the contract and that the terms as stated herein represent full and final settlement between the parties. The parties agree that the Contractor shall retain title to all hardware associated with the terminated launch service. The parties agree that the above settlement shall represent the total amount to be paid to the Contractor without agreeing on or segregating the particular elements of costs or profits comprising this amount.
- 28.3 The refund amount shall be payable in full no later than thirty (30) days after receipt of the written notice of termination. Delinquent payment(s) shall be subject to interest at the applicable rate as determined by the Secretary of the Treasury.

Table C-9: Reserved

- 28.4 The provisions of this Contract clause shall only apply from Award until the point of intentional ignition of the launch vehicle. The provision of this Contract clause shall in no way be deemed to limit the rights of the Government under Section C, Clause 1.0(m), Termination for Cause. In the event the Government exercises its rights under Section C, Clause 1.0(m), Termination for Cause, the provisions of this contract clause will not apply.

29.0 CO-MANIFESTED PAYLOADS

29.1 Definitions

- (A) Primary Payload: the payload which serves to determine the launch day and time, and without which the vehicle would not launch.
- (B) Secondary Payload: Any payload carried by the launch vehicle in space not required by the primary payload. The secondary payload requires the approval of the primary payload customer prior to manifesting. If the secondary payload is not ready to support scheduled launch day, the secondary payload will be demanifested and replaced with a mass simulator.

29.2 NASA Secondary Payload with NASA Primary Payload

(A) Procedures

NASA may request to manifest a NASA secondary payload on a NASA primary mission. The preferred method of ordering this secondary payload service will be via non-standard service task order. If the non-standard service is not provided in the catalog for the particular launch service, the Government will submit a task order requesting a proposal for a non-standard service to accommodate a secondary payload. The Contracting Officer will provide a description of the proposed secondary payload including, as a minimum: volume, mass, attachment requirements, and data requested by the Contractor. The task order will identify any additional non-standard services or mission unique requirements.

Upon receipt of the task order, the Contractor shall develop a proposal to accommodate the secondary payload or provide a response that the Contractor cannot accommodate the secondary payload on any existing planned missions. The Contractor's proposal shall include a firm fixed-price for the secondary payload (if not ordered under a non-standard service), any additional non-standard services required, any mission unique services, and a proposed payment schedule with accomplishment criteria.

If the Government is unable to provide the secondary payload for launch vehicle integration or there is insufficient time to complete a new mission analysis before the launch date, the Government will bear the cost and the Contractor shall be responsible for designing, fabricating, and installing a secondary payload mass simulator.

In the event of termination for convenience of the NASA secondary payload services, all costs associated with terminating such service shall be determined in accordance with contract Section C, Clause 1.0(l), "Termination for the Government's convenience."

(B) Delays

Any delays shall be subject to contract Section C, Clause 19.0, Adjustments to Launch Schedule.

(C) Mission Success

Mission success determination for the NASA primary and secondary payload shall be made in accordance with contract Section C, Clause 24.0, Mission Success Determination, Investigation, and Corrective Actions with the following exception:

In the event the secondary payload causes primary mission failure, the primary mission shall be determined a full success for purposes of contract Section C, paragraph 24.2.

29.3 Non-NASA Payload with NASA Primary Payload

(A) Procedures

The Contractor may propose to manifest a non-NASA payload on a NASA primary mission. The Contractor shall propose the mission requirements and consideration to be received by NASA. The Contractor shall submit, at no cost to NASA, a detailed payload description, a dual payload compatibility assessment, and any additional documentation or analyses requested by NASA. NASA maintains the right to approve or disapprove the non-NASA payload proposed for manifesting on a NASA primary mission. NASA will respond to the Contractor's request within sixty (60) calendar days after receipt of all NASA requested documentation and analyses.

If the Contractor is unable to provide the non-NASA payload for launch vehicle integration or there is insufficient time to complete a new mission analysis before the launch date, the Contractor shall bear the cost and be responsible for designing, fabricating, and installing a secondary payload mass simulator.

(B) Delays

NASA shall incur no costs or damages associated with delaying the non-NASA mission under any circumstance. The non-NASA payload shall not cause the NASA primary mission launch date to be delayed without NASA approval. If NASA approves a launch delay caused by the non-NASA payload, the NASA Contracting Officer will unilaterally determine whether the Government will be entitled to equitable adjustment under contract Section C, Clause 19.0, Adjustments to Launch Schedule.

(C) Mission Success

Mission success determination for the NASA primary payload shall be made in accordance with contract Section C, Clause 24.0, Mission Success Determination, Investigation, and Corrective Actions with the following exception:

In the event the non-NASA payload causes primary mission failure, the primary mission shall be determined a full success for purposes of contract Section C, paragraph 24.2.

29.4 NASA Secondary Payload on a Non-NASA Primary Payload

(A) Procedures

NASA may request to manifest a NASA secondary payload on a non-NASA primary mission via a task order requesting a proposal for a non-standard

service to accommodate a secondary payload. The Contracting Officer will provide a description of the proposed secondary payload including, as a minimum: volume, mass, attachment requirements, and data requested by the Contractor. The task order will also identify any additional non-standard services or mission unique requirements. If the Government is unable to provide the secondary payload for launch vehicle integration or there is insufficient time to complete a new mission analysis before the launch date, the Government will bear the cost and the Contractor shall be responsible for designing, fabricating, and installing a secondary payload mass simulator.

Upon receipt of the task order, the Contractor shall develop a proposal to accommodate the secondary payload or provide a response that the Contractor cannot accommodate the secondary payload on any existing planned missions. The Contractor's proposal shall include a firm-fixed price for the secondary payload, any additional non-standard services required, any mission unique services, and a proposed payment schedule with accomplishment criteria. The Contractor shall identify the primary mission and the target launch date for the mission. The Contractor shall make all arrangements for and coordinate the concurrence of manifesting the secondary payload with the primary mission customer.

The terms and conditions of this contract shall apply to NASA secondary payload efforts, however the level of NASA insight and approval will be limited to those activities directly affecting the secondary payload. The Contracting Officer shall identify any additional reductions to the terms and conditions of the contract in each task order for NASA secondary payload services.

In the event of termination for convenience of the NASA secondary payload services, all costs associated with terminating such service shall be determined in accordance with contract Section C, Clause 1.0(l), "Termination for the Government's convenience."

(B) Delays

The Contractor shall incur no costs or damages associated with delaying the secondary mission. The secondary mission shall not cause the primary mission launch date to be delayed without Contractor approval. If the Contractor approves a launch delay caused by the secondary payload, delay damages shall not apply.

(C) Mission Success

Mission success determination for the NASA secondary payload shall be made in accordance with contract Section C, Clause 24.0, Mission Success

Determination, Investigation, and Corrective Actions with the following exception:

In the event the primary payload causes secondary mission failure, the secondary mission shall be determined a full success for purposes of contract Section C, paragraph 24.2.

29.5 Contractor Risk Determination for NASA Secondary Missions

Upon receipt of a task order, the Contractor shall, as part of NASA secondary payload integration activities, perform a payload compatibility assessment for all manifested NASA secondary payloads. The Contractor shall notify the Contracting Officer, in writing if, in the Contractor's opinion, the NASA secondary payload would pose unacceptable risk to the success of the primary mission. The notification shall provide detailed substantiation of said risks.

In the event the Contractor, or the primary mission Customer, determines the risk is unacceptable, the Contractor and the Contracting Officer will mutually agree to terminate the task order or re-manifest the NASA secondary payload on another mission. In the event the task order is terminated, NASA will only be liable for the cost of the compatibility analysis and any other payments made to the Contractor shall be repaid to the Government or reallocated to another mission.

30.0 EXPORT CONTROL AND FOREIGN NATIONALS

- 30.1 The Contractor shall comply with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120-130, and the Export Administration Regulations (EAR), 15 CFR Parts 730-744, in the performance of this contract. The Contractor shall be responsible for obtaining export licenses, where required.
- 30.2 The Contractor shall be responsible for obtaining the required export licenses before utilizing foreign nationals in the performance of this contract, including instances where the work is to be performed at launch sites. NASA will be responsible for all ITAR requirements for their foreign national customers, as applicable.
- 30.3 The Contracting Officer, or designated representative, may authorize the Contractor to export ITAR-controlled technical data pursuant to the exemption set forth in 22 CFR 125.4(b)(3) where an international agreement provides for the export of such data and the data does not disclose the details of the design, development, production or manufacture of any defense article.

31.0 DOMESTIC SOURCE CRITERIA

- 31.1 In addition to the certification regarding United States commercial provider of space transportation services (Public Law 105-303, Title II, Section 201), the Contractor shall continue to comply with domestic source criteria. Failure to comply with the criteria may be grounds for "Termination for Cause" in accordance with contract Section C, Clause 1.0(m).
- 31.2 Participation in this procurement is restricted to prime Contractors from the United States launch vehicle/services industry. "United States industry" means any corporation, partnership, joint venture, association, or other entity which is organized or existing under the laws of the United States or any State, and whose controlling interest is held by United States citizens. "Launch services" means all services required in the performance of this contract, excluding those necessary to produce or manufacture launch vehicles, its components and other equipment and facilities required in the performance of the contract. "Controlling interest" means ownership of an amount of equity in such entity sufficient to direct management or to void transactions entered into by management. Ownership of at least fifty-one (51) percent of the equity creates a rebuttable presumption that such interest is controlling.
- 31.3 The Contractor shall provide in the performance of this contract launch vehicles that are domestic end products. The launch vehicle shall be a domestic end product only if the cost of its components, mined, produced or manufactured in the United States exceeds 50 percent of the cost of all its components. The cost of each component includes transportation costs to the place of incorporation into the launch vehicle and any applicable duty (whether or not a duty-free entry certificate is issued). "Components," as used in this contract clause, means those materials and supplies directly incorporated into the end product.
- 31.4 The Contractor shall provide, in the performance of this contract, domestic launch services. Launch services shall be considered to be domestic if the cost for launch services performed by United States industry sources exceeds 50 percent of the cost of the total required launch services.

32.0 LIABILITY FOR THIRD PARTY CLAIMS

- 32.1 This contract clause applies to Third Party claims that arise out of the conduct of hazardous launch activities during the provision of launch services under this contract. More specifically, this contract clause allocates between the Government and the Contractor the risk of Third Party claims for damage to or loss of property or personal injury or death arising from the burning, explosion, detonation, combustion or impact of a launch vehicle, its payload, or a component thereof, whether or not the payload is separated from the launch vehicle, from the time of launch until thirty (30) days after launch.
- 32.2 Definitions:

Covered Launch Activities: Any and all activities involved in the preparation of a launch vehicle and payload for launch, and conduct of the launch, when those activities take place at a launch site in the United States.

Launch: The intentional ignition of the first-stage motor(s) of the launch vehicle that has been integrated with the payload.

Launch Vehicle: The baseline LVS consisting of a common core booster section and any strap on motors attached, one (1) interstage, an orbital adjust module, the payload fairing and the payload adapter.

Party or Parties: The Contractor or NASA, or both.

Payload: All NASA or NASA-sponsored equipment that has been or will be integrated with the launch vehicle for transportation into earth orbit or escape trajectories.

Related Party: (i) Any of the Parties' directors, officers, agents, employees or customers

(ii) Any of the Parties' contractors, subcontractors, or suppliers at any tier involved directly or indirectly in the performance of this Contract

(iii) Any entity having any right, title or interest, whether through sale, lease or service arrangement or otherwise, directly or indirectly, in the payload, the launch vehicle, or the launch service.

Third Party: Any person or entity other than NASA, the Contractor and Related Parties.

32.3 Required Insurance for Liability to Third Parties

(A) The Contractor shall continue in effect or acquire insurance to protect the Parties and the Related Parties from liability for claims from Third Parties for damage to or loss of property or personal injury or death arising in connection with the covered launch activities under this contract. The amount of the required insurance shall be the maximum amount available in the commercial marketplace at reasonable cost, but shall not exceed \$500 million for each launch. The policy or policies shall name NASA and the related parties as additional insured parties. Required insurance coverage shall attach no later than the arrival of the launch vehicle at the launch site and shall remain in force for at least thirty (30) days following launch.

- (B) The Contractor shall provide acceptable evidence to the Contracting Officer of required insurance no later than thirty (30) days prior to the beginning of the covered launch activities. The amount of required insurance and the terms and conditions for the policy or policies shall be subject to review by the Contracting Officer. Once reviewed, the policy or policies may not be modified or canceled without the prior, written approval of the Contracting Officer.
- (C) The foregoing insurance requirement does not preclude the Contractor from acquiring or continuing in effect any additional insurance to protect the interests of the Contractor or its Related Parties.

32.4 Third Party Claims in Excess of Required Insurance

- (A) NASA has determined that launches, under this contract, are conducted by NASA in performance of its functions, as specified in 42 U.S.C. § 2473(a). As a result, once the Contractor or its insurers have paid out for Third Party claims the amount of required insurance under paragraph 32.3(B), NASA will consider any additional Third Party claims for damage to or loss of property or personal injury or death arising from the launches as claims against the United States under the authority of 42 U.S.C. § 2473(c)(13).
- (B) The Contractor (once it or its insurers have paid to Third Party claimants, from their own funds, an amount equal to the amount of required insurance for a Launch) shall adjust, settle and pay meritorious and reasonable additional Third Party claims in excess of the amount of required insurance. To the extent NASA determines that such costs exceed \$25,000, it will forward such claim to the Secretary of Treasury for certification and payment pursuant to 31 U.S.C. § 1304(a). Such costs are subject to the availability of funds and the usual tests for allowability and the total of such costs shall be paid up to a limit of \$1.5 billion above the insurance obtained by the Contractor for each launch.
- (C) In evaluating Third Party claims against the United States paid by the Contractor, NASA will consider such a claim to be meritorious unless the claim represents:
 - (i) Liabilities for which the Contractor is otherwise responsible under the express terms or conditions of the contract or a task order issued under this contract
 - (ii) Liabilities for which the Contractor has failed to insure or to maintain insurance as required by the Contracting Officer
 - (iii) Liabilities for which the Contractor has not reasonably adjusted, settled, or paid on a meritorious and reasonable basis.

- (iv) Liabilities that result from willful misconduct or lack of good faith on the part of any of the Contractor's directors, officers, managers, superintendents, or other representatives who have supervision or direction of:
 - (a) All or substantially all of the Contractor's business
 - (b) All or substantially all of the Contractor's operations at any one plant or separate location in which this contract is being performed
 - (c) A separate and complete major industrial operation in connection with the performance of this contract
- (v) Liabilities that arise from the willful misconduct or gross negligence of the Claimant or, in the case of a claim based on death, the claimant's descendant.

32.5 Third Party Liability for NASA Secondary Payloads on Non-NASA Primaries

The requirements of this clause 32.0 shall apply to all launch services provided under this contract except for those services involving NASA secondary payloads which are manifested on a launch service for non-NASA (commercial) primary payloads. In the event that a NASA secondary payload is manifested on a launch service for a non-NASA (commercial) primary payload, the contractor shall obtain third party liability insurance and indemnification for third party claims in excess of insurance pursuant to the Commercial Space Launch Act, 49 U.S.C. 70101 et seq.

33.0 FAR 52.212-3 OFFEROR REPRESENTATIONS AND CERTIFICATIONS--COMMERCIAL ITEMS (AUG 2009) ALT I (APRIL 2002)

The Offeror Representations and Certifications (Attachment E1) as completed by the Contractor are hereby incorporated in their entirety by reference with the same force and effect as if they were given in full text.

34.0 FAR 52.212-5 CONTRACT TERMS AND CONDITIONS REQUIRED TO IMPLEMENT STATUTES OR EXECUTIVE ORDERS--COMMERCIAL ITEMS (APR 2010)

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

(1) 52.222-50, Combating Trafficking in Persons (FEB 2009) (22 U.S.C. 7104(g)).

___ Alternate I (AUG 2007) of 52.222-50 (22 U.S.C. 7104(g)).

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

(3) 52.233-4, Applicable Law for Breach of Contract Claim (OCT 2004) (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:

[Contracting Officer shall check as appropriate]

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

X (2) 52.203-13, Contractor Code of Business Ethics and Conduct (Apr 2010) (Pub. L. 110-252, Title VI, Chapter 1 (41 U.S.C. 251 note)).

___ (3) 52.203-15, Whistleblower Protections under the American Recovery and Reinvestment Act of 2009 (Mar 2009) (Section 1553 of Pub L. 111-5) (Applies to contracts funded by the American Recovery and Reinvestment Act of 2009)

___ (4) 52.204-11, American Recovery and Reinvestment Act—Reporting Requirements (Mar 2009) (Pub. L. 111-5).

___ (5) 52.219-3, Notice of Total HUBZone Set-Aside (Jan 1999) (15 U.S.C. 657a).

X (6) 52.219-4, Notice of Price Evaluation Preference for HUBZone Small Business Concerns (Jul 2005) (if the offeror elects to waive the preference, it shall so indicate in its offer) (15 U.S.C. 657a).

___ (7) [Reserved]

___ (8)(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.
- ☐ (9)(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.
- ☒ (10) 52.219-8, Utilization of Small Business Concerns (May 2004) (15 U.S.C. 637(d)(2) and (3)).
- ☒ (11)(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.
- ☒ (iii) Alternate II (Oct 2001) of 52.219-9.
- ☐ (12) 52.219-14, Limitations on Subcontracting (Dec 1996) (15 U.S.C. 637(a)(14)).
- ☒ (13) 52.219-16, Liquidated Damages—Subcontracting Plan (Jan 1999)(15 U.S.C. 637(d)(4)(F)(i)).
- ☐ (14)(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.
- ☒ (15) 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).
- ☐ (16) 52.219-26, Small Disadvantaged Business Participation Program-Incentive Subcontracting (Oct 2000) (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).
- ☐ (17) 52.219-27, Notice of Total Service-Disabled Veteran-Owned Small Business Set-Aside (May 2004) (15 U.S.C. 657f).
- ☒ (18) 52.219-28, Post Award Small Business Program Rerepresentation (April 2009) (15 U.S.C. 632(a)(2)).

- X (19) 52.222-3, Convict Labor (June 2003) (E.O. 11755).
- X (20) 52.222-19, Child Labor-Cooperation with Authorities and Remedies (Aug 2009) (E.O. 13126).
- X (21) 52.222-21, Prohibition of Segregated Facilities (Feb 1999).
- X (22) 52.222-26, Equal Opportunity (Mar 2007) (E.O. 11246).
- X (23) 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (Sep 2006) (38 U.S.C. 4212).
- X (24) 52.222-36, Affirmative Action for Workers with Disabilities (Jun 1998) (29 U.S.C. 793).
- X (25) 52.222-37, Employment Reports on Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (Sep 2006) (38 U.S.C. 4212).
- X (26) 52.222-54, Employment Eligibility Verification (Jan 2009) (Executive Order 12989). (Not applicable to the acquisition of commercially available off-the-shelf items or certain other types of commercial items as prescribed in 22.1803.)
- (27) (i) 52.223-9, Estimate of Percentage of Recovered Material Content for EPA-Designated Items (May 2008)(42 U.S.C. 6962(c)(3)(A)(ii)). (Not applicable to the acquisition of commercially available off-the-shelf items.)
- (ii) Alternate I (May 2008) of 52.223-9 (42 U.S.C. 6962(i)(2)(C)). (Not applicable to the acquisition of commercially available off-the-shelf items.)
- (28) 52.223-15, Energy Efficiency in Energy-Consuming Products (Dec 2007) (42 U.S.C. 8259b).
- (29) (i) 52.223-16, IEEE 1680 Standard for the Environmental Assessment of Personal Computer Products (Dec 2007) (E.O. 13423).
- (ii) Alternate 1 (Dec 2007) of 52.223-16
- (30) 52.225-1, Buy American Act-Supplies (Feb 2009)(41 U.S.C. 10a-10d).

- (31) (i) 52.225-3, Buy American Act-Free Trade Agreements-Israeli Trade Act (Jun 2009) (41 U.S.C. 10a-10d, 19 U.S.C. 3301 note, 19 U.S.C. 2112 note, 19 U.S.C. 3805 note, Pub. L. 108-77, 108-78, 108-286, 108-301, 109-53, 109-169, 109-283, and 110-138).
- (ii) Alternate I (Jan 2004) of 52.225-3.
- (iii) Alternate II (Jan 2004) of 52.225-3.
- (32) 52.225-5, Trade Agreements (Aug 2009) (19 U.S.C. 2501, *et seq.*, 19 U.S.C. 3301 note).
- (33) 52.225-13, Restrictions on Certain Foreign Purchases (Jun 2008)(E.O.'s, proclamations, and statutes administered by the Office of Foreign Assets Control of the Department of the Treasury).
- (34) 52.226-4, Notice of Disaster or Emergency Area Set-Aside (Nov 2007) (42 U.S.C. 5150).
- (35) 52.226-5, Restrictions on Subcontracting Outside Disaster or Emergency Area (Nov 2007) (42 U.S.C. 5150).
- X (36) 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)).
- (37) 52.232-30, Installment Payments for Commercial Items (Oct 1995) (41 U.S.C. 255(f), 10 U.S.C. 2307(f)).
- X (38) 52.232-33, Payment by Electronic Funds Transfer-Central Contractor Registration (Oct 2003)(31 U.S.C. 3332).
- (39) 52.232-34, Payment by Electronic Funds Transfer-Other than Central Contractor Registration (May 1999)(31 U.S.C. 3332).
- (40) 52.232-36, Payment by Third Party (Feb 2010) (31 U.S.C. 3332).
- (41) 52.239-1, Privacy or Security Safeguards (Aug 1996) (5 U.S.C. 552a).
- (42)(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) (Sep 2009) (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 (Sep 2009) (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 (Feb 2009) (41 U.S.C. 351, *et seq.*).
- (7) 52.226-6, Promoting Excess Food Donation to Nonprofit Organizations. (Mar 2009) (Pub. L. 110-247).
- (8) 52.237-11, Accepting and Dispensing of \$1 Coin (Sep 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 three (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 three (3) years after any resulting final termination settlement. Records relating to appeals under the disputes clause or to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are finally resolved.

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

(e)

- (1) Notwithstanding the requirements of the clauses in paragraphs (a), (b), (c) and (d) of this clause, the Contractor is not required to flow down any FAR clause, other than those in paragraphs (e)(1) 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) 52.203-13, Contractor Code of Business Ethics and Conduct (APR 2010) (Pub. L. 110-252, Title VI, Chapter 1 (41 U.S.C. 251 note)).

- (ii) 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.

- (iii) Reserved

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

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

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

(vii) Reserved

(viii) 52.222-41, Service Contract Act of 1965, (Nov 2007), flow down required for all subcontracts subject to the Service Contract Act of 1965 (41 U.S.C. 351, *et seq.*)

(ix) 52.222-50, Combating Trafficking in Persons (Feb 2009) (22 U.S.C. 7104(g)).

Alternate I (Aug 2007) of 52.222-50 (22 U.S.C. 7104(g)).

(x) 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.*)

(xi) 52.222-53, Exemption from Application of the Service Contract Act to Contracts for Certain Services--Requirements (Feb 2009) (41 U.S.C. 351, *et seq.*)

(xii) 52.222-54, Employment Eligibility Verification (Jan 2009).

(xiii) 52.226-6, Promoting Excess Food Donation to Nonprofit Organizations. (Mar 2009) (Pub. L. 110-247). Flow down required in accordance with paragraph (e) of FAR clause 52.226-6.

(xiv) 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.

35.0 RESERVED

36.0 LISTING OF CLAUSES INCORPORATED BY REFERENCE

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

36.1 FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1) CLAUSES

FAR 52.202-1	Definitions (Jul 2004)
FAR 52.211-14	Notice of Priority Rating for National Defense, Emergency Preparedness, and Energy Program Use (Apr 2008)

FAR 52.215-1(c)(3)	Instructions to Offerors-Competitive Acquisition (Jan 2004)
FAR 52.222-1	Notice to the Government of Labor Disputes (Feb 1997)
FAR 52.227-14	Rights in Data—General (Dec 2007)
FAR 52.227-14	Rights in Data—General (Dec 2007) Alternate II (Dec 2007)
FAR 52.227-14	Rights in Data—General (Dec 2007) Alternate III (Dec 2007)
FAR 52.232-18	Availability of Funds (Apr 1984)
FAR 52.233-1	Disputes (July 2002)
FAR 52.242-15	Stop-Work Order (Aug 1989)
FAR 52.243-1	Changes—Fixed-Price (Aug 1987) Alternate I (Apr 1984)
FAR 52.246-4	Inspection of Services—Fixed-Price (Aug 1996)
FAR 52.246-25	Limitation of Liability—Services (Feb 1997)

36.2 NASA FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES:

NFS 1852.215-84	Ombudsman (Oct 2003) James E. Hattaway, Jr. at (321) 867-7246
NFS 1852.219-74	Use of Rural Area Small Businesses (Sep 1990)
NFS 1852.219-75	Small, Small Disadvantaged, and Women-Owned Small Business Subcontracting Reporting (May 1999)
NFS 1852.219-76	NASA 8 Percent Goal (Jul 1997)
NFS 1852.223-70	Safety and Health (April 2002)
NFS 1852.223-75	Major Breach of Safety or Security (Feb 2002)
NFS 1852.225-70	Export Licenses (Feb 2000) Alternate I (Feb 2000)
NFS 1852.228-75	Minimum Insurance Coverage (Oct 1988)
NFS 1852.243-71	Shared Savings (Mar 1997)

36.3 KENNEDY SPACE CENTER STANDARD CLAUSES

KSC 52.204-96	Security Controls for KSC & CCAFS (Apr 2010)
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37.0 FAR 52.252-2 CLAUSES INCORPORATED BY REFERENCE (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 this/these address(es):

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

GSA FAR Homepage

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

NASA FAR Supplement

[nfstoc.htm](#)

Homepage

<http://procurement.ksc.nasa.gov/clauses.htm>

KSC Standard Unique
Clauses

38.0 RESERVED

39.0 SPECIAL UNDERSTANDING REGARDING DAMAGE TO GOVERNMENT PAYLOADS

Prior to intentional ignition of the launch vehicle on the launch pad, the Contractor shall not be responsible for damage to the spacecraft while the spacecraft is under the control of the Contractor, except when such damage is caused by the gross negligence, willful misconduct, or lack of good faith by the Contractor. In the event the Contractor is determined to be responsible for such damage, the Contractor shall reimburse the Government for the cost of spacecraft repairs as well as any costs associated with launch delays as set forth in the Section C, Clause 19.0, entitled "Adjustments to Launch Schedule." After intentional ignition, the provisions of Contract Section C, clause 24.0 shall apply.

40.0 SPECIAL UNDERSTANDING REGARDING LIABILITY FOR THIRD PARTY CLAIMS FOR NUCLEAR INCIDENTS

In the event that a launch service acquired under this contract carries a payload containing a Radioisotope Thermoelectric Generator (RTG) or other nuclear materials for which third party liability insurance is not commercially available, NASA will obtain from the Department of Energy (DOE) the necessary agreement to provide to the Contractor indemnification against third party claims pursuant to the Price Anderson Act, 42 U.S.C. §2210. Such agreement shall be obtained, and the Launch Service Task Order (LSTO) for the subject launch service shall be modified to reflect the Price Anderson Act indemnification prior to integration of the RTG or other nuclear materials into the launch vehicle. The Contractor shall not be required to integrate the RTG or other nuclear materials into the subject mission's launch vehicle prior to the time at which Price Anderson Act or other indemnification for the nuclear risk has been obtained. Any delay by NASA in timely obtaining Price Anderson Act indemnification prior to scheduled integration which results in a launch delay, shall constitute a Government-caused delay under clause 19.0 of the Contract. Such a Government-caused delay to the subject mission shall be subject to the contract's changes clause.

41.0 DEPARTMENT OF ENERGY (DOE) 952.250-70 NUCLEAR HAZARDS INDEMNITY AGREEMENT (JUN 1996)

(a) Authority. This clause is incorporated into this contract pursuant to the authority contained in subsection 170d of the Atomic Energy Act of 1954, as amended (hereinafter called the Act.)

(b) Definitions. The definitions set out in the Act shall apply to this clause.

(c) Financial protection. Except as hereafter permitted or required in writing by DOE, the contractor will not be required to provide or maintain, and will not provide or maintain at Government expense, any form of financial protection to cover public liability, as described in paragraph (d)(2) below. DOE may, however, at any time require in writing that the contractor provide and maintain financial protection of such a type and in such amount as DOE shall determine to be appropriate to cover such public liability, provided that the costs of such financial protection are reimbursed to the contractor by DOE.

(d)(1) Indemnification. To the extent that the contractor and other persons indemnified are not compensated by any financial protection permitted or required by DOE, DOE will indemnify the contractor and other persons indemnified against (i) claims for public liability as described in subparagraph (d)(2) of this clause; and (ii) such legal costs of the contractor and other persons indemnified as are approved by DOE, provided that DOE's liability, including such legal costs, shall not exceed the amount set forth in section 170e.(1)(B) of the Act in the aggregate for each nuclear incident or precautionary evacuation occurring within the United States or \$100 million in the aggregate for each nuclear incident occurring outside the United States, irrespective of the number of persons indemnified in connection with this contract.

(2) The public liability referred to in subparagraph (d)(1) of this clause is public liability as defined in the Act which (i) arises out of or in connection with the activities under this contract, including transportation; and (ii) arises out of or results from a nuclear incident or precautionary evacuation, as those terms are defined in the Act.

(e)(1) Waiver of Defenses. In the event of a nuclear incident, as defined in the Act, arising out of nuclear waste activities, as defined in the Act, the contractor, on behalf of itself and other persons indemnified, agrees to waive any issue or defense as to charitable or governmental immunity.

(2) In the event of an extraordinary nuclear occurrence which:

(i) Arises out of, results from, or occurs in the course of the construction, possession, or operation of a production or utilization facility; or

(ii) Arises out of, results from, or occurs in the course of transportation of source material, by-product material, or special nuclear material to or from a production or utilization facility; or

(iii) Arises out of or results from the possession, operation, or use by the contractor or a subcontractor of a device utilizing special nuclear material or by-product material, during the course of the contract activity; or

(iv) Arises out of, results from, or occurs in the course of nuclear waste activities, the contractor, on behalf of itself and other persons indemnified, agrees to waive:

(A) Any issue or defense as to the conduct of the claimant (including the conduct of persons through whom the claimant derives its cause of action) or fault of persons indemnified, including, but not limited to:

1. Negligence;
2. Contributory negligence;
3. Assumption of risk; or
4. Unforeseeable intervening causes, whether involving the conduct of a third person or an act of God;

(B) Any issue or defense as to charitable or governmental immunity; and

(C) Any issue or defense based on any statute of limitations, if suit is instituted within 3 years from the date on which the claimant first knew, or reasonably could have known, of his injury or change and the cause thereof. The waiver of any such issue or defense shall be effective regardless of whether such issue or defense may otherwise be deemed jurisdictional or relating to an element in the cause of action. The waiver shall be judicially enforceable in accordance with its terms by the claimant against the person indemnified.

(v) The term extraordinary nuclear occurrence means an event that DOE has determined to be an extraordinary nuclear occurrence as defined in the Act. A determination of whether or not there has been an extraordinary nuclear occurrence will be made in accordance with the procedures in 10 CFR Part 840.

(vi) For the purposes of that determination, "offsite" as that term is used in 10 CFR part 840 means away from "the contract location" which phrase means any DOE facility, installation, or site at which contractual activity under this contract is being carried on, and any contractor-owned or controlled facility, installation, or site at which the contractor is engaged in the performance of contractual activity under this contract.

(3) The waivers set forth above:

(i) Shall be effective regardless of whether such issue or defense may otherwise be deemed jurisdictional or relating to an element in the cause of action;

(ii) Shall be judicially enforceable in accordance with its terms by the claimant against the person indemnified;

(iii) Shall not preclude a defense based upon a failure to take reasonable steps to mitigate damages;

(iv) Shall not apply to injury or damage to a claimant or to a claimant's property which is intentionally sustained by the claimant or which results from a nuclear incident intentionally and wrongfully caused by the claimant;

(v) Shall not apply to injury to a claimant who is employed at the site of and in connection with the activity where the extraordinary nuclear occurrence takes

place, if benefits therefore are either payable or required to be provided under any workmen's compensation or occupational disease law;

(vi) Shall not apply to any claim resulting from a nuclear incident occurring outside the United States;

(vii) Shall be effective only with respect to those obligations set forth in this clause and in insurance policies, contracts or other proof of financial protection; and

(viii) Shall not apply to, or prejudice the prosecution or defense of, any claim or portion of claim which is not within the protection afforded under (A) the limit of liability provisions under subsection 170e. of the Act, and (B) the terms of this agreement and the terms of insurance policies, contracts, or other proof of financial protection.

(f) Notification and litigation of claims. The contractor shall give immediate written notice to DOE of any known action or claim filed or made against the contractor or other person indemnified for public liability as defined in paragraph (d)(2). Except as otherwise directed by DOE, the contractor shall furnish promptly to DOE, copies of all pertinent papers received by the contractor or filed with respect to such actions or claims. DOE shall have the right to, and may collaborate with, the contractor and any other person indemnified in the settlement or defense of any action or claim and shall have the right to (1) require the prior approval of DOE for the payment of any claim that DOE may be required to indemnify hereunder; and (2) appear through the Attorney General on behalf of the contractor or other person indemnified in any action brought upon any claim that DOE may be required to indemnify hereunder, take charge of such action, and settle or defend any such action. If the settlement or defense of any such action or claim is undertaken by DOE, the contractor or other person indemnified shall furnish all reasonable assistance in effecting a settlement or asserting a defense.

(g) Continuity of DOE obligations. The obligations of DOE under this clause shall not be affected by any failure on the part of the contractor to fulfill its obligation under this contract and shall be unaffected by the death, disability, or termination of existence of the contractor, or by the completion, termination or expiration of this contract.

(h) Effect of other clauses. The provisions of this clause shall not be limited in any way by, and shall be interpreted without reference to, any other clause of this contract, including the clause entitled Contract Disputes, provided, however, that this clause shall be subject to the clauses entitled Covenant Against Contingent Fees, and Accounts, records, and inspection, and any provisions that are later added to this contract as required by applicable Federal law, including statutes, executive orders and regulations, to be included in Nuclear Hazards Indemnity Agreements.

(i) Civil penalties. The contractor and its subcontractors and suppliers who are indemnified under the provisions of this clause are subject to civil penalties,

pursuant to 234A of the Act, for violations of applicable DOE nuclear-safety related rules, regulations, or orders.

(j) Criminal penalties. Any individual director, officer, or employee of the contractor or of its subcontractors and suppliers who are indemnified under the provisions of this clause are subject to criminal penalties, pursuant to 223(c) of the Act, for knowing and willful violation of the Atomic Energy Act of 1954, as amended, and applicable DOE nuclear safety-related rules, regulations or orders which violation results in, or, if undetected, would have resulted in a nuclear incident.

(k) Inclusion in subcontracts. The contractor shall insert this clause in any subcontract which may involve the risk of public liability, as that term is defined in the Act and further described in paragraph (d)(2) above. However, this clause shall not be included in subcontracts in which the subcontractor is subject to Nuclear Regulatory Commission (NRC) financial protection requirements under section 170b. of the Act or NRC agreements of indemnification under section 170c. or k. of the Act for the activities under the subcontract.

(l) Effective date. This indemnity agreement shall be applicable with respect to nuclear incidents occurring on or after August 20, 1988.

42.0 NFS 1852.228-78 CROSS-WAIVER OF LIABILITY FOR SCIENCE OR SPACE EXPLORATION ACTIVITIES UNRELATED TO THE INTERNATIONAL SPACE STATION (DEVIATION) (OCT 2009)

(a) The purpose of this clause is to extend a cross-waiver of liability to NASA contracts for work done in support of Agreements between Parties involving Science or Space Exploration activities, unrelated to the International Space Station (ISS), but which involve a launch. This cross-waiver of liability shall be broadly construed to achieve the objective of furthering participation in space exploration, use, and investment.

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

(1) "Agreement" refers to any NASA Space Act agreement that contains the cross-waiver of liability provision authorized in 14 CFR 1266.104.

(2) "Damage" means:

(i) Bodily injury to, or other impairment of health of, or death of, any person;

(ii) Damage to, loss of, or loss of use of any property;

(iii) Loss of revenue or profits; or

(iv) Other direct, indirect, or consequential Damage;

(3) "Launch 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.

(4) "Party" means a party to a NASA Space Act agreement for Science or Space Exploration activities, unrelated to the ISS, but which involve a launch and a party that is neither the prime contractor under this contract nor a subcontractor at any tier hereto.

(5) "Payload" means all property to be flown or used on or in a Launch Vehicle.

(6) "Protected Space Operations" means all Launch or Transfer Vehicle activities and Payload activities on Earth, in outer space, or in transit between Earth and outer space in implementation of an Agreement for Science or Space Exploration activities, unrelated to the ISS, but which involve a launch. Protected Space Operations begins at the signature of the Agreement and ends when all activities done in implementation of the agreement are completed. It includes, but is not limited to:

(i) Research, design, development, test, manufacture, assembly, integration, operation, or use of Launch or Transfer Vehicles, 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 excludes activities on Earth which are conducted on return from space to develop further a Payload's product or process other than for the activities within the scope of an Agreement.

(7) "Related entity" means:

(i) A contractor or subcontractor of a Party at any tier;

(ii) A user or customer of a party at any tier; or

(iii) A contractor or subcontractor of a user or customer of a Party at any tier. The terms "contractors" and "subcontractors" include suppliers of any kind.

(c) Cross-waiver of liability:

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

(i) A Party;

(ii) A Party to another NASA Agreement or contract that includes flight on the same Launch Vehicle;

(iii) A Related Entity of any of the entities identified in (c)(1)(i) or (c)(1)(ii) of this clause; or

(iv) The employees of any of the entities identified in (c)(1)(i) through (c)(1)(iii) of this clause.

(2) The contractor agrees to extend the cross-waiver of liability as set forth in paragraph (c)(1) of this clause to its own subcontractors at all tiers by requiring them, by contract or otherwise, to:

(i) Waive all claims against the entities or persons identified in paragraphs (c)(1)(i) through (c)(1)(iv) of this clause; and

(ii) Require that their Related Entities waive all claims against the entities or persons identified in paragraph (c)(1)(i) through (c)(1)(iv) of this clause.

(3) For avoidance of doubt, this cross-waiver includes a cross-waiver of claims arising from the *Convention on International Liability for Damage Caused by Space Objects*, which entered into force on September 1, 1972, where the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations.

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

(i) Claims between the Government and its own contractors or between its own contractors and subcontractors;

(ii) Claims made by a natural person, his/her estate, survivors, or subrogees (except when a subrogee is a Party to an Agreement or is otherwise bound by the terms of this cross-waiver) for bodily injury to, or

other impairment of health, or death of such person;

(iii) Claims for Damage caused by willful misconduct;

(iv) Intellectual property claims;

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

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

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

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

SECTION D

ATTACHMENT D1

STATEMENT OF WORK

FALCON 1 and FALCON 1e

ATTACHMENT D1
STATEMENT OF WORK
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Statement of work

1.0 INTRODUCTION

1.1 Scope

This Statement of Work (SOW) and all Exhibits and documents attached or referenced herein define the Government's requirements for the Contractor to provide launch services in support of NASA's Launch Services Program (LSP). Unless expressly stated otherwise, Exhibits are supplemental to the SOW, and do not replace requirements in the SOW. The scope of this contract effort includes risk category 2 and 3 launch services capable of delivering, at a minimum, a 250kg payload to orbit at an altitude of 200 km and a launch inclination of 28.5°. [NOTE: The information contained in this SOW pertains to both the Falcon 1 and Falcon 1e Launch Vehicle configurations.]

This SOW defines the overall launch service requirements for 'NASA or NASA-sponsored payloads' (hereinafter referred to as 'payloads'). The Contractor shall perform all tasks necessary to safely and reliably launch payloads in accordance with NASA-defined mission objectives. The Contractor shall support advance planning and perform analysis tasks as directed by the Contracting Officer.

It is the general contemplation of the parties to this contract that the Contractor shall have a broad mission in performing launch service related functions for the Government and designees. Therefore, the general scope of the contract covers any launch service and launch service related activities arising from the SOW in support of earth and space science exploration, and space station re-supply.

1.2 Objectives

The goal of the NASA Launch Services (NLS) contract is to provide the Agency with domestic launch services that are safe, successful, reliable, and affordable. The launch services will be provided at a fixed price. The contract will, to the maximum extent practical, incorporate best commercial practices.

The objectives of this contract are to:

- Ensure the safety of the public, as well as all personnel, hardware, and property associated with the launch services.
- Provide affordable, accurate, and on-time delivery of NASA and/or NASA-sponsored payloads to space on expendable launch vehicles.
- Provide a mechanism to incorporate new launch services, technology upgrades, improved systems engineering processes, and advances in manufacturing techniques.
- Provide risk mitigation while utilizing commercial practices.

- Provide flexible manifesting policy that recognizes the national priorities of NASA missions.
- Provide a capability to optimize cost, schedule, and performance to satisfy mission objectives.
- Provide for clear Government visibility into program schedule, technical performance, and risk.
- Foster competition and create opportunities for new, emerging launch service providers.
- Promote partnering among customers, launch service providers, and the LSP to maximize flexibility and responsiveness to customers' needs.

1.3 Compliance Documents

The Contractor shall comply with the requirements contained in the following documents.

Document No.	Revision	Document Title
Applicable Range Safety Requirements		(e.g., EWR-127-1, AFSPCMAN 91-710, RSM-2002)
ISO 9001/2000 ¹	2000	International Organization of Standardization
AS9100	2009	Aerospace Quality Management System
KNPR 8715.3 ²		KSC Safety Practices Procedural Requirements
LSP-PD-120.05	BASIC	Launch Telemetry Requirements
NPR 8715.6 ³	A	NASA Procedural Requirements for Limiting Orbital Debris
NASA-STD-8719.9 ²		NASA Safety Standard for Lifting Devices and Equipment

¹ ISO 9001/2008 is required after November 2010

² The Contractor shall comply with the latest revisions of these documents. These documents apply to NASA property, personnel, software, and processes performed in NASA-owned facilities.

³ The Contractor shall support NASA's compliance with this document.

1.4 Reserved

2.0 STANDARD LAUNCH SERVICE

The Contractor shall perform all launch service tasks necessary to deliver payloads to defined orbital parameters in compliance with mission requirements. The launch service shall support missions to all orbital parameters, consistent with vehicle configuration capabilities and launch Range restrictions. The Contractor shall provide launch services, which are in compliance with all Range and responsible authority requirements. The Contractor shall make all arrangements with the responsible authorities for the required launch Range authorization and support for vehicle processing; integrated payload/vehicle processing, launch; and launch site maintenance and modifications. NASA reserves the right to approve the choice of launch site [e.g. Cape Canaveral Air Force Station (CCAFS), Vandenberg Air Force Base (VAFB)].

The Contractor shall furnish all services, maintain all equipment and infrastructure including, but not limited to: program management, mission integration, launch site support, ground and flight system safety, and performance assurance, necessary to accomplish the safe and successful launch of payloads to the required orbit conditions within required launch periods. The Contractor shall provide facilities and services at Contractor facilities for NASA personnel performing insight and approval functions during the performance of the contract. The Contractor shall provide access to launch vehicle documentation in support of NASA insight and approval functions.

The Contractor shall provide all necessary services, test hardware and software, and mission specific elements required to integrate the payload(s) to the launch vehicle systems. The Contractor shall meet all launch service performance requirements described in Exhibit 1, Capabilities, Specifications and Environments. All capabilities and conditions stated in Exhibit 1 must be consistent and compatible with all other capabilities and conditions stated in Exhibit 1 and in response to the requirements of the SOW. Any exceptions to the stated capabilities or conditions must be specifically noted.

The Contractor shall coordinate with NASA Public Affairs Office all press releases concerning launches under this contract. During vehicle build-up, payload integration, and launch countdown, the Contractor shall allow NASA Public Affairs access to facilities to photograph and videotape activities, including hazardous operations. The Contractor shall assist NASA Public Affairs in developing the launch commentary for NASA Television by furnishing launch countdown and operations background material. The Contractor may also be asked to provide information to support the development of the press kit document and the NASA pre-launch and post-launch news conferences. The Contractor shall coordinate with NASA Public Affairs Protocol and Guest

Services a minimum of sixty (60) days in advance of each launch to determine any special requirements.

The Contractor shall provide standard launch services as delineated in Exhibit 2, Standard Launch Services List which shall comply with the requirements of the SOW. All hardware, software, analyses, and support required to provide each item listed in Exhibit 2, shall be included in the standard launch service.

All Contract Data Requirements List (CDRL) and Supplemental Data Requirements List (SDRL) items, identified in Attachment D2 and D3 respectively, shall be included in the standard launch service.

2.1 Launch Vehicle

The standard launch service shall include, as a minimum, the following:

(A) Launch timing capabilities with

- (i) Reserved
- (ii) Multiple approximately twenty-four (24) hour re-launch attempts in the event of a launch scrub
- (iii) Instantaneous launch window
- (iv) Inertial targeting over a ^{B4} launch window utilizing multiple discrete or continuous targeting. ^{B4} continuous targeting. Multiple dis

B4

(B) A launch vehicle and Payload Adapter (PA) with appropriate electrical and mechanical interfaces (as described in Exhibit 1) required for payload integration and testing:

(C) A payload separation system with the following characteristics:

- (i) The payload shall be protected from debris generated by the separation system.
- (ii) The separation system shall function in a manner that prevents any re-contact with the payload, including Contractor-provided attach hardware on the payload, by the upper stage or any element of the separation system once separation has been initiated.
- (iii) Redundant payload separation indications.

(D) A Payload Fairing (PLF) with the following items, as a minimum:

- (i) Two payload access doors of sizes B4 whose locations shall be mission unique within the stated structural limitations of the fairing. Additional or different size doors shall be provided as a non-standard service. The Contractor shall provide payload personnel access through all standard and non-standard access doors from fairing mate through final vehicle closeout.
- (ii) Thermal environments specified not to exceed B4 during ascent on any launch vehicle component inside the fairing with a view factor to the payload, with the exception of the upper stage motor which shall not exceed B4. Maximum thermal environments shall be specified in the mission specific ICD (CDRL C2-1.1).
- (iii) Thermal and/or acoustic blankets sealed or filtered such that venting of blanket material debris does not contaminate the payload.

(E) Flight instrumentation, as specified in Exhibit 1, paragraph 9.0, Payload Environment Instrumentation, to provide data adequate to support Section C, paragraph 24.2, Mission Success Determination.

(F) Capability to spin payloads, when applicable, prior to deployment over a minimum range of zero (0) B4 with an accuracy B4 per second.

(G) Post mission maneuvers:

- (i) A Collision/Contamination Avoidance Maneuver (CCAM), when applicable, following payload separation to minimize payload contamination and any chance of re-contact with the separated payload
- (ii) End of mission maneuvers after CCAM shall support the limiting of orbital debris IAW mission requirements and vehicle capability.

(H) Provisions for the prevention of static charging on umbilical connectors that may be subjected to static charging from plasma heating or atmospheric particulate matter (e.g., bleed resistors, dead facing, or connector covers).

(I) A logo in accordance with NASA provided artwork. The size of the logo shall be a maximum of B4 dimensions. The logo installation shall be appropriately documented in the mission Interface Control Document (ICD) (CDRL C2-1.1).

- (J) Availability of a Test Payload Adapter (TPA), with appropriate mechanical interfaces and payload separation system, to support payload integration and testing at NASA/NASA Customer (NNC) facilities or such other locations as defined by the ICD. At this facility, the Contractor shall support, with necessary personnel and equipment, the following: a fit check of the payload with the flight PA, environmental testing with a TPA (personnel support is limited to one installation and one removal of TPA), payload shock testing with a TPA, and sufficient pyrotechnics for two shock test firings.
- (K) Command, control, and power signal capability from the launch control facility to the payload umbilical Ground Support Equipment (GSE) IAW the mission specific ICD.
- (L) All mechanical GSE required to interface with the payload mechanical adapters and accomplish the payload to launch vehicle mating operation IAW the mission ICD.
- (M) Both halves of the electrical connector at each spacecraft-to-launch vehicle interface. The Contractor shall provide three (3) sets for each electrical connector interface: a flight set, a flight spare set, and a set for spacecraft testing.
- (N) All other hardware equipment, software, infrastructure, and logistics necessary to perform the contracted launch services.

2.2 Program Management

The Contractor shall provide all program management functions required to provide the launch services and to satisfy the mission requirements for each NASA mission. The program management function of this contract shall provide insight to NASA for all technical and programmatic activities performed under this contract.

The Contractor shall coordinate all program management functions and issues directly with the KSC LSP designated representative(s). The NASA Contracting Officer is the only NASA representative authorized to provide formal contract direction.

2.2.1 Formal Reviews

The Contractor shall conduct program reviews, design reviews, and readiness reviews, and shall provide for the participation of NNC. 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 NNC attendees (CDRL C1-1)

2.2.1.1 Program Reviews

During the contract performance period, the Contractor shall conduct Program Reviews with NASA at least once per year to: report development and production status, ensure schedules support program objectives, review action items, review program schedules, and discuss any issues. The intent of the program review is to provide a forum for open dialog between NASA and the Contractor with respect to launch services. NASA will provide status of Agency direction at the reviews. The review location shall alternate between NASA and Contractor facilities unless mutually agreed upon to do otherwise.

2.2.1.2 Design Reviews – Mission Specific

The Contractor shall conduct and chair/co-chair design reviews, as described below, that apply to the system, subsystem, component, and software level for all mission specific items. Where there is not a direct match between a SOW specified mission specific design review(s) and the Contractor's standard review(s), the Contractor's review process will be acceptable provided it addresses equivalent content. All derived requirements from all system requirements must be identified and addressed in each of these reviews. NASA will approve the Mission Unique items in these reviews.

(A) Mission Specific Requirements Review (MSRR)

The Contractor shall conduct an MSRR prior to the Mission Specific Preliminary Design Review (MSPDR) with NNC to review the mission specific design requirements for the following items:

- (i) System requirements' identification and definition to a level adequate to verify launch vehicle performance capabilities.
- (ii) Design restrictions, limitations, and known violations.
- (iii) Physical and mechanical interfaces (e.g., payload to launch vehicle, payload envelope, and access provisions).
- (iv) Electrical interfaces (e.g., launch vehicle to payload, payload to umbilical, interfaces with electrical ground support equipment, pad electrical systems, ground batteries, telemetry, grounding, and power).
- (v) Functional interfaces (e.g., structures, structural loads, and vibration).
- (vi) Avionics systems and interfaces (e.g., payload avionics interfaces with launch vehicle, separation systems, telemetry interfaces, payload command and telemetry, and RF).

- (vii) Mass properties.
- (viii) Environmental requirements (e.g., thermal, contamination, vibration, pressure, Electromagnetic Compatibility (EMC), shock, launch complex RF, and lightning).
- (ix) Orbital requirements, launch vehicle performance, launch window injection, and deployment attitudes and rates.
- (x) Payload/Launch Vehicle separation requirements (e.g., separation conditions, launch vehicle post-separation maneuver requirements, and telemetry).

(B) Mission Specific Preliminary Design Review (MSPDR)

The Contractor shall conduct a preliminary detailed design review prior to major commitment to drawings and design. Mission unique trade studies shall be completed prior to the MSPDR. The Contractor shall discuss analyses performed and their results along with comparisons to any similar proven designs. The Contractor shall evaluate the safety of the design and its ability to meet safety requirements. The preliminary mission unique design shall be subject to NASA's approval. NASA reserves the right to withhold approval until all action items have been closed. As a minimum, the Contractor shall provide verification of the following items at the MSPDR:

- (i) All system requirements have been allocated to the subsystem and component level and the flow down is adequate to verify system performance.
- (ii) The design solutions being proposed are expected to meet the performance and functional requirements.
- (iii) The design does not pose major problems that may cause schedule delays.
- (iv) Overall system architecture has been established and all launch vehicle to payload interfaces have been identified and are verifiable.
- (v) The design solution can be produced based on existing processes and techniques; if not, risk areas, which require unique and unproved processes, are identified and risk mitigation plans are established.
- (vi) An acceptable operations concept has been developed.
- (vii) Preliminary launch vehicle interfaces have been defined.

- (viii) Preliminary plans are established for end-to-end testing methodologies.
- (ix) 30% mission unique drawings released.

(C) Mission Specific Critical Design Review (MSCDR)

The Contractor shall conduct an MSCDR prior to design freeze and before significant fabrication activity begins. The Contractor shall present a final detailed design using drawings, analyses, and evaluation testing that shows the design meets final performance and interface specifications, safety requirements, and mission objectives. The Contractor shall provide selection criteria for the evaluation tests performed to prove validity. The mission unique critical design shall be subject to NASA's approval. NASA reserves the right to withhold approval until all action items have been closed. As a minimum, the Contractor shall provide verification of the following items at the MSCDR:

- (i) All technical problems and design anomalies have been resolved without compromising system performance, reliability and safety.
- (ii) The detailed design will meet performance, functional requirements, and schedule.
- (iii) Software simulations and prototyping results do not present any potential mission risks.
- (iv) All key subsystem and/or component engineering analyses are complete.
- (v) Integrated safety analysis identifying any remaining hazards and proposed resolution.
- (vi) Launch vehicle/payload compatibility test plans have been defined.
- (vii) 90% mission unique drawings released.

(D) Mission Specific System Acceptance Review (MSSAR)

The NLS Contractor shall conduct an MSSAR after the design, fabrication, qualification testing and analysis is complete and shall incorporate any flight data available as part of the launch service. The Contractor shall address all mission specific items for the payload and mission requirements to verify qualification, compliance, and systems-level compatibility using completed analyses, test, inspection, and demonstrations results. The mission unique system acceptance shall be subject to NASA's approval. NASA reserves the right to withhold approval until all action items have been closed. As a

minimum, the Contractor shall provide verification of the following items at the MSSAR:

- (i) Results of the mission specific acceptance reviews of the major suppliers or major subsystems;
- (ii) *Design changes that occurred subsequent to MSCDR or changes as a result of new flight data;*
- (iii) Summary of applicable component tests (test setups, test cases, results and significant anomalies), analyses, margins, or similarity assessments. Included in the summary is component qualification rationale (similarity, test, analysis) for all affected components that are new, changed or subject to new environments or functional requirements;
- (iv) Qualification rationale for the system as a whole;
- (v) Methodology and results of current analyses;

2.2.1.3 Readiness Reviews

The Launch Vehicle Systems Readiness Review, Pre-Mate Readiness Review, Launch Management Coordination Meeting (LMCM), Flight Readiness Review (FRR) and Launch Readiness Review (LRR) described herein will be conducted for each NASA mission.

(A) Launch Vehicle Systems Readiness Review

The Contractor shall conduct a Launch Vehicle Systems Readiness Review to demonstrate that the launch site and launch vehicle are ready to proceed with launch vehicle processing activities at the launch site. The Contractor shall present as a minimum:

- (i) Mission description including S/C and launch vehicle configuration; integration status; summary of waivers; post launch data review of previous flights (NASA and non-NASA); mission specific analyses results and status; vehicle hardware assignments, assessments and status; and launch site status
- (ii) A detailed schedule showing all activities (ground and flight) remaining to achieve a successful, on-time launch

(B) Pre-Mate Readiness Review

The Contractor shall conduct a Pre-Mate Readiness Review to demonstrate the launch site and launch vehicle are ready for payload mechanical and

electrical integration. The Contractor shall conduct a launch vehicle/site walk-down [reference SOW Section 2.4.1.1(D)] with NNC participation prior to or in conjunction with the Pre-Mate Readiness Review. The Contractor shall present as a minimum:

- (i) Action item status, safety status, payload mating plan, closure plan, payload integration/launch site documentation, interface verifications, checkout and launch software status, nonconformance reports, launch site status, S/C readiness, and review of flight profile.
- (ii) A detailed schedule showing all activities remaining to achieve an on-time launch.

(C) Launch Management Coordination Meeting (LMCM)

The Contractor shall participate in an LMCM conducted by NASA before each launch dress rehearsal or launch. The LMCM is used to ensure the readiness of the launch team to execute the procedures necessary to conduct the launch dress rehearsal (reference SOW Section 2.4.1.3) or launch. At this meeting, participant roles and responsibilities during countdown shall be identified. The Contractor shall develop and present a decision matrix for its launch team which defines who has authority to issue a GO, NO GO, and HOLD during launch countdown. The Contractor shall describe its launch day management activities, identify key team members, and define responsibilities and communications between the launch vehicle, NASA, and payload teams.

(D) Flight Readiness Review (FRR)

NASA will conduct/chair, and the Contractor shall participate in an FRR for each mission to ensure the specific launch vehicle is acceptable for flight and all Range and other mission requirements have been met, or will be satisfied prior to launch. The FRR is held approximately three (3) days before launch. As a minimum, the Contractor shall provide verification that:

- (i) All critical items required to proceed into final launch countdown are ready
- (ii) Vehicle configuration is defined and all vehicle systems have been verified IAW launch site test plans
- (iii) All previously recorded action items have been closed or are reflected on the schedule
- (iv) All previously held Contractor's readiness review actions have been closed or resolved

- (v) Launch site/Range support organizations have committed to launch
- (vi) Tracking and data support resources are committed to launch
- (vii) Any open work is identified and closeout plans and schedules are in place and supportable
- (viii) Any constraints to launch are identified and resolution plans developed
- (ix) Mission risks are known and documented
- (x) Launch commit criteria for payload and launch vehicle is approved and released

The Contractor shall also discuss:

- (i) Anomalies from previous missions, including non-NASA missions
- (ii) Hardware/software failures in the field either on the NASA assigned launch vehicle or in the fleet
- (iii) Open corrective actions/problems reports
- (iv) Mission Unique and First flight items

(E) Launch Readiness Review (LRR)

NASA will conduct/chair, and the Contractor shall participate in an LRR one day prior to launch to verify all actions from the FRR are complete and final processing has been successfully completed. NASA will appoint the chairperson for this review. At the conclusion of this review, an "approval to proceed with launch countdown" is given. Representatives from the Contractor, Range, and NNC agencies sign the Certificate of Flight Readiness. The Contractor shall prepare the Certificate of Flight Readiness. A sample Certificate of Flight Readiness is provided in Exhibit 4.

2.2.2 Risk Management

The Contractor shall implement risk management techniques that address the identification, analysis, mitigation, and tracking of potential impacts to mission success. The Contractor shall develop the criteria, methods, and procedures used for identifying critical items in the Risk Management Plan (CDRL C3-6).

2.2.3 Configuration Management

The Contractor shall perform configuration management of the launch vehicle design and production for all launch vehicle components/subsystems, hardware, and software.

2.2.4 Manifest Policy

The Contractor shall develop and provide a Manifest Policy as described in CDRL C1-4 that addresses the Contractor's overall approach to ensuring timely launch of payloads. The Contractor shall provide a Program Master Schedule and Launch Vehicle Planning Manifest (SDRL S1-3) to support Government mission scheduling.

2.2.5 New Launch Vehicle Orientation

The Contractor shall conduct an orientation briefing at KSC. This briefing shall introduce Contractor personnel and establish project interfaces with NASA personnel and describe the Contractor's organization and infrastructure. The briefing shall contain information summarizing the design, performance, fabrication, integration, testing, qualification and operational features of the launch vehicle systems and supporting facilities required to provide the launch service in the form of diagrams, schematics, pictures, drawings, videos, etc.

2.3 Mission Integration Services

2.3.1 Mission Integration Management

The Contractor shall be responsible for managing the mission integration of the payload flight and ground systems with the launch vehicle and its associated GSE. In accordance with this responsibility, the Contractor shall perform, as a minimum, the following services:

- (A) Provide a single point of contact with overall mission responsibility for each mission. This single point of contact shall be responsible for coordinating support from all technical disciplines and management during the integration process.
- (B) Conduct mission integration meetings (kick-off, working group, technical interchange) approximately quarterly from Mission Integration Start (L-30M) to launch.
- (C) Provide a co-chairperson along with NASA for all working groups and technical interchange meetings. The Contractor co-chairperson shall be responsible for preparing and distributing agendas, minutes and action item logs for each meeting (SDRL S1-2). The Contractor shall maintain the action item database and ensure closure of all actions.

- (D) Provide appropriate technical/engineering representation at payload preliminary and critical design reviews.
- (E) Plan, schedule, and manage mission analyses required to define and verify compatibility of the payload with the interface requirements and environments (reference Table D1-A, SOW paragraph 2.3.2).
- (F) Track development status of and resolve issues associated with mission specific hardware and software.
- (G) Coordinate interface and support requirements for the mission.
- (H) Plan/coordinate mission specific flight operations.
- (I) Manage integration activities at the launch site.
- (J) Manage and coordinate the launch vehicle safety approval process.
- (K) Prepare, maintain and implement a payload to launch vehicle ICD for each mission. The ICD shall include all mission requirements including launch vehicle and launch site interface definition and environments (including GSE). The ICD shall include the payload to launch vehicle/launch site electrical and mechanical interface drawings (CDRL C2-1.1). Thirty (30) days prior to launch, the approved ICD shall be incorporated into the contract via contract modification as Exhibit 8 to Attachment D1. Any approved changes after its inclusion into the contract will be incorporated prior to mission success determination.
- (L) Create and maintain an ICD Verification Matrix (CDRL C2-1.2) which shall include a verification plan for each requirement in the ICD based on the appropriate method. The Contractor shall perform verification of each ICD requirement based upon the verification plan identified in the Verification Matrix.
- (M) Manage the design, development, qualification, testing and integration of mission unique requirements.
- (N) Evaluate the capability of the launch vehicle and define any performance and payload volume the Contractor may make available to NASA for secondary payloads.
- (O) Provide mission's status to NNC throughout the launch campaign from Authority to Proceed (ATP) through mission success determination.
- (P) Provide appropriate representation and participation at NASA conducted Ground Operations Working Groups (GOWG's) approximately 2 times a

year from L-27 months to spacecraft arrival at the launch site and at the NASA Ground Operations Review (GOR).

2.3.2 Mission Analyses

All vehicles provided under this contract shall include the following analysis for each mission as part of the standard launch service. The Contractor shall prepare and submit the standard mission analyses as listed in Table D1-A.

CDRL	ANALYSIS
C4-1	Performance and Guidance Accuracy Analysis
C4-2	Final Mission Analysis (FMA)
C4-3	Payload/Expendable Stage Separation Analysis
C4-4	Payload Fairing Venting Analysis
C4-5	Payload Fairing Clearance Analysis
C4-6	Pre-Flight Controls and Stability Analysis
C4-7	Coupled Dynamic Loads Analysis
C4-8	Integrated Thermal Analysis
C4-9	RF Link Analysis
C4-10	Payload/Launch Vehicle EMC, RF, and EED Compatibility Analysis
C4-11	Mission Unique Software
C4-12	Quick Look Flight Report
C4-13	Final Flight Report

Table D1-A: Mission Analyses to Support Payload Integration

The standard launch service shall include all analyses required to evaluate compliance with NPR 8715.6A, NASA Procedural Requirements for Limiting Orbital Debris. The number of submittals for the Standard Mission Analyses are identified in Table D2-A.

2.3.3 Mission Success Determination

Mission success will be based on the criteria set forth in Section C, paragraph 24.1, Mission Success Criteria. Mission success determination requirements are detailed in Section C, paragraph 24.2, Mission Success Determination. The Contractor shall prepare and submit a Quick Look Flight Report (CDRL C4-12) and a Final Flight Report (CDRL C4-13). Within thirty (30) days of receipt of the Final Flight Report, the Contracting Officer will either determine the launch a Mission Success or inform the Contractor of the Government's intent to withhold determination for payload evaluation.

2.4 Launch Site Support

2.4.1 Pre-Launch Checkout and Launch Support

2.4.1.1 Launch Vehicle Preparation and Launch

For launch services provided under this contract, the Contractor shall, as a minimum;

- (A) Perform all launch vehicle preparations and launch site operations necessary to safely and successfully deliver the payload to the desired orbit.
- (B) Generate the required documents (CDRL C3-7) and obtain all required safety approvals for the launch vehicle system and integrated payload/launch vehicle system operations including payload/launch vehicle system integration and launch operations.
- (C) Provide NASA access to all meetings including, but not limited to, scheduling meetings, test briefings, and technical meetings. Upon request, the Contractor shall provide copies of schedules, test briefings, and other material presented at technical meetings.
- (D) Conduct launch vehicle/launch site walk-downs with NNC participation.
- (E) Comply with the submittal and operational requirements for all NASA provided facilities occupied during launch vehicle processing (CDRL C1-5). Failure to comply may result in denied access to the NASA provided facility.

2.4.1.2 Telemetry Data and Launch Countdown Support

2.4.1.2.1 Vehicle Telemetry

Telemetry data shall be archived in an industry standard format compatible with NASA's LSP Data Center. All recordings shall include direct receiver video-out data when available, as well as reshaped data waveforms when applicable for each designated telemetry link. Archived data should include receiver signal strengths, tracking antenna azimuth/elevation and IRIG-B Timing. All media shall be clearly documented and labeled with the mission, date, record length and any and all channel assignments and associated digital sample rates or clock rates per channel recorded.

2.4.1.2.2 Baseline and Integrated Vehicle Support

The Contractor shall provide, in electronic form, all raw launch vehicle and GSE telemetry (RF and hardwire) formats described in sufficient detail to allow NASA to process and verify the data prior to initial launch vehicle power-up at the

launch site. This shall include a detailed listing and description of all measurements and calibration coefficients for all launch vehicle and GSE telemetry (TM) links including the guidance system and any embedded data streams. The Contractor shall provide to the NASA LSP Data Center, via electronic format, any changes to the launch vehicle and/or GSE telemetry format as the change is implemented to the launch vehicle and/or GSE telemetry streams (CDRL C6-1).

The Contractor shall provide NASA with a compatible data recording (CDRL C6-2) representative of the telemetry (RF and hardwire) signals of the launch vehicle and GSE prior to the initial launch vehicle power-up test on each mission. This will allow NASA to verify its ability to process the Contractor's telemetry (SDRL S6-1).

The Contractor shall submit an initial end-to-end launch vehicle telemetry path test plan (SDRL S6-2) NLT 6 months prior to launch. This plan shall describe the telemetry links from the launch vehicle through down range and deployable telemetry assets specific to that mission. The plan shall identify and/or suggest orbiting or ground locations and/or mobile assets to meet LSP telemetry coverage requirements. The Contractor shall submit a final end-to-end launch vehicle telemetry path test plan NLT sixty (60) calendar days prior to launch. The final plan shall verify the adequacy of telemetry link margins with down range assets, and shall include link margin analysis and shall present data flow diagrams between the NASA designated NASA LSP Data Center and downrange assets.

The Contractor shall record all launch vehicle and GSE telemetry streams while the vehicle is powered prior to launch. The Contractor shall provide real-time launch vehicle and GSE telemetry (RF and hardwire) data to the NASA designated LSP Data Center for system level launch vehicle testing (system-level testing to include anytime the vehicle or stage is powered and exercised, with data transmitted from the flight telemetry system for the purpose of evaluating system health and function). Examples include, but are not limited to, telemetry test data during initial vehicle power-up, flight simulation prior to payload mate, and flight simulation following payload mate (SDRL S6-3).

The Contractor shall provide compatible data of all recorded launch vehicle and GSE telemetry (CDRL C6-2).

The Contractor shall provide a mutually agreed upon transport interface or extend the Spacecraft command and telemetry streams between the launch complex and the NASA designated NASA LSP Data Center.

The Contractor shall provide voice and video communications from the launch complex to the designated NASA LSP Data Center during integrated and stand-alone spacecraft operations at the launch complex.

The Contractor shall implement the NASA provided console communications configuration for those consoles occupied by the NASA team within the Contractor's launch control center. The Contractor shall validate this configuration with the designated NASA LSP Data Center prior to launch vehicle testing and mission simulations.

The Contractor shall provide real-time launch vehicle and GSE telemetry (RF and hardwire) data to the NASA designated NASA LSP Data Center. Examples include, but are not limited to telemetry test data during initial vehicle power-up, flight simulation prior to payload mate, and flight simulation following payload mate (SDRL S6-3).

The Contractor shall provide to NASA, upon request, launch vehicle processing test procedures in a mutually agreed upon electronic format prior to the test (SDRL S5-1).

The Contractor shall submit to NASA a draft version of a preliminary Statement of Work for each downrange asset no later than four (4) months prior to launch. The Contractor shall coordinate the downrange assets and shall provide NASA the latest documentation required by the downrange assets (e.g. PRD, Expedite OR, etc) for receiving, recording, and relaying the data no later than sixty (60) days prior to launch. The Contractor shall ensure proper operation of all launch vehicle telemetry links (RF and hardwire), voice communication channels, and video (including launch vehicle mounted camera video as applicable) to the NASA designated NASA LSP Data Center prior to baseline launch vehicle processing. The Contractor shall provide the downrange assets with the technical coordination needed to execute the telemetry coverage (e.g. telemetry playback tapes, mission trajectory disks, etc) prior to the first data flow test. The Contractor shall ship required electronic hardware and satisfy export control and frequency authorizations as required by local and international governments.

The Contractor shall provide data flow path diagrams and data flow schedules between the NASA designated NASA LSP Data Center and down range assets to NASA NLT fifteen (15) calendar days prior to launch and again at the Flight Readiness Review (SDRL S6-4). The Contractor shall also provide down range asset status/readiness at the Flight Readiness Review.

2.4.1.2.3 Launch Countdown and Flight Support

The Contractor shall provide launch countdown procedures, Mission Constraints Documents (CDRL C1-2) and a Mission Console Notebook (CDRL C1-3) for the launch dress rehearsal and launch in hard copy and a mutually agreed upon electronic format.

The Contractor shall provide ^{B4} NASA personnel access to consoles, with vehicle monitoring capabilities, co-located within the Contractor's launch control center. The Contractor shall provide access to real-time telemetry (RF and hardwire), voice communication channels with talk/listen capabilities, video and telephones for the co-located NASA personnel. The Contractor shall implement the NASA provided console communications configuration for those consoles occupied by the NASA team within the Contractor's launch control center. The Contractor shall support validation of this configuration with the designated NASA LSP Data Center prior to launch dress rehearsal and launch.

The Contractor shall deliver real-time launch vehicle and GSE telemetry (RF and hardwire), voice communication channels and video to the designated NASA LSP Data Center from the start of launch countdown through Range Loss of Signal (LOS) when in range of an existing ground receiving station, or as supplemented as described in SOW paragraph 2.4.3, Range Support and Services. If the launch vehicle telemetry, voice communication channels or video is uniquely encoded, the Contractor shall provide the decoded launch vehicle telemetry, voice communication channels, and video to the NASA LSP Data Center.

The Contractor shall receive and record the raw launch vehicle telemetry data for all phases of powered flight, from two ^{B4} ^{B4} IAW NASA Policy LSP-PD-120.05. The Contractor shall receive and record launch vehicle ^{B4} ^{B4} after payload separation IAW NASA Policy LSP-PD-120.05.

The Contractor shall provide real-time transmission back to the NASA designated NASA LSP Data Center of all mandatory receive and record launch vehicle telemetry coverage times IAW NASA Policy LSP-PD-120.05. The Contractor shall provide the raw telemetry data recorded post launch (SDRL S6-3).

During the Launch Countdown, the Contractor shall poll NASA at key milestone events for GO/NO-GO status. The final poll shall include the NASA Launch Manager's GO/NO-GO status for launch. The Contractor shall provide NASA access to anomalies and concurrence with anomaly resolution prior to proceeding with Launch Countdown. The Contractor shall poll NASA for any recycle of the Launch Countdown.

On day of launch, the Contractor shall maintain voice contact with the downrange assets and provide status/readiness to the launch team as requested.

The Contractor shall be responsible for coordinating and ensuring all tracking and data recovery support meets mission requirements (CDRL C2-3).

The Contractor shall arrange for the shipping of the recorded telemetry media(s) from the downrange assets to the NASA designated NASA LSP Data Center no later than five (5) calendar days following launch.

2.4.1.3 Launch Dress Rehearsal

The Contractor shall conduct a minimum of one Dress Rehearsal prior to launch. The rehearsal shall exercise the launch countdown procedure, and will have the participation of the NNC and launch vehicle Contractor launch teams. The rehearsal may use an abbreviated countdown script with simulated payload/vehicle conditions, including anomalies.

2.4.2 Launch Site Payload Support

2.4.2.1 Payload Processing Facility

For launches conducted from CCAFS, VAFB, and WFF, NASA will provide the Payload Processing Facility (PPF) unless processing services are purchased as a non-standard service. In the event the Contractor proposes and NASA approves an alternate launch site, the Contractor shall be responsible for providing a PPF, subject to NASA approval, meeting the payload requirements.

2.4.2.2 Launch Site Payload Integration Support

The Contractor shall provide all services, equipment, and support required for the integration and launch of each payload. Services shall include, as a minimum, the following:

- (A) Encapsulation of the payload complement at the PPF, for either flight or transport to the launch complex, transport, mate with the launch vehicle and performance of integrated checkout activities.
- (B) Verification of the end-to-end functionality of the umbilical lines provided for payload use.
- (C) Support for the installation and checkout of the payload GSE (provided by the payload customer) at the launch site, and payload communication accommodations from the pad to the PPF. The Contractor shall also provide for a NASA console at the Contractor's launch control center.
- (D) Provision of the mountings for, and the installation of, the payload GSE (provided by the payload customer) at the launch complex and/or remote sites.

- (E) Provision for contingency off-loading of payload propellants in accordance with the appropriate Range Safety requirements and appropriate payload procedures.
- (F) *Provision for launch site services to meet payload requirements such as: power, air conditioning, GN₂/GHe purges, and contamination control.*
- (G) Support of all activities required to de-mate and to return the payload to the processing facility if necessary.
- (H) Preparation of the procedures for integrated launch vehicle/payload operations for NASA approval and incorporation of the payload procedures as appropriate (CDRL C5-5).
- (I) Coordination of payload and launch vehicle operations into an integrated operational flow, preparation of the schedules, and provision of the schedules with updates as needed to NNC.
- (J) Provision of contamination control for payloads while they are in the possession of the Contractor, or in a Contractor-provided PPF IAW the SOW, paragraph 2.4.2.3.
- (K) Provision of a payload protective cover for use after payload mate to the launch vehicle, if the fairing is installed at the launch pad. The cover shall be purged with conditioned air meeting the minimum requirements stated in the SOW, paragraph 2.4.2.3(C). Provisions shall be made for payload personnel ingress and egress.
- (L) Certification of payload contamination control requirements for: fairing surface cleanliness, cleanroom environments, and purge system cleanliness.
- (M) *Support for the installation of customer provided RF re-radiating equipment.*
- (N) Provision for the planning and execution of activities associated with the integrated testing of the customer's payload with the launch vehicle on the launch pad.

2.4.2.3 Contamination and Environmental Control

The Contractor shall provide and implement a generic payload contamination control plan and, if required, provide and implement a contamination control implementation plan for each payload. Using IEST-STD-CC1246D, MIL-PRF-27401, ISO 14644-1, ISO 14644-2, and NASA RP-1124 (Rev-4) as guidelines, the launch service shall meet the following minimum requirements:

- (A) Payload/Vehicle Integration Environment. For all Contractor provided facilities where the payload resides and is exposed (including payload processing facilities, integration facilities, or facilities at the launch pad), a Class 8 clean room environment IAW ISO 14644-1 shall be provided. In addition, the temperature and humidity environment shall have the ability to be controlled and maintained within a range of 34 and 34 respectively. This environment shall be maintained at all times unless the payload is encapsulated within a transportation container or payload fairing and purge air has been established IAW 2.4.2.3(B) or (C), herein. If the Contractor provides a payload protective cover as identified in paragraph 2.4.2.2(K) of the SOW, and purge air has been established, the facility environment may be exceeded. Prior to removal of the payload protective cover, the facility shall be returned to a Class 8 IAW ISO 14644-1 clean room environment. The Contractor shall provide contamination and environmental monitoring when the payload is exposed.
- (B) Transportation Environment. The following shall apply to all payload transportation containers (including the payload fairing, if used for transportation) provided by the Contractor. Following payload encapsulation, the transportation container shall be purged with conditioned filtered air and the payload environment shall be maintained within a temperature and humidity range of 34 respectively. The Contractor shall identify periods or configurations where the temperature and humidity requirements cannot be met. Conditioned air filtration shall be capable of removing 99.97% of all particles greater than 0.3 microns and removing 95% of all hydrocarbons with a molecular weight greater than 70.
- (C) Fairing Environment. Following fairing installation and payload mate to the launch vehicle, the PLF environment shall be purged with conditioned filtered air and shall maintain a temperature set point range, selectable by the payload, of 34, through T-0. Relative humidity shall be maintained within 30% to 50%, controllable to 5%. The Contractor shall identify periods or configurations where the temperature and humidity requirements cannot be met. Conditioned air filtration shall be capable of removing 99.97% of all particles greater than 0.3 microns and removing 95% of all hydrocarbons with a molecular weight greater than 70. After the fairing has been closed out for flight, Grade B, Type 1, GN₂ (or better) IAW MIL-PRF-27401F, may be used for purging the fairing environment. Fairing GN₂ purging or conditioning air shall not impinge directly on the payload at any point.
- (D) Fairing Internal and Payload Adapter Surface Cleaning. The internal surfaces of the payload fairing compartment (including Payload Adapter) shall be cleaned, certified, and maintained to IEST-STD-CC1246D Level 750A or better, with the number and locations of samples to be determined by the integration team. Cleaning and certification shall be accomplished in a

clean room rated at or above Class 8 IAW ISO14644-1. In lieu of IEST-STD-CC1246D Level 750A, the payload fairing compartment (including Payload Adapter) may be cleaned and certified such that contribution from launch vehicle sources measured from S/C turnover (Launch Vehicle Contractor control of S/C for integrated operations) through CCAM shall not exceed 1% total obscuration and 150 Angstroms molecular contamination. The sampling methodology for particulate shall be per ASTM E1216 and for molecular per ASTM E1235. The number and locations of samples to be determined by the integration team.

(E) Reserved

(F) Clean Room Garments. 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.

(G) Materials. All materials used in areas in close proximity to the payload shall be selected based on NASA RP-1124 (Rev-4). Materials shall have a Total Mass Loss (TML) of less than 1.0% and Collected Volatile Condensable Materials (CVCM) of less than 0.10%, or be expressly identified and submitted to NASA for approval.

2.4.2.4 Operational Support Services

The Contractor shall provide 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 payload hazards and have adequate knowledge to carry out their tasks unescorted in a safe manner. The Contractor shall provide access for payload personnel to the payload/launch vehicle or storage facilities to accommodate payload customer requirements. The Contractor shall provide security to meet the requirements for payload or personnel protection. The Contractor shall provide to NASA, upon request, launch service user's guide and facility information (SDRL S1-1).

2.4.3 Range Support and Services

Launch vehicles provided under this contract shall include all hardware, software, analysis and support necessary to meet the applicable Range Safety Requirements (e.g., EWR-127-1, AFSPCMAN 91-710, or RSM-2002).

As part of the launch service, 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. If required, NASA will provide down

range telemetry aircraft, Tracking and Data Relay Satellite System (TDRSS) and/or NASA owned ground station support for tracking and data recovery. The Contractor shall be responsible for coordinating and ensuring all tracking and data recovery support meets mission requirements (CDRL C2-3).

The Contractor shall make arrangements for Range provided services necessary to support the launch service. As a minimum, the following services are to be provided: fluids, gases, propellants, ordnance storage, facility usage, equipment support, shop and laboratory services, meteorology, base security, fire protection and environmental health.

The mission specific Program Requirements Document/Operational Requirements (PRD/OR)(CDRL C2-2), or equivalent mission specific Range support documentation, shall be submitted to obtain Range support. The Contractor, with support from NASA, shall complete all forms pertinent to the mission and submit them to the appropriate Range for formal acceptance.

2.5 Safety, Reliability, and Quality Assurance

During the period of performance 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 and launch of the LVS.

2.5.1 Safety and Health Program

The Contractor shall provide a Safety and Health Plan that will implement safety and health requirements consistent with federal, state, and local government regulations and applicable launch processing site Safety and Health requirements. This Plan shall describe the Safety organization including structure of management interfaces and also system safety methods employed to ensure compliance with applicable launch processing site safety requirements.

The Contractor shall implement a system safety program to identify hazards of systems/subsystems and impose applicable design requirements and management controls to prevent mishaps. The Contractor shall develop system safety documentation, plans, procedures, technical analyses, etc., IAW safety requirements of the applicable launch processing site. Launch processing site safety required documentation shall be made available to NASA (SDRL S3-4) upon request. The Contractor shall participate in all safety working groups (i.e. payload safety working group (PSWG), etc.) as the launch vehicle safety representative for each NASA mission under this contract.

When the contractor is performing work in any NASA owned facility (e.g., buildings 836 and SLC-2W at VAFB and PHSF at KSC), all NASA requirements and safety documentation as contained in the SOW, paragraph 1.3, Compliance

Documents, shall be adhered to. The Contractor shall submit system safety documentation (baseline and any changes) to NASA for review/approval IAW CDRL C3-7 for processing at all NASA provided facilities. NASA will review the safety documentation to ensure designs, processing and operations do not pose an unacceptable safety risk to NASA personnel/contractors, resources or risk to Mission Success.

The Contractor shall report Close Calls/Mishaps to NASA IAW CDRL C3-2. The Contractor shall make provisions for NASA safety representative insight into integrated Payload/launch vehicle processing.

2.5.2 Reliability Program

The Contractor shall implement and maintain a Reliability Program with an overall vehicle design reliability of no less than 95% at an 80% confidence factor. The Contractor's program shall facilitate evaluation of the Contractor and subcontractor's programs to determine if the product meets the overall design reliability requirements. Overall vehicle reliability predictions shall be incrementally revised to reflect design modifications.

2.5.3 Quality Assurance Program

The Contractor shall maintain a quality management system that is ISO 9001/2000 third party certified (ISO 9001/2008 third party certification is required after November 2010). The Registrar shall be accredited by either the International Registrar of Certified Auditors (IRCA) or the Registrar Accreditation Board (RAB). In the event the Contractor certification is revoked, NASA shall be notified within five (5) business days (CDRL C3-3).

The Contractor shall maintain a Software Assurance Program using ISO 90003 as a guideline.

The Contractor shall accommodate NASA participation in Contractor and subcontractor audits and ISO audits. NASA insight will consist of monitoring audits with the Contractor's auditors and inspectors in order to provide understanding of the Contractor's quality system and insight of their processes.

The Contractor shall support NASA performance of ISO 2nd party audits, as required. The audits will be performed IAW ISO 19011 requirements.

The Contractor shall provide a current Audit Plan and schedule for in-house and subcontractor audits upon request from NASA (CDRL C3-4). The Contractor shall provide a copy of both the Contractor performed internal Quality Audit Report and the subcontractor/vendor Quality Audit Reports (CDRL C3-5).

The Contractor shall provide for NASA attendance at any flight hardware reviews the Contractor performs at Contractor or subcontractor facilities. The Contractor shall make available to NASA any build paper, test results, nonconformance reports, discrepancy history, statistical process control, and failure analyses that are relevant to the reviews.

The Contractor shall provide read-only quality information to NASA (via remote terminal) from such Quality Assurance on-line database systems as exist and to which the Contractor has regular and timely input. An example is an on-line Problem/Failure Reporting (P/FR) system.

The contractor shall provide NASA all anomaly resolutions that affect the integrated payload/launch vehicle assembly, including both hardware and software. NASA will approve all integrated payload/launch vehicle anomaly resolutions. The contractor shall provide insight to Material Review Board (MRB) and failure reporting for all launch vehicle nonconformances.

The Contractor shall participate in the Government/Industry Data Exchange Program (GIDEP) and provide Alert System Documentation (CDRL C3-1).

2.6 NASA Insight and Approval

The Contractor shall comply with the Government's implementation of NPD 8610.23 and NPD 8610.24 as defined under Section C, Clause 25.0 and the SOW paragraph 2.2.1, Formal Reviews. As part of the standard launch service, the Contractor shall provide the data, documentation, drawings, analytical models, and support services as necessary to accommodate the requirements specified under contract Section C, Clause 25.0, Government Insight and Approval.

The Contractor shall notify NASA of qualification or test anomalies involving similar launch vehicles, systems, subassemblies and components. The Contractor shall make available to NASA all problem reports or discrepancy reports on launch vehicle systems' failures and anomalies. This shall include insight into fleet-wide problems, anomalies, MRB actions, deviations or waivers to systems, subsystems, materials, processes, and test equipment including those used on non-NASA missions.

In the event of an anomaly or launch failure, the Contractor shall support NASA's Failure Review Board, if activated, or shall allow NASA to fully participate 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 and copy machines from

one to three residents and up to four visitors at each location. A minimum of two voice and two data telephone lines shall be provided. Electronic data transfer compatibility between the resident office and off-site NASA institutions is required. A resident office will not be required at CCAFS or VAFB, but NASA will require operational support accommodations (i.e. office space, power, telephone, communication end instruments for monitoring vehicle testing, etc.) at the launch complex during NASA launch operations.

3.0 NON-STANDARD SERVICES

The Contractor shall provide the non-standard services identified in Exhibit 3 as directed by the Contracting Officer. Implementation of all non-standard services shall be fully compliant with this SOW.

4.0 MISSION UNIQUE REQUIREMENTS

The Contractor shall provide the mission unique services identified in Exhibit 9 as directed by the Contracting Officer. Implementation of all mission unique services shall be fully compliant with this SOW.

4.1 Mission Unique Hardware

The Contractor shall design, manufacture, test, and qualify for flight the mission unique hardware that is required to support the payload and mission. The Contractor shall prepare and submit drawings (CDRL C5-4), test plans (CDRL C5-2), and test reports (CDRL C5-3) to support NASA insight and approval of mission unique hardware.

For vehicle changes initiated by the Contractor that are not fleet-wide changes, the Contractor shall prepare and submit a vehicle data package (CDRL C5-1).

The Contractor shall use MIL-STD-1540 B or C as a guideline when developing environmental qualification and acceptance criteria and related test and analysis. Factors of safety for mission unique hardware shall meet the requirements of Table D1-B.

Application	Test		Analysis (No Test)	
	Yield	Ultimate	Yield	Ultimate
Non-Man Rated	1.10	1.25	1.60	2.0

Table D1-B: Mission Unique Hardware Factors of Safety

4.2 Mission Unique Software

The Contractor shall provide source code and mission constants' listings (CDRL C4-11) with appropriate requirement specifications to support NASA approval of

mission unique software. The Contractor shall prepare and submit a pre-flight control system and stability analysis report (CDRL C4-6) for the vehicle and mission unique software used for each mission.

4.3 Unanticipated Mission Unique Services

At the time of contract award, the Government may not have identified all mission unique services required for each mission. As unanticipated mission unique services are identified, the Contracting Officer will authorize the Contractor, in accordance with FAR 52.243-1, Changes – Fixed Price Alt I, to perform these services. In performing unanticipated mission unique services, the Contractor shall design the necessary ground and flight hardware/software; conduct appropriate design reviews; and manufacture, test and qualify for flight launch vehicle mission unique hardware/software, i.e., other than that provided as a standard service (Exhibit 2) or described in the non-standard services list (Exhibit 3).

5.0 SPECIAL TASK ASSIGNMENTS

The Contractor shall be required to perform special studies and analyses, provide materials, or fabricate hardware in support of this contract. Each task will be initiated by written direction from the NASA Contracting Officer. These tasks generally 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.

6.0 INFORMATION TECHNOLOGY SECURITY

The contractor shall comply with NPR 2810.1A, NASA's Policy on the Security of Information Technology for LSC IT hardware and/or software provided to NASA. New IT hardware and/or software systems delivered to NASA shall be compliant prior to authorization to process. The contractor shall develop, update and implement an IT Security Plan compliant with NPR 2810.1A. NASA IT Security personnel will evaluate the LSC IT hardware and/or software security and determine compliance prior to NASA acceptance.

7.0 GUIDELINE DOCUMENTS

The following documents are to be used as guidelines to the extent specified in this SOW. If a revision number or date is not specified, the latest revision of the documents shall be used as guidelines to the extent specified in the SOW.

Document No	Rev.	Document Title
ISO 14644-1	Basic	Clean rooms and associated controlled environments – Part 1: classification of air cleanliness
ISO 14644-2	2000	Clean rooms and associated controlled environments – Part 2: specifications for testing and monitoring to prove continued compliance with ISO 14644-1-First Edition
IRIG-106-07	2007	Telemetry Standards
ISO 90003	2004	Software Engineering - Guidelines for the Application of ISO 9001:2000 to Computer Software
ISO 19011	2002	Guidelines for Quality And/Or Environmental Management Systems Auditing
MIL-STD-1553 ¹	B	Digital Time Division Command/Response Multiplex Data Bus
MIL-STD-1540	B or C	Test Requirements for Launch, Upper-Stage, and Space Vehicles
MIL-STD-176	A, Notice 1	Weight and Balance Data Reporting Forms for Guided Missiles and Space Launch Vehicles
MIL-STD-1773	Notice 1	Fiber Optics Mechanization of an Aircraft Internal Time Division Command/Response Multiplex Data Bus
IEST-STD-CC1246	D 2002	Product Cleanliness Levels and Contamination Control Program
MIL-PRF-27401	F 2008	Propellant Pressurizing Agent, Nitrogen
ASTM E1216	2006	Standard Practice for Sampling for Particulate Contamination by Tapelift
ASTM E1235	2008	Standard Test Method for Gravimetric Determination of Nonvolatile Residue (NVR) in Environmentally Controlled Areas for Spacecraft

NASA RP-1124	4 1997	Outgassing Data for Selecting Spacecraft Materials
NPR 2810.A	2006	Security of Information Technology
NASA-STD-8729.1		Planning, Developing and Managing an Effective Reliability and Maintainability (R&M) Program
NPD 8610.23		Launch Vehicle Technical Oversight Policy
NPD 8610.24		Launch Services Program (LSP) Pre-Launch Readiness Reviews
NPD 8610.7		Launch Services Risk Mitigation Policy for NASA-Owned and/or NASA-Sponsored Payloads/Missions
LSP-PLN-324.01		Expendable Launch Vehicle Certification
NPR 8621.1		NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping
LSP-PLN-353.01		Launch Services Program Risk Management Plan
NPD 1280.1		NASA Management System Policy
NPR 7120.5		NASA Space Flight Program and Project Management Requirements
NPR 8715.3		NASA General Safety Program Requirements

¹ MIL-STD-1773 may be substituted

8.0 RESERVED

SECTION D

ATTACHMENT D1

STATEMENT OF WORK

FALCON 9 Block 1 and Block 2

ATTACHMENT D1

STATEMENT OF WORK

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STATEMENT OF WORK

1.0 INTRODUCTION

1.1 Scope

This Statement of Work (SOW) and all Exhibits and documents attached or referenced herein define the Government's requirements for the Contractor to provide launch services in support of NASA's Launch Services Program (LSP). Unless expressly stated otherwise, Exhibits are supplemental to the SOW, and do not replace requirements in the SOW. The scope of this contract effort includes risk category 2 and 3 launch services capable of delivering, at a minimum, a 250 kg payload to orbit at an altitude of 200 km and a launch inclination of 28.5°. This SOW pertains to SpaceX launch services utilizing both the Falcon 9 Block 1 and Falcon 9 Block 2 launch vehicles.

This SOW defines the overall launch service requirements for 'NASA or NASA-sponsored payloads' (hereinafter referred to as 'payloads'). The Contractor shall perform all tasks necessary to safely and reliably launch payloads in accordance with NASA-defined mission objectives. The Contractor shall support advance planning and perform analysis tasks as directed by the Contracting Officer.

It is the general contemplation of the parties to this contract that the Contractor shall have a broad mission in performing launch service related functions for the Government and designees. Therefore, the general scope of the contract covers any launch service and launch service related activities arising from the SOW in support of earth and space science exploration, and space station re-supply.

1.2 Objectives

The goal of the NASA Launch Services (NLS) contract is to provide the Agency with domestic launch services that are safe, successful, reliable, and affordable. The launch services will be provided at a fixed price. The contract will, to the maximum extent practical, incorporate best commercial practices.

The objectives of this contract are to:

- Ensure the safety of the public, as well as all personnel, hardware, and property associated with the launch services.
- Provide affordable, accurate, and on-time delivery of NASA and/or NASA-sponsored payloads to space on expendable launch vehicles.

- Provide a mechanism to incorporate new launch services, technology upgrades, improved systems engineering processes, and advances in *manufacturing techniques*.
- Provide risk mitigation while utilizing commercial practices.
- Provide flexible manifesting policy that recognizes the national priorities of NASA missions.
- Provide a capability to optimize cost, schedule, and performance to satisfy mission objectives.
- Provide for clear Government visibility into program schedule, technical performance, and risk.
- Foster competition and create opportunities for new, emerging launch service providers.
- Promote partnering among customers, launch service providers, and the LSP to maximize flexibility and responsiveness to customers' needs.

1.3 Compliance Documents

The Contractor shall comply with the requirements contained in the following documents.

Document No.	Revision	Document Title
Applicable Range Safety Requirements		(e.g., EWR-127-1, AFSPCMAN 91-710, RSM-2002)
ISO 9001/2000 ¹	2000	International Organization of Standardization
AS9100	2009	Aerospace Quality Management System
KNPR 8715.3 ²		KSC Safety Practices Procedural Requirements
LSP-PD-120.05	BASIC	Launch Telemetry Requirements
NPR 8715.6 ³	A	NASA Procedural Requirements for Limiting Orbital Debris
NASA-STD-8719.9 ²		NASA Safety Standard for Lifting Devices and Equipment

¹ ISO 9001/2008 is required after November 2010

² The Contractor shall comply with the latest revisions of these documents. These documents apply to NASA property, personnel, software, and processes performed in NASA-owned facilities.

³ The Contractor shall support NASA's compliance with this document.

1.4 Reserved

2.0 STANDARD LAUNCH SERVICE

The Contractor shall perform all launch service tasks necessary to deliver payloads to defined orbital parameters in compliance with mission requirements. The launch service shall support missions to all orbital parameters, consistent with vehicle configuration capabilities and launch Range restrictions. The Contractor shall provide launch services, which are in compliance with all Range and responsible authority requirements. The Contractor shall make all arrangements with the responsible authorities for the required launch Range authorization and support for vehicle processing; integrated payload/vehicle processing, launch; and launch site maintenance and modifications. NASA

reserves the right to approve the choice of launch site [e.g. Cape Canaveral Air Force Station (CCAFS), Vandenberg Air Force Base (VAFB)].

The Contractor shall furnish all services, maintain all equipment and *infrastructure including, but not limited to: program management, mission integration, launch site support, ground and flight system safety, and performance assurance, necessary to accomplish the safe and successful launch of payloads to the required orbit conditions within required launch periods.* The Contractor shall provide facilities and services at Contractor facilities for NASA personnel performing insight and approval functions during the performance of the contract. The Contractor shall provide access to launch vehicle documentation in support of NASA insight and approval functions.

The Contractor shall provide all necessary services, test hardware and software, and mission specific elements required to integrate the payload(s) to the launch vehicle systems. The Contractor shall meet all launch service performance requirements described in Exhibit 1, Capabilities, Specifications and Environments. All capabilities and conditions stated in Exhibit 1 must be consistent and compatible with all other capabilities and conditions stated in Exhibit 1 and in response to the requirements of the SOW. Any exceptions to the stated capabilities or conditions must be specifically noted.

The Contractor shall coordinate with NASA Public Affairs Office all press releases concerning launches under this contract. During vehicle build-up, payload integration, and launch countdown, the Contractor shall allow NASA Public Affairs access to facilities to photograph and videotape activities, including hazardous operations. The Contractor shall assist NASA Public Affairs in developing the launch commentary for NASA Television by furnishing launch *countdown and operations background material.* The Contractor may also be asked to provide information to support the development of the press kit document and the NASA pre-launch and post-launch news conferences. The Contractor shall coordinate with NASA Public Affairs Protocol and Guest Services a minimum of sixty (60) days in advance of each launch to determine any special requirements.

The Contractor shall provide standard launch services as delineated in Exhibit 2, Standard Launch Services List which shall comply with the requirements of the SOW. All hardware, software, analyses, and support required to provide each item listed in Exhibit 2, shall be included in the standard launch service.

All Contract Data Requirements List (CDRL) and Supplemental Data Requirements List (SDRL) items, identified in Attachment D2 and D3 respectively, shall be included in the standard launch service.

2.1 Launch Vehicle

The standard launch service shall include, as a minimum, the following:

(A) Launch timing capabilities with

- (i) Reserved
- (ii) Multiple approximately twenty-four (24) hour re-launch attempts in the event of a launch scrub
- (iii) Instantaneous launch window
- (iv) Inertial targeting over a B4 launch window utilizing multiple discrete or continuous targeting

B4

(B) A launch vehicle and Payload Adapter (PA) with appropriate electrical and mechanical interfaces (as described in Exhibit 1) required for payload integration and testing.

(C) A payload separation system with the following characteristics:

- (i) The payload shall be protected from debris generated by the separation system.
- (ii) The separation system shall function in a manner that prevents any re-contact with the payload, including Contractor-provided attach hardware on the payload, by the upper stage or any element of the separation system once separation has been initiated.
- (iii) Redundant payload separation indications.

(D) A Payload Fairing (PLF) with the following items, as a minimum:

- (i) Three payload access doors of sizes B4, whose locations shall be mission unique within the stated structural limitations of the fairing. Additional or different size doors shall be provided as a non-standard service. The Contractor shall provide payload personnel access through all standard and non-standard access doors from fairing mate through final vehicle closeout.
- (ii) Thermal environments specified not to exceed B4 during ascent on any launch vehicle component inside the fairing with a view factor to the payload, with the exception of the upper

stage motor which shall not exceed 1

B4

Maximum thermal environments shall be specified in the mission specific ICD (CDRL C2-1.1).

- (iii) Thermal and/or acoustic blankets sealed or filtered such that venting of blanket material debris does not contaminate the payload.
- (E) Flight instrumentation, as specified in Exhibit 1, paragraph 9.0, Payload Environment Instrumentation, to provide data adequate to support Section C, paragraph 24.2, Mission Success Determination.
- (F) Capability to spin payloads, when applicable, prior to deployment over a minimum range of zero (0) ^{B4} with an accuracy ^{B4} _{B4} per second.
- (G) Post mission maneuvers:
 - (i) A Collision/Contamination Avoidance Maneuver (CCAM), when applicable, following payload separation to minimize payload contamination and any chance of re-contact with the separated payload
 - (ii) End of mission maneuvers after CCAM shall support the limiting of orbital debris IAW mission requirements and vehicle capability.
- (H) Provisions for the prevention of static charging on umbilical connectors that may be subjected to static charging from plasma heating or atmospheric particulate matter (e.g., bleed resistors, dead facing, or connector covers).
- (I) A logo in accordance with NASA provided artwork. The size of the logo shall be a maximum of ^{B4} dimensions. The logo installation shall be appropriately documented in the mission Interface Control Document (ICD) (CDRL C2-1.1).
- (J) Availability of a Test Payload Adapter (TPA), with appropriate mechanical interfaces and payload separation system, to support payload integration and testing at NASA/NASA Customer (NNC) facilities or such other locations as defined by the ICD. At this facility, the Contractor shall support, with necessary personnel and equipment, the following: a fit check of the payload with the flight PA, environmental testing with a TPA (personnel support is limited to one installation and one removal of TPA), payload shock testing with a TPA, and sufficient pyrotechnics for two shock test firings.
- (K) Command, control, and power signal capability from the launch control facility to the payload umbilical Ground Support Equipment (GSE) IAW the mission specific ICD.

- (L) All mechanical GSE required to interface with the payload mechanical adapters and accomplish the payload to launch vehicle mating operation IAW the mission ICD.
- (M) Both halves of the electrical connector at each spacecraft-to-launch vehicle interface. The Contractor shall provide three (3) sets for each electrical connector interface: a flight set, a flight spare set, and a set for spacecraft testing.
- (N) All other hardware equipment, software, infrastructure, and logistics necessary to perform the contracted launch services.

2.2 Program Management

The Contractor shall provide all program management functions required to provide the launch services and to satisfy the mission requirements for each NASA mission. The program management function of this contract shall provide insight to NASA for all technical and programmatic activities performed under this contract.

The Contractor shall coordinate all program management functions and issues directly with the KSC LSP designated representative(s). The NASA Contracting Officer is the only NASA representative authorized to provide formal contract direction.

2.2.1 Formal Reviews

The Contractor shall conduct program reviews, design reviews, and readiness reviews, and shall provide for the participation of NNC. 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 NNC attendees (CDRL C1-1)

2.2.1.1 Program Reviews

During the contract performance period, the Contractor shall conduct Program Reviews with NASA at least once per year to: report development and production status, ensure schedules support program objectives, review action items, review program schedules, and discuss any issues. The intent of the program review is to provide a forum for open dialog between NASA and the Contractor with respect to launch services. NASA will provide status of Agency direction at the reviews. The review location shall alternate between NASA and Contractor facilities unless mutually agreed upon to do otherwise.

2.2.1.2 Design Reviews – Mission Specific

The Contractor shall conduct and chair/co-chair design reviews, as described below, that apply to the system, subsystem, component, and software level for all mission specific items. Where there is not a direct match between a SOW specified mission specific design review(s) and the Contractor's standard review(s), the Contractor's review process will be acceptable provided it addresses equivalent content. All derived requirements from all system requirements must be identified and addressed in each of these reviews. NASA will approve the Mission Unique items in these reviews.

(A) Mission Specific Requirements Review (MSRR)

The Contractor shall conduct an MSRR prior to the Mission Specific Preliminary Design Review (MSPDR) with NNC to review the mission specific design requirements for the following items:

- (i) System requirements' identification and definition to a level adequate to verify launch vehicle performance capabilities.
- (ii) Design restrictions, limitations, and known violations.
- (iii) Physical and mechanical interfaces (e.g., payload to launch vehicle, payload envelope, and access provisions).
- (iv) Electrical interfaces (e.g., launch vehicle to payload, payload to umbilical, interfaces with electrical ground support equipment, pad electrical systems, ground batteries, telemetry, grounding, and power).
- (v) Functional interfaces (e.g., structures, structural loads, and vibration).
- (vi) Avionics systems and interfaces (e.g., payload avionics interfaces with launch vehicle, separation systems, telemetry interfaces, payload command and telemetry, and RF).
- (vii) Mass properties.
- (viii) Environmental requirements (e.g., thermal, contamination, vibration, pressure, Electromagnetic Compatibility (EMC), shock, launch complex RF, and lightning).
- (ix) Orbital requirements, launch vehicle performance, launch window injection, and deployment attitudes and rates.

- (x) Payload/Launch Vehicle separation requirements (e.g., separation conditions, launch vehicle post-separation maneuver requirements, and telemetry).

(B) Mission Specific Preliminary Design Review (MSPDR)

The Contractor shall conduct a preliminary detailed design review prior to major commitment to drawings and design. Mission unique trade studies shall be completed prior to the MSPDR. The Contractor shall discuss analyses performed and their results along with comparisons to any similar proven designs. The Contractor shall evaluate the safety of the design and its ability to meet safety requirements. The preliminary mission unique design shall be subject to NASA's approval. NASA reserves the right to withhold approval until all action items have been closed. As a minimum, the Contractor shall provide verification of the following items at the MSPDR:

- (i) All system requirements have been allocated to the subsystem and component level and the flow down is adequate to verify system performance.
- (ii) The design solutions being proposed are expected to meet the performance and functional requirements.
- (iii) The design does not pose major problems that may cause schedule delays.
- (iv) Overall system architecture has been established and all launch vehicle to payload interfaces have been identified and are verifiable.
- (v) The design solution can be produced based on existing processes and techniques; if not, risk areas, which require unique and unproved processes, are identified and risk mitigation plans are established.
- (vi) An acceptable operations concept has been developed.
- (vii) Preliminary launch vehicle interfaces have been defined.
- (viii) Preliminary plans are established for end-to-end testing methodologies.
- (ix) 30% mission unique drawings released.

(C) Mission Specific Critical Design Review (MSCDR)

The Contractor shall conduct an MSCDR prior to design freeze and before significant fabrication activity begins. The Contractor shall present a final detailed design using drawings, analyses, and evaluation testing that shows

the design meets final performance and interface specifications, safety requirements, and mission objectives. The Contractor shall provide selection criteria for the evaluation tests performed to prove validity. The mission unique critical design shall be subject to NASA's approval. NASA reserves the right to withhold approval until all action items have been closed. As a minimum, the Contractor shall provide verification of the following items at the MSCDR:

- (i) All technical problems and design anomalies have been resolved without compromising system performance, reliability and safety.
- (ii) The detailed design will meet performance, functional requirements, and schedule.
- (iii) Software simulations and prototyping results do not present any potential mission risks.
- (iv) All key subsystem and/or component engineering analyses are complete.
- (v) Integrated safety analysis identifying any remaining hazards and proposed resolution.
- (vi) Launch vehicle/payload compatibility test plans have been defined.
- (vii) 90% mission unique drawings released.

(D) Mission Specific System Acceptance Review (MSSAR)

The NLS Contractor shall conduct an MSSAR after the design, fabrication, qualification testing and analysis is complete and shall incorporate any flight data available as part of the launch service. The Contractor shall address all mission specific items for the payload and mission requirements to verify qualification, compliance, and systems-level compatibility using completed analyses, test, inspection, and demonstrations results. The mission unique system acceptance shall be subject to NASA's approval. NASA reserves the right to withhold approval until all action items have been closed. As a minimum, the Contractor shall provide verification of the following items at the MSSAR:

- (i) Results of the mission specific acceptance reviews of the major suppliers or major subsystems;
- (ii) Design changes that occurred subsequent to MSCDR or changes as a result of new flight data;

- (iii) Summary of applicable component tests (test setups, test cases, results and significant anomalies), analyses, margins, or similarity assessments. Included in the summary is component qualification rationale (similarity, test, analysis) for all affected components that are new, changed or subject to new environments or functional requirements;
- (iv) Qualification rationale for the system as a whole;
- (v) Methodology and results of current analyses;

2.2.1.3 Readiness Reviews

The Launch Vehicle Systems Readiness Review, Pre-Mate Readiness Review, Launch Management Coordination Meeting (LMCM), Flight Readiness Review (FRR) and Launch Readiness Review (LRR) described herein will be conducted for each NASA mission.

(A) Launch Vehicle Systems Readiness Review

The Contractor shall conduct a Launch Vehicle Systems Readiness Review to demonstrate that the launch site and launch vehicle are ready to proceed with launch vehicle processing activities at the launch site. The Contractor shall present as a minimum:

- (i) Mission description including S/C and launch vehicle configuration; integration status; summary of waivers; post launch data review of previous flights (NASA and non-NASA); mission specific analyses results and status; vehicle hardware assignments, assessments and status; and launch site status
- (ii) A detailed schedule showing all activities (ground and flight) remaining to achieve a successful, on-time launch

(B) Pre-Mate Readiness Review

The Contractor shall conduct a Pre-Mate Readiness Review to demonstrate the launch site and launch vehicle are ready for payload mechanical and electrical integration. The Contractor shall conduct a launch vehicle/site walk-down [reference SOW Section 2.4.1.1(D)] with NNC participation prior to or in conjunction with the Pre-Mate Readiness Review. The Contractor shall present as a minimum:

- (i) Action item status, safety status, payload mating plan, closure plan, payload integration/launch site documentation, interface verifications, checkout and launch software status, nonconformance reports, launch site status, S/C readiness, and review of flight profile.

- (ii) A detailed schedule showing all activities remaining to achieve an on-time launch.

(C) Launch Management Coordination Meeting (LMCM)

The Contractor shall participate in an LMCM conducted by NASA before each launch dress rehearsal or launch. The LMCM is used to ensure the readiness of the launch team to execute the procedures necessary to conduct the launch dress rehearsal (reference SOW Section 2.4.1.3) or launch. At this meeting, participant roles and responsibilities during countdown shall be identified. The Contractor shall develop and present a decision matrix for its launch team which defines who has authority to issue a GO, NO GO, and HOLD during launch countdown. The Contractor shall describe its launch day management activities, identify key team members, and define responsibilities and communications between the launch vehicle, NASA, and payload teams.

(D) Flight Readiness Review (FRR)

NASA will conduct/chair, and the Contractor shall participate in an FRR for each mission to ensure the specific launch vehicle is acceptable for flight and all Range and other mission requirements have been met, or will be satisfied prior to launch. The FRR is held approximately three (3) days before launch. As a minimum, the Contractor shall provide verification that:

- (i) All critical items required to proceed into final launch countdown are ready
- (ii) Vehicle configuration is defined and all vehicle systems have been verified IAW launch site test plans
- (iii) All previously recorded action items have been closed or are reflected on the schedule
- (iv) All previously held Contractor's readiness review actions have been closed or resolved
- (v) Launch site/Range support organizations have committed to launch
- (vi) Tracking and data support resources are committed to launch
- (vii) Any open work is identified and closeout plans and schedules are in place and supportable
- (viii) Any constraints to launch are identified and resolution plans developed

- (ix) Mission risks are known and documented
- (x) Launch commit criteria for payload and launch vehicle is approved and released

The Contractor shall also discuss:

- (i) Anomalies from previous missions, including non-NASA missions
- (ii) Hardware/software failures in the field either on the NASA assigned launch vehicle or in the fleet
- (iii) Open corrective actions/problems reports
- (iv) Mission Unique and First flight items

(E) Launch Readiness Review (LRR)

NASA will conduct/chair, and the Contractor shall participate in an LRR one day prior to launch to verify all actions from the FRR are complete and final processing has been successfully completed. NASA will appoint the chairperson for this review. At the conclusion of this review, an "approval to proceed with launch countdown" is given. Representatives from the Contractor, Range, and NNC agencies sign the Certificate of Flight Readiness. The Contractor shall prepare the Certificate of Flight Readiness. A sample Certificate of Flight Readiness is provided in Exhibit 4.

2.2.2 Risk Management

The Contractor shall implement risk management techniques that address the identification, analysis, mitigation, and tracking of potential impacts to mission success. The Contractor shall develop the criteria, methods, and procedures used for identifying critical items in the Risk Management Plan (CDRL C3-6).

2.2.3 Configuration Management

The Contractor shall perform configuration management of the launch vehicle design and production for all launch vehicle components/subsystems, hardware, and software.

2.2.4 Manifest Policy

The Contractor shall develop and provide a Manifest Policy as described in CDRL C1-4 that addresses the Contractor's overall approach to ensuring timely launch of payloads. The Contractor shall provide a Program Master Schedule

and Launch Vehicle Planning Manifest (SDRL S1-3) to support Government mission scheduling.

2.2.5 New Launch Vehicle Orientation

The Contractor shall conduct an orientation briefing at KSC. This briefing shall introduce Contractor personnel and establish project interfaces with NASA personnel and describe the Contractor's organization and infrastructure. The briefing shall contain information summarizing the design, performance, fabrication, integration, testing, qualification and operational features of the launch vehicle systems and supporting facilities required to provide the launch service in the form of diagrams, schematics, pictures, drawings, videos, etc.

2.3 Mission Integration Services

2.3.1 Mission Integration Management

The Contractor shall be responsible for managing the mission integration of the payload flight and ground systems with the launch vehicle and its associated GSE. In accordance with this responsibility, the Contractor shall perform, as a minimum, the following services:

- (A) Provide a single point of contact with overall mission responsibility for each mission. This single point of contact shall be responsible for coordinating support from all technical disciplines and management during the integration process.
- (B) Conduct mission integration meetings (kick-off, working group, technical interchange) approximately quarterly from Mission Integration Start (L-30M) to launch.
- (C) Provide a co-chairperson along with NASA for all working groups and technical interchange meetings. The Contractor co-chairperson shall be responsible for preparing and distributing agendas, minutes and action item logs for each meeting (SDRL S1-2). The Contractor shall maintain the action item database and ensure closure of all actions.
- (D) Provide appropriate technical/engineering representation at payload preliminary and critical design reviews.
- (E) Plan, schedule, and manage mission analyses required to define and verify compatibility of the payload with the interface requirements and environments (reference Table D1-A, SOW paragraph 2.3.2).
- (F) Track development status of and resolve issues associated with mission specific hardware and software.

- (G) Coordinate interface and support requirements for the mission.
- (H) Plan/coordinate mission specific flight operations.
- (I) Manage integration activities at the launch site.
- (J) Manage and coordinate the launch vehicle safety approval process.
- (K) Prepare, maintain and implement a payload to launch vehicle ICD for each mission. The ICD shall include all mission requirements including launch vehicle and launch site interface definition and environments (including GSE). The ICD shall include the payload to launch vehicle/launch site electrical and mechanical interface drawings (CDRL C2-1.1). Thirty (30) days prior to launch, the approved ICD shall be incorporated into the contract via contract modification as Exhibit 8 to Attachment D1. Any approved changes after its inclusion into the contract will be incorporated prior to mission success determination.
- (L) Create and maintain an ICD Verification Matrix (CDRL C2-1.2) which shall include a verification plan for each requirement in the ICD based on the appropriate method. The Contractor shall perform verification of each ICD requirement based upon the verification plan identified in the Verification Matrix.
- (M) Manage the design, development, qualification, testing and integration of mission unique requirements.
- (N) Evaluate the capability of the launch vehicle and define any performance and payload volume the Contractor may make available to NASA for secondary payloads.
- (O) Provide mission status to NNC throughout the launch campaign from Authority to Proceed (ATP) through mission success determination.
- (P) Provide appropriate representation and participation at NASA conducted Ground Operations Working Groups (GOWG's) approximately 2 times a year from L-27 months to spacecraft arrival at the launch site and at the NASA Ground Operations Review (GOR).

2.3.2 Mission Analyses

All vehicles provided under this contract shall include the following analysis for each mission as part of the standard launch service. The Contractor shall prepare and submit the standard mission analyses as listed in Table D1-A.

CDRL	ANALYSIS
C4-1	Performance and Guidance Accuracy Analysis
C4-2	Final Mission Analysis (FMA)
C4-3	Payload/Expended Stage Separation Analysis
C4-4	Payload Fairing Venting Analysis
C4-5	Payload Fairing Clearance Analysis
C4-6	Pre-Flight Controls and Stability Analysis
C4-7	Coupled Dynamic Loads Analysis
C4-8	Integrated Thermal Analysis
C4-9	RF Link Analysis
C4-10	Payload/Launch Vehicle EMC, RF, and EED Compatibility Analysis
C4-11	Mission Unique Software
C4-12	Quick Look Flight Report
C4-13	Final Flight Report

Table D1-A: Mission Analyses to Support Payload Integration

The standard launch service shall include all analyses required to evaluate compliance with NPR 8715.6A, NASA Procedural Requirements for Limiting Orbital Debris. The number of submittals for the Standard Mission Analyses are identified in Table D2-A.

2.3.3 Mission Success Determination

Mission success will be based on the criteria set forth in Section C, paragraph 24.1, Mission Success Criteria. Mission success determination requirements are detailed in Section C, paragraph 24.2, Mission Success Determination.

The Contractor shall prepare and submit a Quick Look Flight Report (CDRL C4-12) and a Final Flight Report (CDRL C4-13). Within thirty (30) days of receipt of the Final Flight Report, the Contracting Officer will either determine the launch a Mission Success or inform the Contractor of the Government's intent to withhold determination for payload evaluation.

2.4 Launch Site Support

2.4.1 Pre-Launch Checkout and Launch Support

2.4.1.1 Launch Vehicle Preparation and Launch

For launch services provided under this contract, the Contractor shall, as a minimum;

- (A) Perform all launch vehicle preparations and launch site operations necessary to safely and successfully deliver the payload to the desired orbit.
- (B) Generate the required documents (CDRL C3-7) and obtain all required safety approvals for the launch vehicle system and integrated payload/launch vehicle system operations including payload/launch vehicle system integration and launch operations.
- (C) Provide NASA access to all meetings including, but not limited to, scheduling meetings, test briefings, and technical meetings. Upon request, the Contractor shall provide copies of schedules, test briefings, and other material presented at technical meetings.
- (D) Conduct launch vehicle/launch site walk-downs with NNC participation.
- (E) Comply with the submittal and operational requirements for all NASA provided facilities occupied during launch vehicle processing (CDRL C1-5). Failure to comply may result in denied access to the NASA provided facility.

2.4.1.2 Telemetry Data and Launch Countdown Support

2.4.1.2.1 Vehicle Telemetry

Telemetry data shall be archived in an industry standard format compatible with NASA's LSP Data Center. All recordings shall include direct receiver video-out data when available, as well as reshaped data waveforms when applicable for each designated telemetry link. Archived data should include receiver signal strengths, tracking antenna azimuth/elevation and IRIG-B Timing. All media shall be clearly documented and labeled with the mission, date, record length and any and all channel assignments and associated digital sample rates or clock rates per channel recorded.

2.4.1.2.2 Baseline and Integrated Vehicle Support

The Contractor shall provide, in electronic form, all raw launch vehicle and GSE telemetry (RF and hardware) formats described in sufficient detail to allow NASA to process and verify the data prior to initial launch vehicle power-up at the

launch site. This shall include a detailed listing and description of all measurements and calibration coefficients for all launch vehicle and GSE telemetry (TM) links including the guidance system and any embedded data streams. The Contractor shall provide to the NASA LSP Data Center, via electronic format, any changes to the launch vehicle and/or GSE telemetry format as the change is implemented to the launch vehicle and/or GSE telemetry streams (CDRL C6-1).

The Contractor shall provide NASA with a compatible data recording (CDRL C6-2) representative of the telemetry (RF and hardwire) signals of the launch vehicle and GSE prior to the initial launch vehicle power-up test on each mission. This will allow NASA to verify its ability to process the Contractor's telemetry (SDRL S6-1).

The Contractor shall submit an initial end-to-end launch vehicle telemetry path test plan (SDRL S6-2) NLT 6 months prior to launch. This plan shall describe the telemetry links from the launch vehicle through down range and deployable telemetry assets specific to that mission. The plan shall identify and/or suggest *orbiting or ground locations and/or mobile assets to meet LSP telemetry coverage requirements*. The Contractor shall submit a final end-to-end launch vehicle telemetry path test plan NLT sixty (60) calendar days prior to launch. The final plan shall verify the adequacy of telemetry link margins with down range assets, and shall include link margin analysis and shall present data flow diagrams between the NASA designated NASA LSP Data Center and downrange assets.

The Contractor shall record all launch vehicle and GSE telemetry streams while the vehicle is powered prior to launch. The Contractor shall provide real-time launch vehicle and GSE telemetry (RF and hardwire) data to the NASA designated LSP Data Center for system level launch vehicle testing (system-level testing to include anytime the vehicle or stage is powered and exercised, with data transmitted from the flight telemetry system for the purpose of evaluating system health and function). Examples include, but are not limited to, telemetry test data during initial vehicle power-up, flight simulation prior to payload mate, and flight simulation following payload mate (SDRL S6-3).

The Contractor shall provide compatible data of all recorded launch vehicle and GSE telemetry (CDRL C6-2).

The Contractor shall provide a mutually agreed upon transport interface or extend the Spacecraft command and telemetry streams between the launch complex and the NASA designated NASA LSP Data Center.

The Contractor shall provide voice and video communications from the launch complex to the designated NASA LSP Data Center during integrated and stand-alone spacecraft operations at the launch complex.

The Contractor shall implement the NASA provided console communications configuration for those consoles occupied by the NASA team within the Contractor's launch control center. The Contractor shall validate this configuration with the designated NASA LSP Data Center prior to launch vehicle testing and mission simulations.

The Contractor shall provide real-time launch vehicle and GSE telemetry (RF and hardwire) data to the NASA designated NASA LSP Data Center. Examples include, but are not limited to telemetry test data during initial vehicle power-up, flight simulation prior to payload mate, and flight simulation following payload mate (SDRL S6-3).

The Contractor shall provide to NASA, upon request, launch vehicle processing test procedures in a mutually agreed upon electronic format prior to the test (SDRL S5-1).

The Contractor shall submit to NASA a draft version of a preliminary Statement of Work for each downrange asset no later than four (4) months prior to launch. The Contractor shall coordinate the downrange assets and shall provide NASA the latest documentation required by the downrange assets (e.g. PRD, Expedite OR, etc) for receiving, recording, and relaying the data no later than sixty (60) days prior to launch. The Contractor shall ensure proper operation of all launch vehicle telemetry links (RF and hardwire), voice communication channels, and video (including launch vehicle mounted camera video as applicable) to the NASA designated NASA LSP Data Center prior to baseline launch vehicle processing. The Contractor shall provide the downrange assets with the technical coordination needed to execute the telemetry coverage (e.g. telemetry playback tapes, mission trajectory disks, etc) prior to the first data flow test. The Contractor shall ship required electronic hardware and satisfy export control and frequency authorizations as required by local and international governments.

The Contractor shall provide data flow path diagrams and data flow schedules between the NASA designated NASA LSP Data Center and down range assets to NASA NLT fifteen (15) calendar days prior to launch and again at the Flight Readiness Review (SDRL S6-4). The Contractor shall also provide down range asset status/readiness at the Flight Readiness Review.

2.4.1.2.3 Launch Countdown and Flight Support

The Contractor shall provide launch countdown procedures, Mission Constraints Documents (CDRL C1-2) and a Mission Console Notebook (CDRL C1-3) for the launch dress rehearsal and launch in hard copy and a mutually agreed upon electronic format.

The Contractor shall provide NASA personnel access to consoles, with vehicle monitoring capabilities, co-located within the Contractor's launch control center. The Contractor shall provide access to real-time telemetry (RF and hardware), voice communication channels with talk/listen capabilities, video and telephones for the co-located NASA personnel. The Contractor shall implement the NASA provided console communications configuration for those consoles occupied by the NASA team within the Contractor's launch control center. The Contractor shall support validation of this configuration with the designated NASA LSP Data Center prior to launch dress rehearsal and launch.

The Contractor shall deliver real-time launch vehicle and GSE telemetry (RF and hardware), voice communication channels and video to the designated NASA LSP Data Center from the start of launch countdown through Range Loss of Signal (LOS) when in range of an existing ground receiving station, or as supplemented as described in SOW paragraph 2.4.3, Range Support and Services. If the launch vehicle telemetry, voice communication channels or video is uniquely encoded, the Contractor shall provide the decoded launch vehicle telemetry, voice communication channels, and video to the NASA LSP Data Center.

The Contractor shall receive and record the raw launch vehicle telemetry data for all phases of powered flight, from two ^{B4} ~~hours~~ IAW NASA Policy LSP-PD-120.05. The Contractor shall receive and record launch vehicle ^{B4} ~~telemetry~~ after payload separation IAW NASA Policy LSP-PD-120.05.

The Contractor shall provide real-time transmission back to the NASA designated NASA LSP Data Center of all mandatory receive and record launch vehicle telemetry coverage times IAW NASA Policy LSP-PD-120.05. The Contractor shall provide the raw telemetry data recorded post launch (SDRL S6-3).

During the Launch Countdown, the Contractor shall poll NASA at key milestone events for GO/NO-GO status. The final poll shall include the NASA Launch Manager's GO/NO-GO status for launch. The Contractor shall provide NASA access to anomalies and concurrence with anomaly resolution prior to proceeding with Launch Countdown. The Contractor shall poll NASA for any recycle of the Launch Countdown.

On day of launch, the Contractor shall maintain voice contact with the downrange assets and provide status/readiness to the launch team as requested.

The Contractor shall be responsible for coordinating and ensuring all tracking and data recovery support meets mission requirements (CDRL C2-3).

The Contractor shall arrange for the shipping of the recorded telemetry media(s) from the downrange assets to the NASA designated NASA LSP Data Center no later than five (5) calendar days following launch.

2.4.1.3 Launch Dress Rehearsal

The Contractor shall conduct a minimum of one Dress Rehearsal prior to launch. The rehearsal shall exercise the launch countdown procedure, and will have the participation of the NNC and launch vehicle Contractor launch teams. The rehearsal may use an abbreviated countdown script with simulated payload/vehicle conditions, including anomalies.

2.4.2 Launch Site Payload Support

2.4.2.1 Payload Processing Facility

For launches conducted from CCAFS, VAFB, and WFF, NASA will provide the Payload Processing Facility (PPF) unless processing services are purchased as a non-standard service. In the event the Contractor proposes and NASA approves an alternate launch site, the Contractor shall be responsible for providing a PPF, subject to NASA approval, meeting the payload requirements.

2.4.2.2 Launch Site Payload Integration Support

The Contractor shall provide all services, equipment, and support required for the integration and launch of each payload. Services shall include, as a minimum, the following:

- (A) Encapsulation of the payload complement at the PPF, for either flight or transport to the launch complex, transport, mate with the launch vehicle and performance of integrated checkout activities.
- (B) Verification of the end-to-end functionality of the umbilical lines provided for payload use.
- (C) Support for the installation and checkout of the payload GSE (provided by the payload customer) at the launch site, and payload communication accommodations from the pad to the PPF. The Contractor shall also provide for a NASA console at the Contractor's launch control center.
- (D) Provision of the mountings for, and the installation of, the payload GSE (provided by the payload customer) at the launch complex and/or remote sites.
- (E) Provision for contingency off-loading of payload propellants in accordance with the appropriate Range Safety requirements and appropriate payload procedures.

- (F) Provision for launch site services to meet payload requirements such as: power, air conditioning, GN₂/GHe purges, and contamination control.
- (G) Support of all activities required to de-mate and to return the payload to the processing facility if necessary.
- (H) Preparation of the procedures for integrated launch vehicle/payload operations for NASA approval and incorporation of the payload procedures as appropriate (CDRL C5-5).
- (I) Coordination of payload and launch vehicle operations into an integrated operational flow, preparation of the schedules, and provision of the schedules with updates as needed to NNC.
- (J) Provision of contamination control for payloads while they are in the possession of the Contractor, or in a Contractor-provided PPF IAW the SOW, paragraph 2.4.2.3.
- (K) Provision of a payload protective cover for use after payload mate to the launch vehicle, if the fairing is installed at the launch pad. The cover shall be purged with conditioned air meeting the minimum requirements stated in the SOW, paragraph 2.4.2.3(C). Provisions shall be made for payload personnel ingress and egress.
- (L) Certification of payload contamination control requirements for: fairing surface cleanliness, cleanroom environments, and purge system cleanliness.
- (M) Support for the installation of customer provided RF re-radiating equipment.
- (N) Provision for the planning and execution of activities associated with the integrated testing of the customer's payload with the launch vehicle on the launch pad.

2.4.2.3 Contamination and Environmental Control

The Contractor shall provide and implement a generic payload contamination control plan and, if required, provide and implement a contamination control implementation plan for each payload. Using IEST-STD-CC1246D, MIL-PRF-27401, ISO 14644-1, ISO 14644-2, and NASA RP-1124 (Rev-4) as guidelines, the launch service shall meet the following minimum requirements:

- (A) Payload/Vehicle Integration Environment. For all Contractor provided facilities where the payload resides and is exposed (including payload processing facilities, integration facilities, or facilities at the launch pad), a Class 8 clean room environment IAW ISO 14644-1 shall be provided. In

addition, the temperature and humidity environment shall have the ability to be controlled and maintained within a range of $\pm 4^\circ\text{C}$ and 30% to 60%, respectively. This environment shall be maintained at all times unless the payload is encapsulated within a transportation container or payload fairing and purge air has been established IAW 2.4.2.3(B) or (C), herein. If the Contractor provides a payload protective cover as identified in paragraph 2.4.2.2(K) of the SOW, and purge air has been established, the facility environment may be exceeded. Prior to removal of the payload protective cover, the facility shall be returned to a Class 8 IAW ISO 14644-1 clean room environment. The Contractor shall provide contamination and environmental monitoring when the payload is exposed.

- (B) Transportation Environment. The following shall apply to all payload transportation containers (including the payload fairing, if used for transportation) provided by the Contractor. Following payload encapsulation, the transportation container shall be purged with conditioned filtered air and the payload environment shall be maintained within a temperature and humidity range of $\pm 4^\circ\text{C}$ and 30% to 60%, respectively. The Contractor shall identify periods or configurations where the temperature and humidity requirements cannot be met. Conditioned air filtration shall be capable of removing 99.97% of all particles greater than 0.3 microns and removing 95% of all hydrocarbons with a molecular weight greater than 70.
- (C) Fairing Environment. Following fairing installation and payload mate to the launch vehicle, the PLF environment shall be purged with conditioned filtered air and shall maintain a temperature set point range, selectable by the payload, of $\pm 4^\circ\text{C}$, controllable to $\pm 4^\circ\text{C}$, through T-0. Relative humidity shall be maintained within 30% to 50%, controllable to 5%. The Contractor shall identify periods or configurations where the temperature and humidity requirements cannot be met. Conditioned air filtration shall be capable of removing 99.97% of all particles greater than 0.3 microns and removing 95% of all hydrocarbons with a molecular weight greater than 70. After the fairing has been closed out for flight, Grade B, Type 1, GN₂ (or better) IAW MIL-PRF-27401F, may be used for purging the fairing environment. Fairing GN₂ purging or conditioning air shall not impinge directly on the payload at any point.
- (D) Fairing Internal and Payload Adapter Surface Cleaning. The internal surfaces of the payload fairing compartment (including Payload Adapter) shall be cleaned, certified, and maintained to IEST-STD-CC1246D Level 750A or better, with the number and locations of samples to be determined by the integration team. Cleaning and certification shall be accomplished in a

clean room rated at or above Class 8 IAW ISO14644-1. In lieu of IEST-STD-CC1246D Level 750A, the payload fairing compartment (including Payload Adapter) may be cleaned and certified such that contribution from launch vehicle sources measured from S/C turnover (Launch Vehicle Contractor control of S/C for integrated operations) through CCAM shall not exceed 1% total obscuration and 150 Angstroms molecular contamination. The sampling methodology for particulate shall be per ASTM E1216 and for molecular per ASTM E1235. The number and locations of samples to be determined by the integration team.

(E) Reserved

(F) Clean Room Garments. 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.

(G) Materials. All materials used in areas in close proximity to the payload shall be selected based on NASA RP-1124 (Rev-4). Materials shall have a Total Mass Loss (TML) of less than 1.0% and Collected Volatile Condensable Materials (CVCM) of less than 0.10%, or be expressly identified and submitted to NASA for approval.

2.4.2.4 Operational Support Services

The Contractor shall provide 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 payload hazards and have adequate knowledge to carry out their tasks unescorted in a safe manner. The Contractor shall provide access for payload personnel to the payload/launch vehicle or storage facilities to accommodate payload customer requirements. The Contractor shall provide security to meet the requirements for payload or personnel protection. The Contractor shall provide to NASA, upon request, launch service user's guide and facility information (SDRL S1-1).

2.4.3 Range Support and Services

Launch vehicles provided under this contract shall include all hardware, software, analysis and support necessary to meet the applicable Range Safety Requirements (e.g., EWR-127-1, AFSPCMAN 91-710, or RSM-2002).

As part of the launch service, 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. If required, NASA will provide down range telemetry aircraft, Tracking and Data Relay Satellite System (TDRSS) and/or NASA owned ground station support for tracking and data recovery. The Contractor shall be responsible for coordinating and ensuring all tracking and data recovery support meets mission requirements (CDRL C2-3).

The Contractor shall make arrangements for Range provided services necessary to support the launch service. As a minimum, the following services are to be provided: fluids, gases, propellants, ordnance storage, facility usage, equipment support, shop and laboratory services, meteorology, base security, fire protection and environmental health.

The mission specific Program Requirements Document/Operational Requirements (PRD/OR)(CDRL C2-2), or equivalent mission specific Range support documentation, shall be submitted to obtain Range support. The Contractor, with support from NASA, shall complete all forms pertinent to the mission and submit them to the appropriate Range for formal acceptance.

2.5 Safety, Reliability, and Quality Assurance

During the period of performance 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 and launch of the LVS.

2.5.1 Safety and Health Program

The Contractor shall provide a Safety and Health Plan that will implement safety and health requirements consistent with federal, state, and local government regulations and applicable launch processing site Safety and Health requirements. This Plan shall describe the Safety organization including structure of management interfaces and also system safety methods employed to ensure compliance with applicable launch processing site safety requirements.

The Contractor shall implement a system safety program to identify hazards of systems/subsystems and impose applicable design requirements and management controls to prevent mishaps. The Contractor shall develop system safety documentation, plans, procedures, technical analyses, etc., IAW safety requirements of the applicable launch processing site. Launch processing site safety required documentation shall be made available to NASA (SDRL S3-4) upon request. The Contractor shall participate in all safety working groups (i.e. payload safety working group (PSWG), etc.) as the launch vehicle safety representative for each NASA mission under this contract.

When the contractor is performing work in any NASA owned facility (e.g., buildings 836 and SLC-2W at VAFB and PHSF at KSC), all NASA requirements

and safety documentation as contained in the SOW, paragraph 1.3, Compliance Documents, shall be adhered to. The Contractor shall submit system safety documentation (baseline and any changes) to NASA for review/approval IAW CDRL C3-7 for processing at all NASA provided facilities. NASA will review the safety documentation to ensure designs, processing and operations do not pose an unacceptable safety risk to NASA personnel/contractors, resources or risk to Mission Success.

The Contractor shall report Close Calls/Mishaps to NASA IAW CDRL C3-2. The Contractor shall make provisions for NASA safety representative insight into integrated Payload/launch vehicle processing.

2.5.2 Reliability Program

The Contractor shall implement and maintain a Reliability Program with an overall vehicle design reliability of no less than 95% at an 80% confidence factor. The Contractor's program shall facilitate evaluation of the Contractor and subcontractor's programs to determine if the product meets the overall design reliability requirements. Overall vehicle reliability predictions shall be incrementally revised to reflect design modifications.

2.5.3 Quality Assurance Program

The Contractor shall maintain a quality management system that is ISO 9001/2000 third party certified (ISO 9001/2008 third party certification is required after November 2010). The Registrar shall be accredited by either the International Registrar of Certified Auditors (IRCA) or the Registrar Accreditation Board (RAB). In the event the Contractor certification is revoked, NASA shall be notified within five (5) business days (CDRL C3-3).

The Contractor shall maintain a Software Assurance Program using ISO 90003 as a guideline.

The Contractor shall accommodate NASA participation in Contractor and subcontractor audits and ISO audits. NASA insight will consist of monitoring audits with the Contractor's auditors and inspectors in order to provide understanding of the Contractor's quality system and insight of their processes.

The Contractor shall support NASA performance of ISO 2nd party audits, as required. The audits will be performed IAW ISO 19011 requirements.

The Contractor shall provide a current Audit Plan and schedule for in-house and subcontractor audits upon request from NASA (CDRL C3-4). The Contractor shall provide a copy of both the Contractor performed internal Quality Audit Report and the subcontractor/vendor Quality Audit Reports (CDRL C3-5).

The Contractor shall provide for NASA attendance at any flight hardware reviews the Contractor performs at Contractor or subcontractor facilities. The Contractor shall make available to NASA any build paper, test results, nonconformance reports, discrepancy history, statistical process control, and failure analyses that are relevant to the reviews.

The Contractor shall provide read-only quality information to NASA (via remote terminal) from such Quality Assurance on-line database systems as exist and to which the Contractor has regular and timely input. An example is an on-line Problem/Failure Reporting (P/FR) system.

The contractor shall provide NASA all anomaly resolutions that affect the integrated payload/launch vehicle assembly, including both hardware and software. NASA will approve all integrated payload/launch vehicle anomaly resolutions. The contractor shall provide insight to Material Review Board (MRB) and failure reporting for all launch vehicle nonconformances.

The Contractor shall participate in the Government/Industry Data Exchange Program (GIDEP) and provide Alert System Documentation (CDRL C3-1).

2.6 NASA Insight and Approval

The Contractor shall comply with the Government's implementation of NPD 8610.23 and NPD 8610.24 as defined under Section C, Clause 25.0 and the SOW paragraph 2.2.1, Formal Reviews. As part of the standard launch service, the Contractor shall provide the data, documentation, drawings, analytical models, and support services as necessary to accommodate the requirements specified under contract Section C, Clause 25.0, Government Insight and Approval.

The Contractor shall notify NASA of qualification or test anomalies involving similar launch vehicles, systems, subassemblies and components. The Contractor shall make available to NASA all problem reports or discrepancy reports on launch vehicle systems' failures and anomalies. This shall include insight into fleet-wide problems, anomalies, MRB actions, deviations or waivers to systems, subsystems, materials, processes, and test equipment including those used on non-NASA missions.

In the event of an anomaly or launch failure, the Contractor shall support NASA's Failure Review Board, if activated, or shall allow NASA to fully participate 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 and copy machines from

one to three residents and up to four visitors at each location. A minimum of two voice and two data telephone lines shall be provided. Electronic data transfer compatibility between the resident office and off-site NASA institutions is required. A resident office will not be required at CCAFS or VAFB, but NASA will require operational support accommodations (i.e. office space, power, telephone, communication end instruments for monitoring vehicle testing, etc.) at the launch complex during NASA launch operations.

3.0 NON-STANDARD SERVICES

The Contractor shall provide the non-standard services identified in Exhibit 3 as directed by the Contracting Officer. Implementation of all non-standard services shall be fully compliant with this SOW.

4.0 MISSION UNIQUE REQUIREMENTS

The Contractor shall provide the mission unique services identified in Exhibit 9 as directed by the Contracting Officer. Implementation of all mission unique services shall be fully compliant with this SOW.

4.1 Mission Unique Hardware

The Contractor shall design, manufacture, test, and qualify for flight the mission unique hardware that is required to support the payload and mission. The Contractor shall prepare and submit drawings (CDRL C5-4), test plans (CDRL C5-2), and test reports (CDRL C5-3) to support NASA insight and approval of mission unique hardware.

For vehicle changes initiated by the Contractor that are not fleet-wide changes, the Contractor shall prepare and submit a vehicle data package (CDRL C5-1).

The Contractor shall use MIL-STD-1540 B or C as a guideline when developing environmental qualification and acceptance criteria and related test and analysis. Factors of safety for mission unique hardware shall meet the requirements of Table D1-B.

Application	Test		Analysis (No Test)	
	Yield	Ultimate	Yield	Ultimate
Non-Man Rated	1.10	1.25	1.60	2.0

Table D1-B: Mission Unique Hardware Factors of Safety

4.2 Mission Unique Software

The Contractor shall provide source code and mission constants' listings (CDRL C4-11) with appropriate requirement specifications to support NASA approval of mission unique software. The Contractor shall prepare and submit a pre-flight control system and stability analysis report (CDRL C4-6) for the vehicle and mission unique software used for each mission.

4.3 Unanticipated Mission Unique Services

At the time of contract award, the Government may not have identified all mission unique services required for each mission. As unanticipated mission unique services are identified, the Contracting Officer will authorize the Contractor, in accordance with FAR 52.243-1, Changes – Fixed Price Alt I, to perform these services. In performing unanticipated mission unique services, the Contractor shall design the necessary ground and flight hardware/software; conduct appropriate design reviews; and manufacture, test and qualify for flight launch vehicle mission unique hardware/software, i.e., other than that provided as a standard service (Exhibit 2) or described in the non-standard services list (Exhibit 3).

5.0 SPECIAL TASK ASSIGNMENTS

The Contractor shall be required to perform special studies and analyses, provide materials, or fabricate hardware in support of this contract. Each task will be initiated by written direction from the NASA Contracting Officer. These tasks generally 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.

6.0 INFORMATION TECHNOLOGY SECURITY

The contractor shall comply with NPR 2810.1A, NASA's Policy on the Security of Information Technology for LSC IT hardware and/or software provided to NASA. New IT hardware and/or software systems delivered to NASA shall be compliant prior to authorization to process. The contractor shall develop, update and

implement an IT Security Plan compliant with NPR 2810.1A. NASA IT Security personnel will evaluate the LSC IT hardware and/or software security and determine compliance prior to NASA acceptance.

7.0 GUIDELINE DOCUMENTS

The following documents are to be used as guidelines to the extent specified in this SOW. If a revision number or date is not specified, the latest revision of the documents shall be used as guidelines to the extent specified in the SOW.

Document No	Rev.	Document Title
ISO 14644-1	Basic	Clean rooms and associated controlled environments – Part 1: classification of air cleanliness
ISO 14644-2	2000	Clean rooms and associated controlled environments – Part 2: specifications for testing and monitoring to prove continued compliance with ISO 14644-1-First Edition
IRIG-106-07	2007	Telemetry Standards
ISO 90003	2004	Software Engineering - Guidelines for the Application of ISO 9001:2000 to Computer Software
ISO 19011	2002	Guidelines for Quality And/Or Environmental Management Systems Auditing
MIL-STD-1553 ¹	B	Digital Time Division Command/Response Multiplex Data Bus
MIL-STD-1540	B or C	Test Requirements for Launch, Upper-Stage, and Space Vehicles
MIL-STD-176	A, Notice 1	Weight and Balance Data Reporting Forms for Guided Missiles and Space Launch Vehicles
MIL-STD-1773	Notice 1	Fiber Optics Mechanization of an Aircraft Internal Time Division Command/Response Multiplex Data Bus
IEST-STD-CC1246	D 2002	Product Cleanliness Levels and Contamination Control Program

MIL-PRF-27401	F 2008	Propellant Pressurizing Agent, Nitrogen
ASTM E1216	2006	Standard Practice for Sampling for Particulate Contamination by Tapelift
ASTM E1235	2008	Standard Test Method for Gravimetric Determination of Nonvolatile Residue (NVR) in Environmentally Controlled Areas for Spacecraft

NASA RP-1124	4 1997	Outgassing Data for Selecting Spacecraft Materials
NPR 2810.A	2006	Security of Information Technology
NASA-STD-8729.1		Planning, Developing and Managing an Effective Reliability and Maintainability (R&M) Program
NPD 8610.23		Launch Vehicle Technical Oversight Policy
NPD 8610.24		Launch Services Program (LSP) Pre-Launch Readiness Reviews
NPD 8610.7		Launch Services Risk Mitigation Policy for NASA-Owned and/or NASA-Sponsored Payloads/Missions
LSP-PLN-324.01		Expendable Launch Vehicle Certification
NPR 8621.1		NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping
LSP-PLN-353.01		Launch Services Program Risk Management Plan
NPD 1280.1		NASA Management System Policy
NPR 7120.5		NASA Space Flight Program and Project Management Requirements
NPR 8715.3		NASA General Safety Program Requirements

¹ MIL-STD-1773 may be substituted

8.0 RESERVED

SECTION D
ATTACHMENT D1

Exhibit 1

**FALCON 1 and FALCON 1e Capabilities,
Specifications and Environments**

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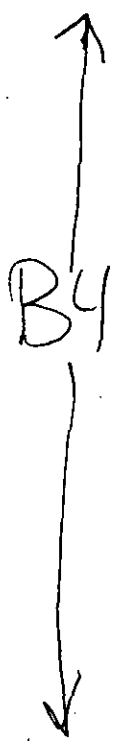
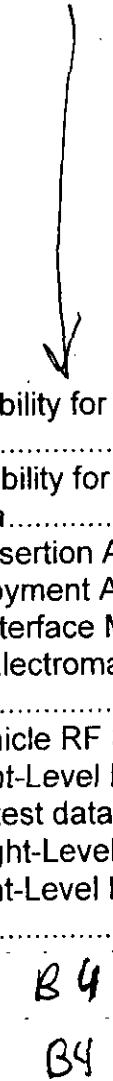
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EXHIBIT 1

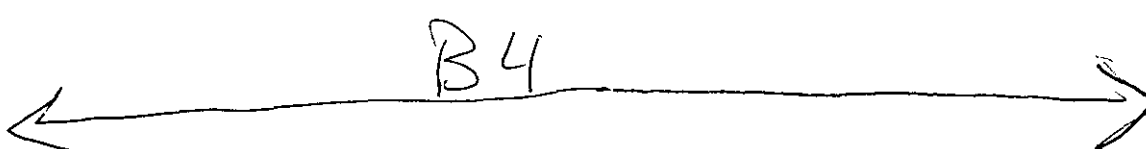
FALCON 1 and FALCON 1e CAPABILITIES, SPECIFICATIONS AND ENVIRONMENTS

Exhibit 1 represents the capabilities, specifications, and environments of the proposed launch services, including all standard launch service and non-standard services.

1.0 VEHICLE CONFIGURATION

The Contractor shall define (in Table D1-C) the vehicle, Solid Rocket Motor (SRM), upper stage, Payload Adapter (PA), and Payload Fairing (PLF) configuration options available for each proposed vehicle class. These configurations shall include all standard electrical systems, mechanical systems, propulsion systems, ordnance devices, and flight instrumentation.

Vehicle Configuration	Falcon 1: The Falcon 1 first stage uses a single Merlin 1C engine which burns LOx/RP-1 and generates 78,000 lbf thrust (sea level). The engine does not have the ability to be throttled. The overall length of the Falcon 1 first stage propellant tank is 402 inches.
SRM Configuration	Not Applicable (N/A)
Upper Stage	Kestrel 2 (K2)
Payload Adapter	The 38.81 inch sixty-point payload attach fitting is provided for S/C mounting and the 38.81" motorized LightBand separation system. Carries an electrical connector(s) that provide separation indication through primary and redundant breakwires. Separation initiated by electrical command to motorized release mechanism with springs integrated to provide delta-velocity.
Payload Fairing	5 foot (1.5m) diameter – length (11.3 feet [3.5m])

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SRM Configuration	Not Applicable (N/A)

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Table D1- C: Vehicle Configurations

2.0 PAYLOAD DELIVERY CAPABILITY

SpaceX has provided where applicable, in Tables D1-D through D1-G3, the maximum payload capability from appropriate launch site with associated ground rules for the two configurations; the Falcon 1 launch vehicle and the Falcon 1e Launch vehicle. The Falcon 1 launch vehicle was part of the previous NASA Launch Services catalog, before the contract period of performance expired. The two small Launch Vehicle configurations are defined in paragraph 1.0, Vehicle Configuration. Performance is expressed in terms of separated payload mass (assuming standard PAs as outlined in paragraph 1.0, Vehicle Configuration) and shall assume a 3-sigma performance reserve for the following orbits:

Low Earth Orbits (LEO): Data shall be provided for circular orbit altitudes from 200 to 2000 km (in increments of 100 km) for inclinations of 0, 5, 10, 20, 28.5, 38, 51.6, 60, 70 and 90 degrees.

Sun-Synchronous Orbits: Data shall be provided for circular orbit altitudes from 200 to 2000 km.

High Energy Missions: Data shall be provided as a function of C_3 from $-10 \text{ km}^2/\text{sec}^2$ to $200 \text{ km}^2/\text{sec}^2$.

Elliptical Orbits: Data shall be provided as a function of apogee altitude and inclination using the launch vehicle's standard ground rules. In addition, provide performance with a perigee altitude of 2000 km.

Geo-Synchronous Orbits (GSO): Data shall be provided for insertion directly into Geo-Synchronous Orbits (GSO).

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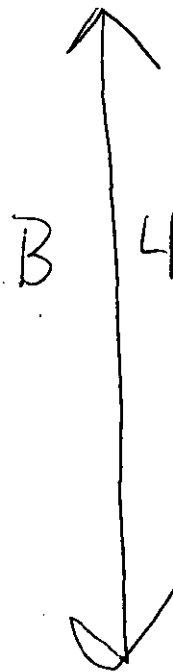
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8.0 PAYLOAD ENVIRONMENT

The Contractor shall provide data for the maximum payload acoustic, vibration, shock, and acceleration, and thermal environment levels during launch and ascent. The maximum electromagnetic radiation levels encountered by the payload shall be depicted in Figure D1-3. The Contractor shall illustrate the pressure profiles and depressurization rates for each PLF in Figure D1-4. The maximum expected payload flight environments due to acoustics (50% fill), vibration, and shock shall be shown in Tables D1-K, D1-L, and D1-M, respectively. The maximum expected total acceleration (limit load factors), including uncertainty factors, shall be shown in Table D1-N (key dynamic events may be broken out as appropriate). The maximum expected sinusoidal vibrations at the base of the PA shall be shown in Table D1-O. The maximum quasi-steady acceleration as a function of payload separated mass shall be shown in Figure D1-5. The Contractor shall provide the maximum thermal environment during ascent for every launch component (i.e., upper stage, unblanketed skin, thermal/acoustic blankets, etc.) inside the fairing with a view factor to the payload in Figure D1-5A.

Falcon 1/1e Launch Vehicle RF System Characteristics

Payload customers must ensure that spacecraft materials or components sensitive to an RF environment are compatible with both the launch pad environment and the RF environment during flight.



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Falcon 1/1e Acoustic Environment

During flight, the payload(s) will be subjected to a varying acoustic environment. Levels are highest at lift off and during transonic flight due to aerodynamic excitation. Falcon 1/1e will make use of acoustic blanketing to reduce the acoustic environment and a nominal (minimal) 2" thick blanket configuration is assumed for all predicted environments. Spectral energy methods were used to predict an acoustic Maximum Predicted Environment (MPE) as shown in Table D1-Ka and D1-Kb below.

Frequency (Hz)	Falcon 1 Payload Acoustic MPE*	Frequency (Hz)	Falcon 1 Payload Acoustic MPE*
20	103	500	122
25	106	630	122
31	109	800	122
40	112	1000	121
50	113.5	1250	120
63	115	1600	118
80	116	2000	117
100	117	2500	116
125	118	3150	115
160	119	4000	114
200	120	5000	113
250	121	6300	112
315	121.5	8000	111
400	122	10000	110
		OASPL	132.6

*Empty Fairing (133 dB OASPL)

**Table D1- Ka: Falcon 1 Maximum Flight-Level Payload Acoustic Environment
(derived from flight and test data)**

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SECTION D

ATTACHMENT D1

EXHIBIT 1

**FALCON 9 Capabilities,
Specifications and Environments**

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EXHIBIT 1

FALCON 9 CAPABILITIES, SPECIFICATIONS AND ENVIRONMENTS

Exhibit 1 represents the capabilities, specifications, and environments of the proposed launch services, including all standard launch service and non-standard services.

1.0 VEHICLE CONFIGURATION

The Contractor shall define (in Table D1-C) the vehicle, Solid Rocket Motor (SRM), upper stage, Payload Adapter (PA), and Payload Fairing (PLF) configuration options available for each proposed vehicle class. These configurations shall include all standard electrical systems, mechanical systems, propulsion systems, ordnance devices, and flight instrumentation.

Vehicle Configuration	Falcon 9 Block 1: The Falcon 9 Block 1 first stage uses nine Merlin 1C engines. The Merlin 1C engine burns LOx/RP-1 and generates 95,000 lbf thrust (sea level). The engine does not have the ability to be throttled.
SRM Configuration	Not Applicable
Upper Stage	Falcon 9 Stage 2 (powered by Merlin Vacuum single engine)
Payload Adapter	The 56.2 inch six-point payload mounting and separation system). Carries an electrical connector(s) that provide separation indication through primary and redundant breakwires. Separation initiated by electrical command to non-explosive separation nuts; integral springs provide delta-velocity.
Payload Fairing	17 foot (5.2m) diameter – single length (45 feet [13.7m])

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SRM	Not Applicable
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Configuration
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Table D1-C: Vehicle Configurations

2.0 PAYLOAD DELIVERY CAPABILITY

SpaceX has provided where applicable, in Tables D1-D through D1-G3, the maximum payload capability from appropriate launch site with associated ground rules for the two configurations of the Falcon 9 launch vehicle (Block 1 and Block 2). The Block 1 launch vehicle was part of the previous NASA Launch Services catalog, before the contract period of performance expired. The configurations are defined in paragraph 1.0, Vehicle Configuration. Performance is expressed in terms of payload mass plus payload separation system – see Performance Ground Rule #1 on page 'Exhibit 1 (F9)-9' and shall assume a 3-sigma performance reserve for the following orbits:

Low Earth Orbits (LEO): Data shall be provided for circular orbit altitudes from 200 to 2000 km (in increments of 100 km) for inclinations of 0, 5, 10, 20, 28.5, 38, 51.6, 60, 70 and 90 degrees.

Sun-Synchronous Orbits: Data shall be provided for circular orbit altitudes from 200 to 2000 km.

High Energy Missions: Data shall be provided as a function of C_3 from $-10 \text{ km}^2/\text{sec}^2$ to $200 \text{ km}^2/\text{sec}^2$.

Elliptical Orbits: Data shall be provided as a function of apogee altitude and inclination using the launch vehicle's standard ground rules. In addition, provide performance with a perigee altitude of 2000 km.

Geo-Synchronous Orbits (GSO): Data shall be provided for insertion directly into Geo-Synchronous Orbits (GSO).

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3.0 INSERTION ACCURACIES

SpaceX provides the following insertion accuracies for the Falcon 9 vehicle configuration. These values have not been verified by multiple operations at the time of the submittal of this proposal. Per the NASA RFP, the orbital parameters in the following table are examples for consideration.

Required 3-Sigma Insertion Error Limit Magnitude	
Variable	Accuracy
Inclination	B4
Argument of Periapsis	
Right Ascension of Ascending Node	
Apogee	
Perigee	
Right Ascension of Launch Asymptote	
Declination of Launch Asymptote	
C ₃	

Table D1- H: Falcon 9 Standard Insertion Accuracy Requirements

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6.0 MECHANICAL INTERFACE

The following drawings show the mechanical interface for the Falcon 9 payload separation system. This is a 6-point, 52.6 inch diameter separation system.

SpaceX will provide, per the Statement of Work, a test launch vehicle adapter and separation system when required for testing and training on separation system operations. Provision of a test adapter is a standard service in the NLS contract.

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SECTION D

ATTACHMENT D1

EXHIBIT 2

**STANDARD LAUNCH SERVICES LIST
Falcon 1, Falcon 1e and Falcon 9**

EXHIBIT 2

STANDARD LAUNCH SERVICES LIST

The Contractor shall provide the following as part of their standard launch service. These services shall be performed for each mission in accordance with the contract terms and conditions. Each item shall include all hardware, software, analyses, and support required to perform the service. All capabilities and conditions in Exhibit 1 that pertain to the services listed herein shall apply.

SOW Para. #	Launch Vehicle Requirements Summary
2.1	Launch Vehicle
A	
(i)	Launch periods as small as TBP days in duration (see SOW for description)
(ii)	Multiple approximately twenty-four (24) hour re-launch attempts in the event of a launch scrub
(iii)	Instantaneous launch window
(iv)	Inertial targeting over a <i>34</i> launch window utilizing multiple discrete or continuous targeting
N/A	Mission Planning for missions extending beyond 45 minutes (GTO and interplanetary)
B	A launch vehicle and Payload Adapter (PA) with appropriate electrical and mechanical interfaces (as described in Exhibit 1) required for payload integration and testing.
C	A payload separation system with the following characteristics (see SOW for description)
(i)	The payload shall be protected from debris generated by the separation system.
(ii)	<i>The separation system shall function in a manner that prevents any re-contact with the payload, including Contractor-provided attach hardware on the payload, by the upper stage or any element of the separation system once separation has been initiated.</i>
(iv)	Redundant payload separation indications.
D	

SOW Para. #	Launch Vehicle Requirements Summary
(i)	Two (F1/1e) or three (F9) payload access doors of sizes (see SOW for description)
(ii)	Thermal environments... (see SOW for description)
(iv)	Thermal and/or acoustic blankets sealed or filtered such that venting of blanket material debris does not contaminate the payload.
E	Flight instrumentation, as specified in Exhibit 1, paragraph 9.0, Payload Environment Instrumentation, to provide data adequate to support Section C, paragraph 24.2, Mission Success Determination.
F	Capability to spin payloads (see SOW for description)
G	Post mission maneuvers (see SOW for description)
(i)	A Collision/Contamination Avoidance Maneuver (CCAM), when applicable, following payload separation to minimize payload contamination and any chance of re-contact with the separated payload
(ii)	End of mission maneuvers after CCAM shall support the limiting of orbital debris IAW mission requirements and vehicle capability.
H	Provisions for the prevention of static charging on umbilical connectors that may be subjected to static charging from plasma heating or atmospheric particulate matter (e.g., bleed resistors, dead facing, or connector covers).
I	A logo in accordance with NASA provided artwork (see SOW for description)
J	Availability of a Test Payload Adapter (TPA) (see SOW for description)
K	Command, control, and power signal capability from the launch control facility to the payload umbilical Ground Support Equipment (GSE) IAW the mission specific ICD.
L	All mechanical GSE required to interface with the payload mechanical adapters and accomplish the payload to launch vehicle mating operation IAW the mission ICD.
M	Both halves of the electrical connector at each spacecraft-to-launch vehicle interface. The Contractor shall provide three (3) sets for each electrical connector interface: a flight set, a flight spare set, and a set for spacecraft testing.

SOW Para. #	Launch Vehicle Requirements Summary
N	All other hardware equipment, software, infrastructure, and logistics necessary to perform the contracted launch services.
2.2	Program Management (see SOW for description)
2.3	Mission Integration Services
2.3.1	Mission Integration Management (see SOW for description)
2.3.2	Mission Analyses (see SOW for description)
2.3.3	Mission Success Determination (see SOW for description)
2.4	Launch Site Support (see SOW for description)
2.4.1	Pre-Launch Checkout and Launch Support
2.4.1.1	Launch Vehicle Preparation and Launch For launch services provided under this contract, the Contractor shall, as a minimum;
A	Perform all launch vehicle preparations and launch site operations necessary to safely and successfully deliver the payload to the desired orbit.
B	Generate the required documents (CDRL C3-7) and obtain all required safety approvals for the launch vehicle system and integrated payload/launch vehicle system operations including payload/launch vehicle system integration and launch operations.
C	Provide NASA access to all meetings including, but not limited to, scheduling meetings, test briefings, and technical meetings. Upon request, the Contractor shall provide copies of schedules, test briefings, and other material presented at technical meetings.
D	Conduct launch vehicle/launch site walk-downs with NNC participation.
E	Comply with the submittal and operational requirements for all NASA provided facilities occupied during launch vehicle processing (CDRL C1-5). Failure to comply may result in denied access to the NASA provided facility.
2.4.1.2	Telemetry Data and Launch Countdown Support
2.4.1.2.1	Vehicle Telemetry

SOW Para. #	Launch Vehicle Requirements Summary
2.4.1.2.2	Baseline and Integrated Vehicle Support

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SOW	Launch Vehicle Requirements Summary
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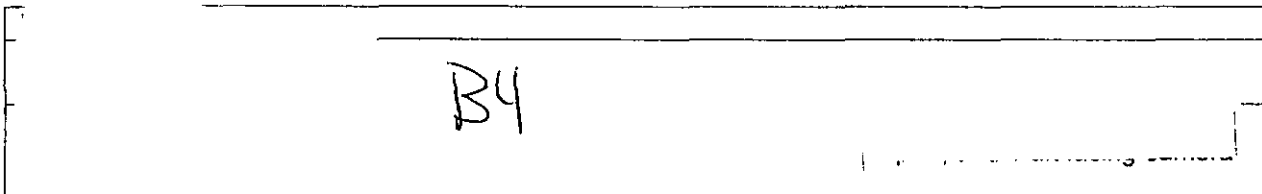
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2.4.1.3	<p>Launch Dress Rehearsal</p> <p>The Contractor shall conduct a minimum of one Dress Rehearsal prior to launch. The rehearsal shall exercise the launch countdown procedure, and will have the participation of the NNC and launch vehicle Contractor launch teams. The rehearsal may use an abbreviated countdown script with simulated payload/vehicle conditions, including anomalies.</p>
2.4.2.	<p>Launch Site Payload Support</p>
2.4.2.1	<p>Payload Processing Facility</p> <p>For launches conducted from CCAFS, VAFB, and WFF, NASA will provide the Payload Processing Facility (PPF) unless processing services are purchased as a non-standard service. In the event the Contractor proposes and NASA approves an alternate launch site, the Contractor shall be responsible for providing a PPF, subject to NASA approval, meeting the payload requirements.</p>

SOW Para. #	Launch Vehicle Requirements Summary
2.4.2.2	Launch Site Payload Integration Support The Contractor shall provide all services, equipment, and support required for the integration and launch of each payload. Services shall include, as a minimum, the following:
A	Encapsulation of the payload complement at the PPF, for either flight or transport to the launch complex, transport, mate with the launch vehicle and performance of integrated checkout activities.
B	Verification of the end-to-end functionality of the umbilical lines provided for payload use.
C	Support for the installation and checkout of the payload GSE (provided by the payload customer) at the launch site, and payload communication accommodations from the pad to the PPF. The Contractor shall also provide for a NASA console at the Contractor's launch control center.
D	Provision of the mountings for, and the installation of, the payload GSE (provided by the payload customer) at the launch complex and/or remote sites.
E	Provision for contingency off-loading of payload propellants in accordance with the appropriate Range Safety requirements and appropriate payload procedures.
F	Provision for launch site services to meet payload requirements such as: power, air conditioning, GN2/GHe purges, and contamination control.
G	Support of all activities required to de-mate and to return the payload to the processing facility if necessary.
H	Preparation of the procedures for integrated launch vehicle/payload operations for NASA approval and incorporation of the payload procedures as appropriate (CDRL C5-5).
I	Coordination of payload and launch vehicle operations into an integrated operational flow, preparation of the schedules, and provision of the schedules with updates as needed to NNC.
J	Provision of contamination control for payloads while they are in the possession of the Contractor, or in a Contractor-provided PPF IAW the SOW, paragraph 2.4.2.3.

SOW Para. #	Launch Vehicle Requirements Summary
K	Provision of a payload protective cover for use after payload mate to the launch vehicle, if the fairing is installed at the launch pad. The cover shall be purged with conditioned air meeting the minimum requirements stated in the SOW, paragraph 2.4.2.3(C). Provisions shall be made for payload personnel ingress and egress.
L	Certification of payload contamination control requirements for: fairing surface cleanliness, cleanroom environments, and purge system cleanliness.
M	Support for the installation of customer provided RF re-radiating equipment.
N	Provision for the planning and execution of activities associated with the integrated testing of the customer's payload with the launch vehicle on the launch pad.
2.4.2.3	Contamination and Environmental Control
A	Payload/Vehicle Integration Environment (see SOW for description)
B	Transportation Environment (see SOW for description)
C	Fairing Environment (see SOW for description)
D	Fairing Internal and Payload Adapter Surface Cleaning (see SOW for description)
E	Reserved
F	Clean Room Garments (see SOW for description)
G	Materials (see SOW for description)
2.4.2.4	Operational Support Services (see SOW for description)
2.4.3	Range Support and Services (see SOW for description)
2.5	Safety, Reliability, and Quality Assurance
2.5.1	Safety and Health Program (see SOW for description)
2.5.2	Reliability Program (see SOW for description)
2.5.3	Quality Assurance Program (see SOW for description)
2.6	NASA Insight and Approval
	The Contractor shall comply with the Government's implementation of NPD 8610.23 and NPD 8610.24 as defined under Section C, Clause 25.0 and the SOW paragraph 2.2.1, Formal Reviews. As part of the standard launch service, the Contractor shall provide the data, documentation, drawings, analytical models, and support services as necessary to accommodate the requirements specified under contract Section C, Clause 25.0, Government Insight and Approval.

SOW Para. #	Launch Vehicle Requirements Summary
	The Contractor shall notify NASA of qualification or test anomalies involving similar launch vehicles, systems, subassemblies and components. The Contractor shall make available to NASA all problem reports or discrepancy reports on launch vehicle systems' failures and anomalies. This shall include insight into fleet-wide problems, anomalies, MRB actions, deviations or waivers to systems, subsystems, materials, processes, and test equipment including those used on non-NASA missions.
	In the event of an anomaly or launch failure, the Contractor shall support NASA's Failure Review Board, if activated, or shall allow NASA to fully participate 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 and copy machines from one to three residents and up to four visitors at each location. A minimum of two voice and two data telephone lines shall be provided. Electronic data transfer compatibility between the resident office and off-site NASA institutions is required. A resident office will not be required at CCAFS or VAFB, but NASA will require operational support accommodations (i.e. office space, power, telephone, communication end instruments for monitoring vehicle testing, etc.) at the launch complex during NASA launch operations.
C 32.3	Required Insurance for Liability to Third Parties
	The Contractor shall continue in effect or acquire insurance to protect the Parties and the Related Parties from liability for claims from Third Parties for damage to or loss of property or personal injury or death arising in connection with the covered launch activities under this contract. The amount of the required insurance shall be the maximum amount available in the commercial marketplace at reasonable cost, but shall not exceed \$500 million for each launch. The policy or policies shall name NASA and the related parties as additional insured parties. Required insurance coverage shall attach no later than the arrival of the launch vehicle at the launch site and shall remain in force for at least thirty (30) days following launch.



SECTION D

ATTACHMENT D1

EXHIBIT 3

**FALCON 1 and FALCON 1e
Non-Standard Launch Services List**

EXHIBIT 3

NON STANDARD LAUNCH SERVICES LIST for Falcon 1 and Falcon 1e

SpaceX shall provide the capability to perform the following non-standard services. This information is provided in response to the instructions in the NLS II RFP. These services shall be performed for each mission, as requested and authorized by the NASA Contracting Officer, in accordance with the contract terms and conditions. Each non-standard item listed shall include all hardware, software, analyses, and support required to provide the service. Any impacts to the capabilities or conditions defined in Exhibit 1 introduced by the non-standard service shall be explained in detail. The Contractor shall not be required to design and develop a non-standard service in support of this contract.

The Contractor shall list all non-standard services provided for each proposed launch vehicle configuration, which will be negotiated and incorporated into the contract. All non-standard services provided shall be fully compliant with the SOW. Any non-standard services provided that are not fully compliant shall be designated as such in the proposal with details supplied as to the impact of making the service compliant. All proposed non-standard services shall have an associated, no-later-than ordering date with respect to the launch date. In addition, the Contractor shall provide any non-standard services deemed useful for future NASA missions based on past experience.

If authorized, the Contractor shall implement the following services:

- 1.0 Alternate Vehicle Configurations or Performance Enhancements (i.e., Extended Nozzles, Additional Motors/Thrust Augmentation) –**

B4

- 2.0 Alternate Fairing Configurations and/or Modifications**

- 2.1 Alternate configurations –** B4

- 2.2 Additional access doors in excess of two included in standard service.** Limitations on location can be provided (for example, doors cannot be located in proximity to the fairing separation split line). This option must be order B4 from launch.

- 2.3 Access doors of non-standard size**
SpaceX can offer doors smaller than the standard size. Limitations on location can be provided (for example, doors cannot be located in proximity to the fairing separation split line). This option must be order B4 from launch.

- 2.4 Mounting provisions, cabling and antenna systems for re-radiating signals from the payload to remote sites –** R4

- 2.5 S, C, X, and Ku-band re-radiation equipment –** B4

- 2.6 RF-transparent doors
SpaceX offers RF-transparent doors in lieu of or in addition to personnel access doors as a standard service. The payload fairing supports a maximum combination of three doors and/or RF windows. Order

B4

3.0 Alternate Payload Adapters (PAs)

- 3.1 Different size or different payload interface PAs
B4 at this time but could be handled on a mission-specific basis
- 3.2 Low tip-off rate PAs

B4

4.0 Upper Stage Hardware – B4

- 4.1 Motor – B4
- 4.2 PA – B4
- 4.3 Spin system with enhanced capability – B4
- 4.4 Despin system with enhanced capability – B4
- 4.5 Improved insertion accuracy options – B4

5.0 Multiple PA, including Related Mission Integration Support

B4

6.0 Secondary PA for Non-Separating Secondary Payload

B4 for IDIQ at this time but can be evaluated as a mission unique service.

7.0 Secondary PA/Separation System for Separating Secondary Payload

- 7.1 Secondary Payload Adapter (with S/C-provided separation system)
B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 7.2 Secondary Payload Adapter (with contractor-provided separation system)
B4 for IDIQ at this time but can be evaluated as a mission unique service.

8.0 RF Through-the-Fairing Transmission Capability

B4 for IDIQ at this time but can be evaluated as a mission unique service.

9.0 Enhanced Electrical Interface

- 9.1 Increased capacity payload-to-GSE interface.
B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 9.2 Launch vehicle command and control of payload
B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 9.3 Launch vehicle supplied payload power capability
B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 9.4 Enhanced telemetry capabilities including interleaving/deinterleaving of payload telemetry data
B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 9.5 Additional launch vehicle environmental instrumentation
B4

10.0 Launch Vehicle Mounted Cameras

Launch Vehicle Mounted Cameras including necessary lighting and the real time transmission of the video signal to the designated NASA LSP Data Center. Identification of potential ground coverage sites and coordination of video transmission between all ground sites and NASA LSP Data Center is to be included.

L B4

11.0 Special Contamination Control Options

- 11.1 Enhanced fairing environment
SpaceX can offer the enhanced fairing environment for Falcon 1 and Falcon 1e as a non-std service. Order B4
- 11.2 Enhanced fairing internal surface cleaning (IEST-STD-CC1246D level 500A)
B4
- 11.3 Optional payload/vehicle integration environments
B4
- 11.4 Additional instrument purge system(s) up to B4 IEST-STD-CC1246D level 100A)
B4 for IDIQ (can be accommodated on a case by case basis).
- 11.5 Grade B Nitrogen (GN₂) IAW MIL-PRF-27401F or conditioned air cooling supply for spot cooling of payload components from payload mate or encapsulation up to B4
Grade B Nitrogen spot cooling is offered with a lead time of B4 before launch.
- 11.6 S/C Grade C Nitrogen (GN₂) IAW MIL-PRF-27401F Purge System
B4

- 11.7 Enhanced PLF and PLA Cleaning IAW IEST-STD-CC1246D level 500A. The internal surfaces of the payload fairing compartment (including Payload Adapter) shall be cleaned, certified and maintained to IEST-STD-CC1246D Level 500A or better, with the number and locations of samples to be determined by the integration team. Cleaning and certification shall be accomplished in a clean room rated at or above Class 8 IAW ISO14644-1. In lieu of IEST-STD-CC1246D Level 500A, the payload fairing compartment (including Payload Adapter) may be cleaned and certified such that contribution from launch vehicle sources measured from S/C turnover (Launch Vehicle Contractor control of S/C for integrated operations) through CCAM shall not exceed 0.5% total obscuration and $<1\text{mg}/0.1\text{m}^2$ Nonvolatile Residue (NVR). The sampling methodology for particulate shall be per ASTM 1216 and for Angstroms molecular contamination per ASTM 1235 with the number and locations of samples to be determined by the integration team.

- B4
11.8 Certified Portable Class 7 Clean Enclosure(s) for Open PLF Access Doors
B4

12.0 Reserved

13.0 Co-Manifested Payload Mission Service

B4
14.0 NASA Secondary Payload Mission Service

15.0 Payload Compatibility Assessment

The Contractor shall provide a document compiling all compatibility analyses performed on the co-manifested or secondary payload to verify the co-manifested or secondary payload does not unacceptably impact the primary. The specifics of the different analyses performed will vary from mission to mission and depend greatly on the nature of both primary and secondary payloads. Some items which are common elements of the document are: combined coupled loads analysis, critical clearance analysis, interface failure modes and effects analysis, safety assessment, combined thermal analysis, and mass properties/GN&C analysis. SpaceX offers this as a non-standard service. Order B4

16.0 Secondary Payload Mission Feasibility Study

A secondary payload mission feasibility study shall assess the performance capability and payload volume available to accommodate secondary payload missions on a non-interference basis with a given primary mission. Separating and non-separating secondary payloads shall be accommodated as a non-standard service. SpaceX offers this as a non-standard service. Order B4

17.0 Secondary Payload Accommodation Study

A secondary payload accommodation study shall address the suitability of and the approach for accommodating secondary payloads on a given vehicle configuration. The study shall develop a design, general payload requirements (secondary payload interface, volume, mass, environments) and implementation scheme for implementing both separating and/or non-separating secondary payloads. Dynamic loading analysis for generic secondary payloads shall be performed so that mission unique analyses are minimized.

SpaceX offers this as a non-standard service. Order 1 B4

18.0 Secondary Payload Mass Simulator

A mass simulator shall be designed and fabricated to match the requirements (e.g., moment of inertia, rigidity, mass, and CG) of the secondary payload that will be replaced. The mass simulator shall also adhere to the requirements (e.g., contamination, cleanliness, and interface) identified in the ICD. The Contractor shall complete any other analyses or documentation required, for replacement of the secondary payload with the mass simulator.

B4

19.0 Payload Processing Facilities

19.1 The Contractor shall provide the capability to provide ground processing facilities for payloads at the Eastern Range.

B4

19.2 The Contractor shall provide the capability to provide ground processing facilities for payloads at the Western Range.

B4

19.3 The Contractor shall provide the capability to provide ground processing facilities for payloads at the Wallops Flight Facility.

B4

19.4 The Contractor shall provide the capability to provide ground processing facilities

B4

20.0 Additional Mission Analysis and Support

20.1 Reserved

20.2 Support for additional mission integration working group meetings in excess of

B4

This can be procured at any time by the customer up until B4 with B4 notice. Meetings are to be held at SpaceX facilities.

20.3 Reserved

20.4 Performance and Guidance Accuracy Analysis

This can be procured at any time by the customer up until B4 and will require B4 to complete. SpaceX assumes format is per the NLS II RFP CDRL.

- 20.5 Coupled Dynamic Loads Analysis
This can be procured at any time by the customer up until B4 and will require B4 to complete. SpaceX assumes format is per the NLS II RFP CDRL.
- 20.6 Pre-Flight Controls and Stability Analysis
This can be procured at any time by the customer up until B4 and will require B4 to complete. SpaceX assumes format is per the NLS II RFP CDRL.
- 20.7 Integrated Thermal Analysis
This can be procured at any time by the customer up until B4 and will require B4 to complete. SpaceX assumes format is per the NLS II RFP CDRL.
- 20.8 RF Link Analysis
This can be procured at any time by the customer up until B4 and will require B4 to complete. SpaceX assumes format is per the NLS II RFP CDRL.
- 20.9 Payload Fairing Clearance Analysis
This can be procured at any time by the customer up until B4 and will require B4 to complete. SpaceX assumes format is per the NLS II RFP CDRL.
- 20.10 Payload/Expended Stage Separation Analysis
This can be procured at any time by the customer up until B4 and will require B4 to complete. SpaceX assumes format is per the NLS II RFP CDRL.
- 20.11 Analysis of ECS flow impingement on payload surfaces
This can be procured at any time by the customer up until B4 and will require B4 to complete.
- 20.12 RF Resonance Analysis to determine maximum RF field strengths that payload and launch vehicle avionics would be exposed to if spacecraft RF transmission systems were activated while encapsulated within the fairing.
B4
- 20.13 Advanced mission performance analysis support (limited feasibility assessments in response to new mission concepts)
B4
- 20.14 Launch vehicle Collision Avoidance (COLA) trajectory and covariance data.
B4
- 20.15 Launch vehicle flight software code and associated documentation.
B4

21.0 Reserved

- 21.1 Reserved
- 21.2 Reserved
- 21.3 Reserved

22.0 NASA Public Affairs Office Support

Accommodations for NASA guests, ^{B4} to view launch, including local transportation, launch viewing facilities, lavatory accommodations, food and beverage service, first aid and medical support for each proposed launch site.

B4

23.0 Launch Service Contractor (LSC) provided Telemetry

The LSC shall provide all telemetry data (main vehicle telemetry and special instrumentation/wideband telemetry system) IAW LSP-PD-120.05, "Launch Telemetry Requirements."

B4

24.0 Launch Service Contractor (LSC) provided Telemetry Acquisition Assistance Message (AAM) Order

B4

The Contractor shall provide Acquisition Assistance Messages (AAMs) to the down-range telemetry sites utilized by the mission for antenna pointing to acquire launch vehicle telemetry and to payload-designated control centers/telemetry sites for acquisition of space vehicle telemetry. The Government utilizes down-range telemetry sites to receive record and relay telemetry data from the Contractor's launch vehicle in accordance with LSP-PD-120.05, "Launch Telemetry Requirements." Mission-specific telemetry sites are selected to acquire data from the launch vehicle during the launch, powered-flight, and spacecraft separation phases of the mission. These telemetry sites may be owned/operated by NASA, the DoD, a U.S. commercial entity, or a foreign entity.

Generation of the AAMs will be treated as no greater than REQUIRED capability for launch commit criteria purposes. Should any greater capability be imposed, then the requirements to meet that greater capability shall be considered outside the scope of this NSS and subject to a separate contract action.

Format for AAMs will be in accordance with industry standard.

B4

B4

25.0 TDRSS Compatible Telemetry System

Design, build, qualify, integrate and test a TDRSS compatible telemetry system in the Launch Vehicle. After first flight, the TDRSS compatible telemetry system will be a standard launch service capability provided for NASA missions.

B4 for IDIQ at this time but can be evaluated as a mission unique service.

26.0 Extended Integration Periods - Order B4 ATP

26.1 B4 Extended Integration Period

This non-standard service provides for the standard launch services beginning B4 No additional services above and beyond the standard services are covered by this non-standard service.

26.2 B4 Extended Integration Period

This non-standard service provides for the standard launch services beginning B4 No additional services above and beyond the standard services are covered by this non-standard service.

26.3 B4 Extended Integration Period

This non-standard service provides for the standard launch services beginning B4 No additional services above and beyond the standard services are covered by this non-standard service.

26.4 B4 Extended Integration Period

This non-standard service provides for the standard launch services beginning B4 No additional services above and beyond the standard services are covered by this non-standard service.

27.0 Contractor Defined Non-Standard Services

27.1 SpaceX offers Falcon 1 and Falcon 1e launch services from Kwajalein (a non-standard NASA launch site) as part of the standard launch service.

SECTION D
ATTACHMENT D1
EXHIBIT 3
FALCON 9
Non-Standard Launch Services List

EXHIBIT 3

NON STANDARD LAUNCH SERVICES LIST for Falcon 9

SpaceX shall provide the capability to perform the following non-standard services. This information is provided in response to the instructions in the NLS II RFP. These services shall be performed for each mission, as requested and authorized by the NASA Contracting Officer, in accordance with the contract terms and conditions. Each non-standard item listed shall include all hardware, software, analyses, and support required to provide the service. Any impacts to the capabilities or conditions defined in Exhibit 1 introduced by the non-standard service shall be explained in detail. The Contractor shall not be required to design and develop a non-standard service in support of this contract.

The Contractor shall list all non-standard services provided for each proposed launch vehicle configuration, which will be negotiated and incorporated into the contract. All non-standard services provided shall be fully compliant with the SOW. Any non-standard services provided that are not fully compliant shall be designated as such in the proposal with details supplied as to the impact of making the service compliant. All proposed non-standard services shall have an associated, no-later-than ordering date with respect to the launch date. In addition, the Contractor shall provide any non-standard services deemed useful for future NASA missions based on past experience.

If authorized, the Contractor shall implement the following services:

- 1.0 Alternate Vehicle Configurations or Performance Enhancements (i.e., Extended Nozzles, Additional Motors/Thrust Augmentation) – B4**
B4
- 2.0 Alternate Fairing Configurations and/or Modifications**
 - 2.1 Alternate configurations**
 - 2.2 Additional access doors in excess of three included in standard service.**
SpaceX offers up to three doors/RF windows in the payload fairing as a standard service. Limitations on location can be provided (for example, doors cannot be located in proximity to the fairing separation split line). This option must be order B4 from launch.
 - 2.3 Access doors of non-standard size**
SpaceX offers a non-standard size door of 36 inches by 24 inches. Limitations on location can be provided (for example, doors cannot be located in proximity to the fairing separation split line). This option must be order B4 from launch.
 - 2.4 Mounting provisions, cabling and antenna systems for re-radiating signals from the payload to remote sites – B4**
 - 2.5 S, C, X, and Ku-band re-radiation equipment – B4**

- 2.6 RF-transparent doors Order: B4
SpaceX offers RF-transparent doors in lieu of or in addition to personnel access doors as a standard service. The payload fairing supports a maximum combination of three doors and/or RF windows.
- 3.0 **Alternate Payload Adapters (PAs)**
- 3.1 Different size or different payload interface PAs
B4 at this time but could be handled on a mission-specific basis
- 3.2 Low tip-off rate PAs
B4 at this time but could be handled on a mission-specific basis
- 4.0 **Upper Stage Hardware - 1 B4**
- 4.1 Motor - 1 B4
- 4.2 PA - B4
- 4.3 Spin system with enhanced capability - B4
- 4.4 Despin system with enhanced capability - B4
- 4.5 Improved insertion accuracy options - B4
- 5.0 **Multiple PA, including Related Mission Integration Support**
B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 6.0 **Secondary PA for Non-Separating Secondary Payload**
B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 7.0 **Secondary PA/Separation System for Separating Secondary Payload**
- 7.1 Secondary Payload Adapter (with S/C-provided separation system)
B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 7.2 Secondary Payload Adapter (with contractor-provided separation system)
B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 8.0 **RF Through-the-Fairing Transmission Capability**
B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 9.0 **Enhanced Electrical Interface**
- 9.1 Increased capacity payload-to-GSE interface.
B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 9.2 Launch vehicle command and control of payload

- B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 9.3 Launch vehicle supplied payload power capability
B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 9.4 Enhanced telemetry capabilities including interleaving/deinterleaving of payload telemetry data
B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 9.5 Additional launch vehicle environmental instrumentation
B4 for IDIQ at this time but can be evaluated as a mission unique service.
- 10.0 Launch Vehicle Mounted Cameras** B4
Launch Vehicle Mounted Cameras including necessary lighting and the real time transmission of the video signal to the designated NASA LSP Data Center. Identification of potential ground coverage sites and coordination of video transmission between all ground sites and NASA LSP Data Center is to be included.
- B4
- 11.0 Special Contamination Control Options**
- 11.1 Enhanced fairing environment
SpaceX offers recirculated nitrogen as the conditioned gas used inside the payload fairing once the Falcon 9 is vertical on the pad with access doors closed and no additional access required. Operating parameters are provided in Exhibit 1.
- 11.2 Enhanced fairing internal surface cleaning (IEST-STD-CC1246D level 500A)
SpaceX can offer the enhanced fairing internal surface cleaning for Falcon 9 as a non-std service. B4
- 11.3 Optional payload/vehicle integration environments
B4
- 11.4 Additional instrument purge system(s) up to B4 (IEST-STD-CC1246D level 100A)
B4 for IDIQ (can be accommodated on a case by case basis).
- 11.5 Grade B Nitrogen (GN₂) IAW MIL-PRF-27401F or conditioned air cooling supply for spot cooling of payload components from payload mate or encapsulation up to B4

- Grade B Nitrogen spot cooling is offered with a lead time of ^{B4} before launch.
- 11.6 ^{B4} S/C Grade C Nitrogen (GN2) IAW MIL-PRF-27401F Purge System
- 11.7 Enhanced PLF and PLA Cleaning IAW IEST-STD-CC1246D level 500A. The internal surfaces of the payload fairing compartment (including Payload Adapter) shall be cleaned, certified and maintained to IEST-STD-CC1246D Level 500A or better, with the number and locations of samples to be determined by the integration team. Cleaning and certification shall be accomplished in a clean room rated at or above Class 8 IAW ISO14644-1. In lieu of IEST-STD-CC1246D Level 500A, the payload fairing compartment (including Payload Adapter) may be cleaned and certified such that contribution from launch vehicle sources measured from S/C turnover (Launch Vehicle Contractor control of S/C for integrated operations) through CCAM shall not exceed 0.5% total obscuration and <1mg/0.1m² Nonvolatile Residue (NVR). The sampling methodology for particulate shall be per ASTM 1216 and for Angstroms molecular contamination per ASTM 1235 with the number and locations of samples to be determined by the integration team.
- 11.8 Certified Portable Class 7 Clean Enclosure(s) for Open PLF Access Doors ^{B4}
- 12.0 **Reserved**
- 13.0 **Co-Manifested Payload Mission Service** ^{B4}
- 14.0 **NASA Secondary Payload Mission Service** ^{B4}
- 15.0 **Payload Compatibility Assessment** ^{B4}

The Contractor shall provide a document compiling all compatibility analyses performed on the co-manifested or secondary payload to verify the co-manifested or secondary payload does not unacceptably impact the primary. The specifics of the different analyses performed will vary from mission to mission and depend greatly on the nature of both primary and secondary payloads. Some items which are common elements of the document are: combined coupled loads analysis, critical clearance analysis, interface failure modes and effects analysis, safety assessment, combined thermal analysis, and mass properties/GN&C analysis. SpaceX offers this as a non-standard service.

16.0 Secondary Payload Mission Feasibility Study Order B4

A secondary payload mission feasibility study shall assess the performance capability and payload volume available to accommodate secondary payload missions on a non-interference basis with a given primary mission. Separating and non-separating secondary payloads shall be accommodated as a non-standard service. SpaceX offers this as a non-standard service.

17.0 Secondary Payload Accommodation Study Order B4

A secondary payload accommodation study shall address the suitability of and the approach for accommodating secondary payloads on a given vehicle configuration. The study shall develop a design, general payload requirements (secondary payload interface, volume, mass, environments) and implementation scheme for implementing both separating and/or non-separating secondary payloads. Dynamic loading analysis for generic secondary payloads shall be performed so that mission unique analyses are minimized.

B4

18.0 Secondary Payload Mass Simulator

A mass simulator shall be designed and fabricated to match the requirements (e.g., moment of inertia, rigidity, mass, and CG) of the secondary payload that will be replaced. The mass simulator shall also adhere to the requirements (e.g., contamination, cleanliness, and interface) identified in the ICD. The Contractor shall complete any other analyses or documentation required, for replacement of the secondary payload with the mass simulator.

B4

19.0 Payload Processing Facilities

19.1 The Contractor shall provide the capability to provide ground processing facilities for payloads at the Eastern Range.

SpaceX shall provide the capability to provide non hazardous ground processing facilities for payloads at the Eastern Range in excess of the B4 included in the standard service. SpaceX requires that this be procured with at least B4 notice.

19.2 The Contractor shall provide the capability to provide ground processing facilities for payloads at the Western Range.

SpaceX shall provide the capability to provide nonhazardous ground processing facilities for payloads at the Western Range in excess of the B4 included in the standard service. SpaceX requires that this be procured with at least B4 notice.

19.3 The Contractor shall provide the capability to provide ground processing facilities for payloads at the Wallops Flight Facility.

19.4 The Contractor shall provide the capability to provide ground processing facilities for Falcon 9 payloads at the Reagan Test Site (USAKA - Kwajalein). Order

20.0 Additional Mission Analysis and Support

20.1 Reserved

20.2 Support for additional mission integration working group meetings in excess of 1

This can be procured at any time by the customer up until with notice. Meetings are to be held at SpaceX facilities.

20.3 Reserved

20.4 Performance and Guidance Accuracy Analysis

This can be procured at any time by the customer up until and will require to complete. SpaceX assumes format is per the NLS II RFP CDRL.

20.5 Coupled Dynamic Loads Analysis

This can be procured at any time by the customer up until and will require to complete. SpaceX assumes format is per the NLS II RFP CDRL.

20.6 Pre-Flight Controls and Stability Analysis

This can be procured at any time by the customer up until and will require to complete. SpaceX assumes format is per the NLS II RFP CDRL.

20.7 Integrated Thermal Analysis

This can be procured at any time by the customer up until and will require to complete. SpaceX assumes format is per the NLS II RFP CDRL.

20.8 RF Link Analysis

This can be procured at any time by the customer up until and will require to complete. SpaceX assumes format is per the NLS II RFP CDRL.

20.9 Payload Fairing Clearance Analysis

This can be procured at any time by the customer up until and will require to complete. SpaceX assumes format is per the NLS II RFP CDRL.

20.10 Payload/Expendable Stage Separation Analysis

This can be procured at any time by the customer up until and will require to complete. SpaceX assumes format is per the NLS II RFP CDRL.

20.11 Analysis of ECS flow impingement on payload surfaces

This can be procured at any time by the customer up until and will require to complete.

20.12 RF Resonance Analysis to determine maximum RF field strengths that payload and launch vehicle avionics would be exposed to if spacecraft RF transmission systems were activated while encapsulated within the fairing.

B4

20.13 Advanced mission performance analysis support (limited feasibility assessments in response to new mission concepts)

B4

20.14 Launch vehicle Collision Avoidance (COLA) trajectory and covariance data.

B4

20.15 Launch vehicle flight software code and associated documentation.

B4

21.0 Reserved

21.1 Reserved

21.2 Reserved

21.3 Reserved

22.0 NASA Public Affairs Office Support

Accommodations for NASA guests, in units of 50, to view launch, including local transportation, launch viewing facilities, lavatory accommodations, food and beverage service, first aid and medical support for each proposed launch site.

SpaceX offers this service as non-standard with advance notice for the Cape Canaveral launch site.

B4

23.0 Launch Service Contractor (LSC) provided Telemetry

The LSC shall provide all telemetry data (main vehicle telemetry and special instrumentation/wideband telemetry system) IAW LSP-PD-120.05, "Launch Telemetry Requirements."

B4

24.0 Launch Service Contractor (LSC) provided Telemetry Acquisition Assistance Message (AAM) Order NLS

B4

The Contractor shall provide Acquisition Assistance Messages (AAMs) to the down-range telemetry sites utilized by the mission for antenna pointing to acquire launch vehicle telemetry and to payload-designated control centers/telemetry sites for acquisition of space vehicle telemetry. The Government utilizes down-range telemetry sites to receive record and relay telemetry data from the Contractor's launch vehicle in accordance with LSP-PD-120.05, "Launch Telemetry Requirements." Mission-specific telemetry sites are selected to acquire data from the launch vehicle during the launch, powered-flight, and spacecraft separation phases of the

mission. These telemetry sites may be owned/operated by NASA, the DoD, a U.S. commercial entity, or a foreign entity.

Generation of the AAMs will be treated as no greater than REQUIRED capability for launch commit criteria purposes. Should any greater capability be imposed, then the requirements to meet that greater capability shall be considered outside the scope of this NSS and subject to a separate contract action.

Format for AAMs will be in accordance with industry standard.

B4

B4

25.0 TDRSS Compatible Telemetry System

Design, build, qualify, integrate and test a TDRSS compatible telemetry system in the Launch Vehicle. After first flight, the TDRSS compatible telemetry system will be a standard launch service capability provided for NASA missions.

B4

26.0 Extended Integration Periods Order B4- ATP

26.1 B4 Extended Integration Period

This non-standard service provides for the standard launch services beginning B4 earlier, at B4. No additional services above and beyond the standard services are covered by this non-standard service.

26.2 B4 Extended Integration Period

This non-standard service provides for the standard launch services beginning B4 earlier, at B4. No additional services above and beyond the standard services are covered by this non-standard service.

26.3 B4 Extended Integration Period

This non-standard service provides for the standard launch services beginning B4 earlier, at B4. No additional services above and beyond the standard services are covered by this non-standard service.

26.4 B4 Extended Integration Period

This non-standard service provides for the standard launch services beginning B4 earlier, at B4. No additional services above and beyond the standard services are covered by this non-standard service.

27.0 Contractor Defined Non-Standard Services

27.1 :

B4

SECTION D
ATTACHMENT D1
EXHIBIT 4

FALCON 1, FALCON 1e, FALCON 9
Sample Certificate of Flight Readiness

SAMPLE CERTIFICATE OF FLIGHT READINESS

FLIGHT CERTIFICATION DOCUMENT FOR THE (TBD) MISSION

The following agencies certify that the necessary launch test operations to date have been completed for the launch vehicle and payload. Pending satisfactory closure of in-line work and any open items identified in the Launch Readiness Review, the launch vehicle, payload, and all supporting systems are ready for the launch operation.

SpaceX

Launch Services Program Chief Engineer
NASA / KSC

Chief Safety Officer
NASA

Launch Services Program Manager
NASA / KSC

S/C Project Manager
NASA / TBP Center

Launch Services Program Launch Director
NASA / KSC

The following Government agencies, involved in supporting this (TBD) mission, certify that all applicable requirements to date have been met and that all Government support elements are making final preparations to support this mission. Pending satisfactory closure of in-line work to prepare for support of this mission and any open items identified in the Launch Readiness Review, all Government support elements are ready for the launch operation. Furthermore, pending satisfactory closure of in-line launch vehicle and observatory processing and any open items identified in the Launch Readiness Review, the (TBD) Space Wing/US Government Launch Authority foresees no national resource protection or Range Safety issues which would preclude launch.

(TBD) Space Wing//US Government Launch Authority

Date

SAMPLE CERTIFICATE OF FLIGHT READINESS

FLIGHT CERTIFICATION DOCUMENT FOR THE (TBD) MISSION

Note: The sample Certificate of Flight Readiness is modified from the suggested format in the NLS-II Request For Proposal. The signature block "(TBD) Space Wing" has been amended to include "US Government Launch Authority". US Air Force Space Command 30th and 45th Space Wings do not have SpaceLift Commander authority for launches from US Army Kwajalein Atoll.

Section D

ATTACHMENT D1

EXHIBIT 7

**FALCON 1 and 1e
Certification Plan**

B4

Redacted in
its entirety

Section D
ATTACHMENT D1
EXHIBIT 7
FALCON 9
Certification Plan

B4

Redacted in
its entirety

EXHIBIT 8

MISSION INTERFACE CONTROL DOCUMENTS (ICD)

Thirty (30) days prior to launch, the approved ICD shall be incorporated into the contract via contract modification as Exhibit 8 to Attachment D1. Any approved changes after its inclusion into the contract will be incorporated prior to mission success determination.

For each mission, the final Interface Control Document (CDRL C2-1.1) shall be attached to the contract.

EXHIBIT 9

LAUNCH SERVICE TASK ORDER MISSION SOLUTIONS

Launch service task order mission solutions will be attached to the contract upon award of task order(s).

TBD

ATTACHMENT D2

CONTRACT DATA REQUIREMENTS LIST (CDRL)

The Contract Data Requirements List (CDRL) identifies critical elements of the contracted effort where NASA requires aspects of mission integration insight and approval. The following CDRL defines the scope of documentation required; however, NASA will utilize the Contractor's existing documentation to the extent practicable. Where there is not a direct match between a CDRL item and the Contractor's standard documentation, the Contractor's documentation will be acceptable provided it contains equivalent data requirements. CDRL 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 submittal cycles.

The number of copies listed in Table D2-A represents the number of hard copies to be delivered to NASA only if the CDRL data is not available electronically, except CDRLs C1-1, C1-2, C1-3, C5-4, and C5-5 which must also be delivered in hard copy. All electronic formats shall be mutually acceptable. All data requirements shall be delivered to the KSC ELV Library. The Contractor shall notify the Contracting Officer in writing of CDRL delivery.

Item	Document	Approval/ Review	Initial Submittal Date	Subsequent Submittal Date	No. of Copies
	C1: Documentation				
C1-1*	Formal Meeting & Review Documentation	Approval (B & E(vi)); Review all other	(A)(i) at Review minus 1W; (A)(ii) at Review; (B,C,D,E) Review plus 1W	A/R	A/R
C1-2*	Countdown Documentation	Approval (A,B); Review (C)	L-1W	As Changed	5
C1-3*	Mission Console Notebook	Review	24 hours prior to Mission Dress Rehearsal	As Changed	100
C1-4	Manifest Policy	Review	Contract Award	As Changed	5
C1-5*	Operations Documentation for Processing in NASA Provided Payload Processing Facilities	Review	A/R in CDRL	As Changed	2

* Required per mission

TABLE D2-A: CDRL INDEX

Item	Document	Approval/ Review	Initial Submittal Date	Subsequent Submittal Date	No. of Copies
	C2: Mission Integration				
C2-1.1*	Interface Control Document (ICD)	Approval	Preliminary ICD at ATP+ 6M	Baseline ICD at L-15M and A/R	10
C2-1.2*	Interface Control Document (ICD) Requirements Verification Matrix	Approval	NLT 3 months after Preliminary ICD CDRL approval	A/R or with each ICD revision	3
C2-2*	Mission Specific Program Requirements Document/ Operational Requirements (PRD/OR)	Approval	A/R	As Changed	3
C2-3*	Launch vehicle Detailed Mission Requirements (DMR)	Approval	A/R	As Changed	3
C2-4*	Reserved				
C2-5*	Mission Success Criteria & Determination Methodology	Approval	NLT L-4M	As Changed	5

* Required per mission

TABLE D2-A: CDRL INDEX (Cont.)

Item	Document	Approval/ Review	Initial Submittal Date	Subsequent Submittal Date	No. of Copies
	C3: Safety & Mission Assurance				
C3-1	Alert System Documentation	Review	Dispo + 1M	A/R	2
C3-2	Mishap Notification, Investigation and Mishap Preparedness, and Contingency Plan	Review	A/R in CDRL	A/R	2
C3-3	ISO 9001/2000 Certification Certificate (ISO 9001/2008 Certification Certificate after November 2010)	Review	Upon Recertification	Upon Recertification	1
C3-4	Quality Management System (QMS) and Supplier/Vendor Audit/Assessment Schedules	Review	Contract Award +45 Days	When Revised	2
C3-5	QMS and Supplier/Vendor Audit/Assessment Report	Review	As Generated	Per Internal or External Audit	2
C3-6	Risk Management Plan	Approval	At Contract Award Plus 90 Days	Annual Review And Updates A/R 1 Electronic and 1 Paper Copy	2
C3-7*	Safety Documentation for Processing In NASA Provided Facilities	Approval for NASA owned facilities; Review for NASA procured facilities	A/R in CDRL	A/R	2

* Required per mission

TABLE D2-A: CDRL INDEX (Cont.)

Item	Document	Approval/ Review	Initial Submittal Date	Subsequent Submittal Date	No. of Copies
	C4: Analysis				
C4-1*	Performance and Guidance Accuracy Analysis (PGAA)	Initial Submittal = Review, Subsequent Submittals = Approval	← B4 →	L-12M; L-6M	3
C4-2*	Final Mission Analysis (FMA)	Approval	← B4 →	Update: L-2 wks	3
C4-3*	Payload/Expendable Stage Separation Analysis	Approval		L-6M	3
C4-4*	Payload Fairing Venting Analysis	Approval	← B4 →	As Required	3
C4-5*	Payload Fairing Clearance Analysis	Approval	← B4 →	L-10M; L-6M	3
C4-6*	Pre-Flight Controls and Stability Analysis	Approval	← B4 →	A/R	3
C4-7*	Coupled Dynamic Loads Analysis	Approval	Receipt of P/L Prelim Model + 4M	L-15M L-26W	3
C4-8*	Integrated Thermal Analysis	Approval	B4	A/R	3
C4-9*	RF Link Analysis	Approval	L-12M	A/R	3
C4-10*	Payload/Launch Vehicle EMC, RF, and EED Compatibility Analysis	Approval	(B,C,D) L-12M; (A&E) A/R in CDRL	(B,C,D) L-3M; (A&E) A/R in CDRL	3
C4-11*	Mission Unique Software	Approval	B4	Final = L-6M	3
C4-12*	Quick Look Flight Report	Review	B4	N/A	3
C4-13*	Final Flight Report	Review		A/R	3

* Required per mission

TABLE D2-A: CDRL INDEX (Cont.)

Item	Document	Approval/ Review	Initial Submittal Date	Subsequent Submittal Date	No. of Copies
	C5: Engineering				
C5-1*	Vehicle Data Package	Review	B4	As Changed	4
C5-2*	Mission Unique Hardware Test Plan	Approval	B4	As Changed	4
C5-3*	Mission Unique Hardware Test Report	Review	B4	As Changed	4
C5-4*	Mission Specific Drawings	Review	As Generated per design review criteria, but not later than 30D prior to fabrication, installation, assembly	As Changed	4
C5-5*	Integrated Procedures	Approval	Review and comment, 45D prior to use; Approval, 1W prior to use	A/R	5

* Required per mission

Item	Document	Approval/ Review	Initial Submittal Date	Subsequent Submittal Date	No. of Copies
	C6: Telemetry and Communications				
C6-1*	Vehicle and GSE Telemetry Formats	Review	L-3M	As Changed with Configuration	2
C6-2*	Vehicle and GSE Telemetry (Test, Pre-Launch, and Launch)	Review	Test + 1D; Pre-Launch + 1D; Launch + 1W	N/A	1

* Required per mission

TABLE D2-A: CDRL INDEX (Cont.)

CDRL DESCRIPTION

Number: C1-1

FORMAL MEETING & REVIEW DOCUMENTATION

DESCRIPTION/PURPOSE:

To provide presentation and handout material, minutes, and accompanying action item 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
 - (i) Mission Specific Design Reviews
 - (ii) All other formal reviews
- (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:
 - (i) Due Date
 - (ii) Subject
 - (iii) Assigned tracking number for each action item
 - (iv) Person or organization responsible for completing the action
 - (v) Status of action (i.e., open, closed, or deleted)
 - (vi) Closure rationale

CDRL DESCRIPTION

Number: C1-2

COUNTDOWN DOCUMENTATION

DESCRIPTION/PURPOSE:

To provide the documents necessary to launch the vehicle and also assist NASA management in determination of a GO or NO-GO.

DATA REQUIREMENTS:

Appendices for the documents listed below shall be provided when necessary to present supplemental or incidental information, detailed tabulations or deviations, or graphic representations.

(A) Countdown

The Countdown document shall provide:

- (i) All necessary steps and built-in holds required to successfully launch the vehicle and its payload during the launch window
- (ii) Procedures required to safe the vehicle after a launch attempt
- (iii) Procedures required to recycle the countdown for another launch attempt

The necessary steps shall be listed as a sequence of events with each entry including a T-time. T-time is defined as the time before launch, not including planned holds, and with T-0 being the time of launch vehicle lift-off from the launch pad. T+ time is any event after T-0. Each member of the launch team shall be identified by call sign and communication channel. All mission constraints to launch shall also be identified.

(B) Mission Constraints Document

This document is a summary of all the launch vehicle, payload and range mission constraints to launch. The launch vehicle constraints shall include, but not be limited to:

- (i) Weather
- (ii) Communication

CDRL DESCRIPTION

Number: C1-2 (cont)

- (iii) Range requirements
- (iv) Collision avoidance (COLA)
- (v) Tracking and telemetry

The document shall also identify critical measurements during the launch countdown. Not to exceed values shall be identified for all critical measurements.

(C) Redline Document

A document that identifies monitored measurements, applicable in test and countdown, used to verify that the Launch Vehicle and ground systems are operating within normal limits. This document shall include Operational and Redline limits which, if specified parameters minimum or maximum values are exceeded, indicate: a condition that may be hazardous to personnel, vehicle, or site; a condition which may compromise the successful completion of the vehicle mission or; a condition that is outside of the expected range based on previous experience or analysis.

CDRL DESCRIPTION

Number: C1-3

MISSION CONSOLE NOTEBOOK

DESCRIPTION/PURPOSE:

A mission console notebook to assist on-console users during pre-count, terminal count, and plus count operations.

DATA REQUIREMENTS:

As a minimum, the notebook shall include:

- (A) Terminal or abbreviated countdown procedure
- (B) Flight sequence of events
- (C) Range, payload, launch vehicle mandatory items
- (D) Communication channel matrix
- (E) Down-range telemetry coverage plan
- (F) Launch window for all possible attempts
- (G) Launch decision flowchart
- (H) Control center seating
- (I) Call sign matrix
- (J) Protocol for calling holds
- (K) Day of launch winds plan

CDRL DESCRIPTION

Number: C1-4

MANIFEST POLICY

DESCRIPTION/PURPOSE:

The contractor shall provide at a minimum: the definition of standard setback guidelines (including setback guidelines against other product lines that are offered to other non-NASA customers), manifest separation ground rules, priorities, and assumptions, or equivalent.

DATA REQUIREMENTS:

Documentation shall be delivered in a mutually acceptable format.

CDRL DESCRIPTION**Number: C1-5****OPERATIONS DOCUMENTATION FOR PROCESSING IN NASA PROVIDED
PAYLOAD PROCESSING FACILITIES****DESCRIPTION/PURPOSE:**

This item covers the submission of documentation to NASA when performing operations in a NASA provided facility in support of this contract.

DATA REQUIREMENTS:

The following items shall be submitted for the launch vehicle hardware and operations to be brought in a NASA provided PPF.

- Launch Vehicle facility, processing, security, contamination requirements and processing contingency plans.
 - Initial submittal date 18 months prior to launch.
- Documentation of any hazardous waste that the launch vehicle will produce in the facility.
 - Initial submittal date sixty (60) days prior to arrival.
- Non-hazardous Launch vehicle standalone procedures.
 - Initial submittal date forty-five (45) days prior to use.
- Launch vehicle personnel badging and training requirements to include any medical certifications.
 - Initial submittal date ninety (90) days prior to arrival.

CDRL DESCRIPTION

Number: C2-1.1

INTERFACE CONTROL DOCUMENT (ICD)

DESCRIPTION/PURPOSE:

The ICD identifies and defines the functional and environmental interfaces, and performance requirements of the payload, and payload GSE with the launch vehicle and associated payload/launch processing facilities. Thirty (30) days prior to launch, the approved ICD shall be incorporated into the contract via contract modification as Exhibit 8 to Attachment D1. Any approved changes after its inclusion into the contract will be incorporated prior to mission success determination.

Preliminary ICD is the first CDRL release of the ICD and is expected to have several TBD's. Baseline ICD is the next release of the CDRL and is expected to have very few TBD's.

DATA REQUIREMENTS:

The number of interface requirement changes incorporated in each new revision and subsequent release of the ICD shall not exceed ten (10) approved requirements changes.

Where there is not a direct match between the specified ICD data requirements identified below and the Contractor's standard ICD, the Contractor's standard ICD will be acceptable provided it addresses equivalent content:

1.0 INTRODUCTION

1.1 Purpose

1.2 Scope

1.3 Definitions

1.4 Interface Change Control

1.4.1 ICD Change Procedure

1.4.2 Interface Requirement Discrepancy

1.5 Requirement Traceability

1.6 Requirements Status

2.0 APPLICABLE DOCUMENTS

2.1 Government Documents

2.2 Contractor Documents

2.3 Other Documents

3.0 INTERFACE REQUIREMENTS

3.1 Structural /Mechanical Interfaces

3.1.1 Structural Interfaces

3.1.1.1 Static Payload Envelope

3.1.1.2 PLF Clearance Requirements

3.1.1.3 SC Clearance Requirements

3.1.1.4 Separation Clearance Requirements

3.1.1.5 SC Access Requirements

3.1.2 Structural Loads

3.1.2.1 SC Stiffness

3.1.2.2 SC Interface Loads

3.1.2.3 Strength

3.1.2.4 SC Load Factors

3.1.3 Mass Properties

3.1.3.1 SC Mass Properties

3.1.3.2 SC Propellant Data

3.2 Electrical Interfaces

3.2.1 Airborne Interfaces

3.2.1.1 Standard Electrical Interfaces

3.2.1.2 Separation Indication

3.2.1.3 Interface Electrical Constraints

3.2.1.4 SC Separation System Electrical Interface

3.2.1.5 SC to LV Interleaved Telemetry

3.2.2 SC Umbilical Interface

3.2.2.1 T-0 Umbilical Interface

3.2.2.2 EGSE Interface Electrical Constraints

3.2.3 EGSE Telemetry/Command/Data Link

3.2.3.1 EGSE Hardline Links

3.2.3.2 SC Interleaved Data

3.2.4 Electrical Grounding

3.2.4.1 Spacecraft Grounding

3.2.4.2 Support Equipment Grounding

3.2.4.3 Personnel Grounding

3.2.4.4 Ground Continuity

3.3 Environmental Interfaces

3.3.1 Thermal

3.3.1.1 SC Thermal Environments

3.3.2 Contamination

3.3.2.1 Payload Fairing Purge

3.3.2.1.1 Spacecraft Transport to the Launch Complex

3.3.2.1.2 Spacecraft at Launch Complex

3.3.2.2 GHe Concentration

3.3.2.3 Payload Compartment Cleanliness

3.3.2.3.1 Non-Volatile Residue

3.3.2.3.2 PLF Inspection

3.3.2.3.3 PLA Inspection

3.3.2.3.4 Witness Plate Access

3.3.2.3.5 Spacecraft Cleanliness

3.3.2.4 Spacecraft Contaminant Deposition Limits

3.3.2.4.1 Particulate

3.3.2.4.2 Molecular

3.3.2.5 Spacecraft Instrument GN₂ Purge

3.3.3 Ascent Pressure

3.3.4 Dynamics

3.3.4.1 Sine Vibration

3.3.4.2 Acoustics

3.3.4.3 Shock

3.3.5 Electromagnetic Compatibility

3.3.5.1 EMI Safety Margin

3.3.5.2 Radiated Emissions

3.3.5.2.1 Spacecraft Maximum Allowable Radiated Emissions

3.3.5.2.2 Launch Vehicle Maximum Allowable Radiated Emissions

3.3.5.2.3 SC RF Susceptibility

3.3.5.2.4 Launch Site RF Environment

3.3.5.2.5 Portable Sources Radiated Emissions

3.3.5.3 PLF Electrostatic Discharge

3.3.5.4 Thermal Blanket Electrostatic Discharge

3.3.5.5 RF Transmitter/Receiver Systems EMC

3.3.5.6 Lightning

3.3.5.7 SC/LV Interface Electrical Bonding

3.3.6 Mission Satisfaction Kit

3.4 Flight Design

3.4.1 Contract Orbit Requirements

3.4.1.1 Mission Orbit Specification

3.4.1.2 Reference Mission

3.4.2 Launch Window

3.4.3 SC Separation

3.4.4 Sun Angle Constraint

3.4.5 Thermal Roll

3.4.6 LV Telemetry Data

3.4.6.1 SC Separation State Vector

3.4.6.2 SC Provided Post Separation Data

3.5 Ground Operations

3.5.1 Spacecraft Contractor Supplied Ground Support Equipment

3.5.2 Payload Processing Facility

3.5.3 Launch Complex Ground Operations

3.5.3.1 GSE

3.5.3.2 Ground Operations Communications

3.5.3.2.1 Countdown Clock

3.5.3.2.2 Closed Circuit TV

3.5.3.2.3 Public Address

3.5.3.2.4 Telephone

3.5.3.2.5 Operating Voice System

3.5.3.2.6 Contingency Operations

3.5.4 SC Transport

3.5.4.1 Processing Facility to Launch Complex Transport

3.5.4.2 SC Hoist and Mate Loads

3.5.5 Environmental Control System

3.5.5.1 PLF Environmental Control System

3.5.6 Fluids And Gases Requirements

3.6 Safety Requirements

CDRL DESCRIPTION

Number: C2-1.2

INTERFACE CONTROL DOCUMENT (ICD) REQUIREMENTS VERIFICATION MATRIX

DESCRIPTION/PURPOSE:

A verification matrix will document and track all ICD requirements and methods by which they will be verified and responsible organization. The verification matrix shall list the final documentation of the verification approved by the cognizant LSC engineer.

DATA REQUIREMENTS:

The verification matrix shall be released no later than three (3) months after the Preliminary ICD CDRL approval and shall be updated upon release of each ICD revision.

Where there is not a direct match between the specified ICD Verification Matrix data requirements identified below and the Contractor's standard ICD Verification Matrix, the Contractor's standard ICD Verification Matrix will be acceptable provided it addresses equivalent content:

- ICD requirement language
- ICD requirement paragraph number
- Verification Method (Test, Inspection, Analysis, Demonstration)
- Responsible Organization
- Verification Plan
- Verification Source
- Notes/Comments
- Status

CDRL DESCRIPTION

Number: C2-2

MISSION SPECIFIC PROGRAM REQUIREMENTS DOCUMENT/OPERATIONAL REQUIREMENTS (PRD/OR)

DESCRIPTION/PURPOSE:

The Mission Specific Program Requirements Document (PRD) and Operational Requirements (OR) identifies specific support services provided by the Range. Range support services required by NASA and the Contractor are submitted to the Range through the PRD and OR.

DATA REQUIREMENTS:

The Mission Specific PRD/OR, or equivalent mission specific Range support request documentation for the proposed launch site(s), shall be submitted to obtain Range support. The Contractor, with support from NASA/KSC, completes all forms appropriate to the mission in the format required by the Range and submits them to the appropriate Range for formal acceptance.

CDRL DESCRIPTION**Number: C2-3****LAUNCH VEHICLE DETAILED MISSION REQUIREMENTS (DMR)****DESCRIPTION/PURPOSE:**

The Launch Vehicle DMR documents formal requests for tracking, communications, and data system services that are either managed by or negotiated through the Exploration, Operations, Communication and Navigation Systems Division (Code 450) at Goddard Space Flight Center (GSFC).

DATA REQUIREMENTS:

The DMR, consisting of sets of Universal Documentation System (UDS) standard forms (with associated instructions), shall be completed to obtain network support from NASA for the baseline launch vehicle. The Contractor, with the support of NASA/KSC, completes all forms appropriate to the vehicle and submits them to NASA/KSC for review and GSFC Code 450 for formal acceptance. The DMR shall follow the format provided in the NASA/GSFC Instruction Manual for the NASA DMR document.

CDRL DESCRIPTION

Number: C2-4

Reserved

CDRL DESCRIPTION

Number: C2-5

MISSION SUCCESS CRITERIA & DETERMINATION METHODOLOGY

DESCRIPTION/PURPOSE:

This data item proposes the criteria and methodology to support the Contracting Officer's determination of mission success.

DATA REQUIREMENTS:

- (A) A list of proposed criteria to be used to determine the success of the mission. These criteria shall be based on applicable flight related ICD requirements.
- (B) The Contractor's proposed methods, including required vehicle telemetry measurements, ground observation, and analysis/reconstruction techniques, for verifying that each proposed mission success criterion is satisfied. Allowances for sensor measurement accuracy shall be explicitly identified and justified.

CDRL DESCRIPTION

Number: C3-1

ALERT SYSTEM DOCUMENTATION

DESCRIPTION/PURPOSE:

A Government Industries Data Exchange Program (GIDEP) Alert Report will be generated for matches of all hardware covered by this contract.

DATA REQUIREMENTS:

- (A) This report will identify all matches of hardware provided under this contract.
- (B) The report shall identify the GIDEP Alert number, flight hardware impacted, analysis of the problem, and any corrective action required.
- (C) The report shall include results from any subcontractor GIDEP Alert reviews.

CDRL DESCRIPTION

Number: C3-2

**MISHAP NOTIFICATION, INVESTIGATION AND MISHAP PREPAREDNESS, AND
CONTINGENCY 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. Contractor employee on NASA-owned property, custodian of NASA assets elsewhere to the extent those assets are involved, or contractors involved in payload to launch vehicle integrating operations, shall report mishaps or close calls. Mishap Preparedness and Contingency Plan (MPCP) describes the immediate actions required in response to a mishap.

DATA REQUIREMENT:

a. GENERAL:

Mishap reporting, investigation and corrective action requirements differ according to whether the specific mishap occurs on NASA property or on contractor property. Mishaps occurring on third party property will be handled in the same manner as those occurring on contractor property.

- a.1. MPCPs shall describe how the Contractor responds to mishaps described below. This plan shall identify, by name, and responsibility all contractor personnel with responsibilities for mishap response, data impoundment, and hardware impoundment (includes retrieval of mishap generated debris). It shall describe: impoundment process, notification of NASA and other authorities, public release of information, and debris collection process. Additionally it shall describe special procedures for emergency response and debris retrieval personnel and identify potential post mishap hazards along with PPE and other hazard mitigation procedures. MSDSs shall be made available to first responders if requested. The MPCP shall also contain a description how the contractor interfaces with the NASA IRT and the process for transferring impounded data and material to the investigation authority. A template MPCP plan shall be delivered no later than six months prior to the first launch and will be updated after each launch based on lessons learned. The mission unique MPCP shall be delivered no later than one week prior to launch.

CDRL DESCRIPTION

Number: C3-2 (cont)

2. NASA MISHAPS:

<u>Classification Level & Investigation Type</u>	<u>Property Damage</u>	<u>Injury</u>
Type A Mishap	Total direct cost of mission failure and property damage is \$1,000,000 or more, or Crewed aircraft hull loss has occurred, or Occurrence of an unexpected aircraft departure from controlled flight (except high performance jet/test aircraft such as F-15, F-16, F/A-18, T-38, OV-10, and T-34, when engaged in flight test activities).	Occupational injury and/or illness that resulted in: A fatality, or A permanent total disability, or The hospitalization for inpatient care of 3 or more people within 30 workdays of the mishap.
Type B Mishap	Total direct cost of mission failure and property damage of at least \$250,000 but less than \$1,000,000.	Occupational injury and/or illness has resulted in permanent partial disability. or The hospitalization for inpatient care of 1-2 people within 30 workdays of the mishap.
Type C Mishap	Total direct cost of mission failure and property damage of at least \$25,000 but less than \$250,000.	Nonfatal occupational injury or illness that caused any workdays away from work, restricted duty, or transfer to another job beyond the workday or shift on which it occurred.
Type D Mishap	Total direct cost of mission failure and property damage of at least \$1,000 but less than \$25,000.	Any nonfatal OSHA recordable occupational injury and/or illness that does not meet the definition of a Type C mishap.
Close Call	An event in which there is no equipment/property damage or minor equipment/property damage (less than \$1000), but which possesses a potential to cause a mishap.	An event in which there is no injury or only minor injury requiring first aid, but which possesses a potential to cause a mishap.

3. ONSITE MISHAPS OCCURRING ON NASA PROPERTY:

Any unplanned occurrence, event, or anomaly involving NASA personnel, equipment, or facilities that meet one of the mishap classifications as defined above shall follow the Mishap and Close Call Reporting, Investigating, and Recordkeeping procedural requirements as documented in NPR 8621.1. For

occurrences that meet one of the mishap classifications as defined above and occurring on NASA KSC owned facilities, launch sites or equipment, the Mishap and Close Call reporting, investigation and recordkeeping procedural requirements as documented in KNPR 8715.3 shall be followed.

CDRL DESCRIPTION

Number: C3-2 (cont)

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.

- a. **Telephonic Report:** The Contractor shall notify the NASA Launch Services Division Safety Office within one hour of the occurrence of a Type A mishap, Type B mishap, high-visibility mishap, or high-visibility close call that involves NASA personnel or property while performing work in support of this SOW. For Type C or D Mishaps and Close Calls involving NASA personnel or property, the contractor shall notify the Launch Services Division Safety Office within four (4) hours of the occurrence.
 - i. During this notification, the Contractor shall provide the following information: the Facility name, location of incident, time of incident, number of fatalities (if known), number of hospitalized employees (if known), type of injury (if known), type of damage (if known), contact person, contact person's phone number, and a brief description of the mishap.
- b. **24-Hour Report:** The Contractor shall provide an initial incident report to the Launch Services Division Safety Office within twenty-four (24) hours of the incident for all Mishaps, or Close Calls involving NASA personnel or property while performing work in support of this SOW. The following information, as a minimum, shall be included: author of report; author's phone number and mail code; date report submitted; time report submitted; incident date; incident time; incident_general location; exact location (if known); responsible organization; organization's point of contact; point of contact's phone number and mail code; mission affected; program impact (if known); number and type of injuries or fatalities (if known); type of damage to equipment, flight hardware, flight software, or facilities; estimate of direct cost of damage; and a brief description of the mishap or close call.
- c. **Notify OSHA:** Within eight (8) hours of a work-related mishap involving death of a Federal employee, or the hospitalization for inpatient care of three or more employees (provided at least one is a Federal employee) the contractor shall notify OSHA by calling the area office nearest the site of the mishap or OSHA's toll-free number, 1.800.321.6742. OSHA notification is required for any fatality or three or more hospitalizations that occur up to thirty (30) workdays after the respective mishap. In notifying OSHA, the Contractor shall provide OSHA with the following information: the establishment name, location of incident, time of incident, number of fatalities (if known), number of hospitalized employees (if known), contact person, contact person's phone number, and a brief description of the mishap.

CDRL DESCRIPTION

Number: C3-2 (cont)

- 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 fifteen (15) days of completion. This plan will include any verification activities identified by the Contractor to ensure that corrective actions have been implemented or, if applicable, accomplished.

CDRL DESCRIPTION

Number: C3-3

ISO 9001/2000 CERTIFICATION CERTIFICATE (ISO 9001/2008 CERTIFICATION CERTIFICATE AFTER NOVEMBER 2010)

DESCRIPTION/PURPOSE:

The certificate that is provided by the Registrar upon successful completion of ISO 9001/2000 certification (ISO 9001/2008 certification after November 2010).

DATA REQUIREMENTS:

After completion of ISO 9001/2000 3rd party certification (ISO 9001/2008 3rd party certification after November 2010), a copy of the certificate shall be provided to NASA. Upon loss of certification, NASA shall be notified within five (5) business days.

CDRL DESCRIPTION

Number: C3-4

QUALITY MANAGEMENT SYSTEM (QMS) AND SUPPLIER/VENDOR
AUDIT/ASSESSMENT SCHEDULES

DESCRIPTION/PURPOSE:

A QMS and Supplier/Vendor schedule that lists all planned audits/assessments and visits to subcontractors, suppliers, vendors, and internal sites.

DATA REQUIREMENTS:

The list shall include the subject of the audit/assessment, a tracking number or identifier, assigned assessor, and a schedule by month indicating the planned event.

CDRL DESCRIPTION

Number: C3-5

QMS AND SUPPLIER/VENDOR AUDIT/ASSESSMENT REPORT

DESCRIPTION/PURPOSE:

Audit/Assessment Report documenting the findings and corrective actions of Audit/Assessments conducted. Reports will be used to monitor Quality Management System and the Supplier Management/Procurement System.

DATA REQUIREMENTS:

The report shall include the date and location of the audit/assessment, participating individuals, purpose of the audit/assessment, assessment duration, method of assessment (i.e., ISO9001/2000 (ISO 9001/2008 after November 2010), AS9100, internal policies/procedures), objective, findings, corrective action, discussions/comments, and conclusion.

CDRL DESCRIPTION

Number: C3-6

RISK MANAGEMENT PLAN

DESCRIPTION/PURPOSE:

In accordance with NPD 8610.23A, the contractor shall submit a Contractor's Risk Management Plan to be provided to the COTR for subsequent distribution.

DATA REQUIREMENTS:

A. This Risk Management Plan shall describe how the contractor proposes to manage and accept risk throughout the program and on all activities required to perform this contract. It shall describe how the contractor will identify, assess, and mitigate/control risks as an integral part of the Contractor's management and decision process.

- Information that illustrates the functional relationships and lines of communication, including the involvement of sub-contractors and major vendors.
- Descriptions of the risk management function within the organization including the process through which management decisions will be made. This will include a description of interfaces with NASA organizations and the NASA decision process for areas such as critical and catastrophic hazards, corrective actions, mishaps, anomaly resolution, safety and technical variances/waivers/exceptions, cost, schedule and mission success.
- Description of the management controls that will be used to ensure compliance with the risk mitigation process.

B. Risk reports shall be delivered quarterly (at a minimum) to the COTR. The reports shall include all identified risks, their likelihood, consequence and status of all activities associated with the mitigation, avoidance or acceptance of each risk. The report shall indicate the relative prioritization of all risks.

C. Access to the contractor's risk database shall be provided to NASA personnel to be identified by the COTR or Contracting Officer.

CDRL DESCRIPTION

Number: C3-7

SAFETY DOCUMENTATION FOR PROCESSING IN NASA PROVIDED FACILITIES

DESCRIPTION/PURPOSE:

This item covers the submission of documentation to NASA when performing operations in a NASA provided facility in support of this contract. NASA will approve this documentation when processing in NASA owned facilities and NASA will review this documentation when processing in NASA procured facilities. This includes system safety documentation associated with launch vehicle systems, flight hardware and any associated equipment and/or ground support equipment.

DATA REQUIREMENTS:

Safety Documentation:

- Safety Data Package (Missile System Prelaunch Safety Package – MSPSP)
 - System Descriptions
 - Hazards Analyses/Hazard Reports
 - Single Failure Point (SFP) Analyses (where applicable)
 - Test Plans and Nondestructive Examination Plans
 - Material Compatibility
 - Material Safety Data Sheets (MSDS's)
- Tailored Range Safety Requirements
- Any Waivers or Equivalent Level of Safety Requests
- Mishap Preparedness and Contingency Plans
 - Initial submittal date forty-five (45) days prior to shipment to the facility
- Radiation control and use authorization for all ionizing and non-ionizing (radio frequency and high intensity light) sources
 - Initial submittal date 4 months prior to use
- Hazardous launch vehicle standalone procedures
 - Initial submittal date forty-five (45) days prior to use

If the LV, hardware, equipment, and/or system is of a new design or is being upgraded/modified, the Contractor shall provide draft and preliminary revision of the safety documentation. The Safety Data Package, tailored Range Safety requirements, and any waivers or Equivalent Level of Safety requests shall be delivered to NASA thirty (30) days prior to each design review milestone (i.e. MSPDR, MSCDR). Final revisions of safety documentation shall be delivered to NASA for approval at least forty-five (45) calendar days prior to first use for hazardous operations.

The Contractor shall update the safety data documentation and any technical analyses as necessary to keep the data current and resubmit to NASA for review.

CDRL DESCRIPTION

Number: C4-1

PERFORMANCE AND GUIDANCE ACCURACY ANALYSIS (PGAA)

DESCRIPTION/PURPOSE:

This analysis is prepared using the best available mission requirements (payload mass properties, insertion state vector requirements, tracking requirements, etc.) to identify any potential problems inherent in accomplishing the mission objectives. This analysis shall include parametric trade studies.

DATA REQUIREMENTS:

The analysis shall include, as a minimum:

- (A) The nominal and 3-sigma limits for orbit elements and associated covariance matrix
- (B) Performance impacts as a function of launch date and time
- (C) Performance capability, margins and reserves, including description of how performance reserve is calculated
- (D) Sequence of events and tracking coverage
- (E) Time history of trajectory from launch to targeted condition and end of mission maneuvers
- (F) Launch vehicle summary weight statement
- (G) Sources and magnitude for all dispersions used. If statistical dispersions are used, then the distribution method (e.g., normal, gaussian) shall be specified for each parameter
- (H) Definition of all coordinate systems used
- (I) Reference to the source(s) for all payload and launch vehicle inputs to this analysis (e.g., requirements, mass properties)
- (J) Evaluation of compliance with applicable ICD requirements and constraints.
- (K) Launch windows determined by analysis
- (K) Input file

CDRL DESCRIPTION

Number: C4-2

FINAL MISSION ANALYSIS (FMA)

DESCRIPTION/PURPOSE:

This analysis is prepared based on payload requirements resulting from NASA review of the PGAA and contains information similar to that in the PGAA. This analysis supports pre-flight verification of compliance with mission requirements.

DATA REQUIREMENTS:

The FMA shall include, as a minimum:

- (A) The nominal 5 or 6 Degree of Freedom (DOF) trajectory simulation for each targeted insertion condition utilizing actual weights and propulsion models (electronic format is preferred).
- (B) All Data Requirements identified in PGAA Data Requirement Description.

CDRL DESCRIPTION

Number: C4-3

PAYLOAD/EXPENDED STAGE SEPARATION ANALYSIS

DESCRIPTION/PURPOSE:

The Payload/Expended Stage Separation Analysis is required to demonstrate that adequate separation distance exists between the payload and the upper stage during the relative motion predicted following payload deployment. The analysis is also required to demonstrate that payload tip-off rates satisfy requirements. This analysis supports pre-flight verification of compliance with mission requirements.

DATA REQUIREMENTS:

- (A) Provide nominal, 3-sigma, or worst-case payload tip-off rates and cone angles (cone angles if deployed while spinning) at deployment.
- (B) The analysis shall include the effects of residual thrust, vehicle and payload mass properties uncertainties, and separation mechanism uncertainties. Additionally, include any methods utilized to ensure contamination upon separation is prevented.
- (C) The report documenting this analysis shall list and describe all dispersion sources used for the analysis, mass properties data sources, and all coordinate systems used.
- (D) Expended stage/payload relative motion analysis following payload deployment

CDRL DESCRIPTION

Number: C4-4

PAYLOAD FAIRING VENTING ANALYSIS

DESCRIPTION/PURPOSE:

This analysis shall evaluate and verify that the payload depressurization rate requirements are satisfied.

DATA REQUIREMENTS:

The Payload Fairing Venting Analysis shall be based on the mission trajectory and payload geometry and volume.

CDRL DESCRIPTION

Number: C4-5

PAYLOAD FAIRING CLEARANCE ANALYSIS

DESCRIPTION/PURPOSE:

This analysis documents/demonstrates that sufficient clearance exists under dynamic conditions is available to prevent payload damage from lift-off through payload fairing jettison.

DATA REQUIREMENTS:

The Payload Fairing Clearance Analysis shall include, as a minimum, the effects of:

- (A) Thermal pre-load
- (B) Disconnect forces
- (C) Actuator forces
- (D) Dynamic response

CDRL DESCRIPTION

Number: C4-6

PRE-FLIGHT CONTROLS AND STABILITY ANALYSIS

DESCRIPTION/PURPOSE:

This report describes analyses conducted to ensure an acceptable vehicle mission unique autopilot design.

DATA REQUIREMENTS:

- (A) List all flight conditions analyzed. Reference source for flight condition data (e.g., nominal mission trajectory).
- (B) Provide tabular-format gain and filter histories for all times during the course of the mission and provide detailed descriptions of all filters used (by reference, if previously supplied). Mission unique software electronic-format files are acceptable.
- (C) List all vehicle models used including, but not limited to: aerodynamics, mass properties, structural frequencies, thrust profiles, and liquid slosh representations. Reference the source for each vehicle model.
- (D) List all dispersions used and describe (or reference) how they were defined.
- (E) List all software tools used to develop the analyses documented in this report.
- (F) Provide detailed descriptions of all linear analysis results, to include rigid body and flexible mode gain and phase margins at all flight conditions analyzed.
- (G) Provide vehicle structural mode frequency histories in graphical or tabular format.
- (H) Describe the results of any and all time-domain controllability analyses either generally applicable to the design or unique to design of the autopilot in the mission unique software.
- (I) Provide detailed flight control system consumables budget, including, but not limited to: any reaction/attitude control system propellant usage, thrust vector control system hydraulic fluid expelled, and vernier engine propellant consumed.

CDRL DESCRIPTION

Number: C4-7

COUPLED DYNAMIC LOADS ANALYSIS

DESCRIPTION/PURPOSE:

This analysis defines flight loads to major vehicle and payload structure. This analysis also supports pre-flight verification of compliance with mission requirements.

DATA REQUIREMENTS:

- (A) Describe the models, methodology and forcing functions used.
- (B) The flight events and conditions that cause the greatest loads on the payload shall be identified and included in the analysis. The flight events and conditions that cause the greatest deflections in the fairing and payload (including instances of minimum clearance) shall be identified and included in the analysis.
- (C) Output from each flight event shall include maximum/minimum tables of payload selected Acceleration Transformation Matrices (ATM), interface forces, and internal Load Transformation Matrices (LTM).
- (D) Worst-case payload fairing dynamic relative deflections shall be identified and included.
- (E) Three load cycles will be required per mission: A preliminary loads cycle, intermediate loads cycle, and a verification loads cycle.

CDRL DESCRIPTION

Number: C4-8

INTEGRATED THERMAL ANALYSIS

DESCRIPTION/PURPOSE:

The purpose of this CDRL is to quantify payload thermal environments in various operational configurations (pre-launch and in-flight). The scope of this analysis may vary depending on the complexity of the payload and upper stage thermal interfaces.

DATA REQUIREMENTS:

The integrated thermal analysis that is performed using the PGAA shall utilize current standard methodologies (e.g. Monte Carlo ray tracing techniques), not restrict the payload model size to less than 1000 thermal nodes or 2000 geometric surfaces and shall include, to the fidelity required by the thermal interfaces:

- (A) Temperature time histories at selected locations (identified by the payload) in the payload thermal model.
- (B) Description of all inputs, assumptions, boundary conditions, and analytical methods used to perform the analysis, including the following components:
 - (i) Pre-launch payload fairing ECS gas conditioning analyses
 - (ii) Payload fairing aeroheating
 - (iii) Trajectory simulation assumptions relative to the actual PGAA.
 - (iv) Ascent and on orbit (up to payload separation) analyses.
- (C) Summary of results identifying maxima and minima (for the selected locations of interest, identified by the payload) and the times and flight events at which they occur.
- (D) Input and output thermal analysis files used for the documented analyses.

CDRL DESCRIPTION

Number: C4-9

RF LINK ANALYSIS

DESCRIPTION/PURPOSE:

This analysis is performed for each nominal mission trajectory and is required to ensure sufficient RF Link margins exist for both the telemetry and flight termination systems during all phases of powered flight through payload separation. This analysis also supports pre-flight verification of compliance with mission requirements.

DATA REQUIREMENTS:

The document shall include the following data as a minimum:

- (A) Definition and description of all coordinate systems used.
- (B) Identification of the mission trajectory used.
- (C) Nominal, maximum and minimum loss / gain factors for all elements in each TX/RX signal propagation path.
- (D) A listing of all ground and mobile telemetry station locations and space based telemetry assets.
- (E) An electronic copy of respective antenna patterns with Theta, θ , having values from zero (0) to one hundred eighty (180) degrees and Phi, ϕ , having values from zero (0) to three hundred sixty (360) degrees for both magnitude and phase in a maximum of five (5) degree increments.
- (F) Analysis outputs, which must capture all information presented in the sample figure below (see Figure D2-1).

CDRL DESCRIPTION**Number: C4-9 (cont)**

- (G) Descriptive contractor recommendations to mitigate any risks identified by this analysis.

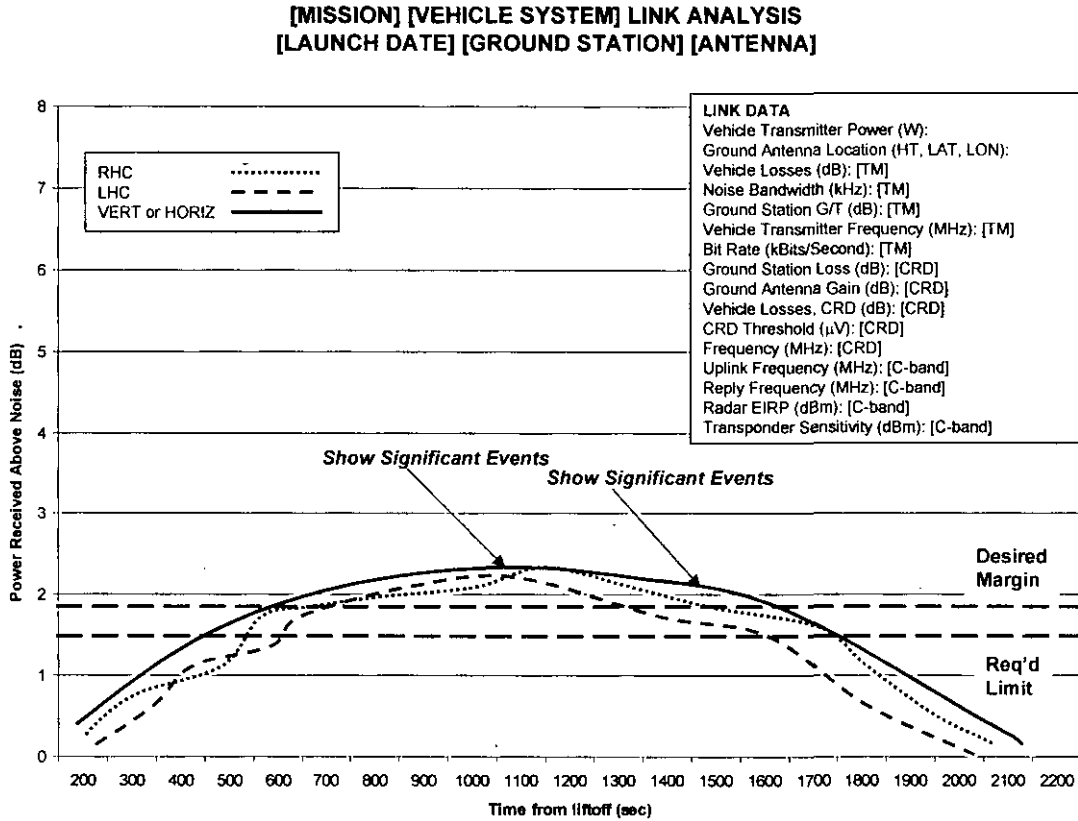


Figure D2-1: Power -Vs- Plus Count Time

CDRL DESCRIPTION**Number: C4-10****PAYLOAD/LAUNCH VEHICLE EMC, RF, AND EED COMPATIBILITY ANALYSIS****DESCRIPTION/PURPOSE:**

This Electromagnetic Compatibility (EMC), Radio Frequency (RF), and EED compatibility analysis documents the results of EMC/RF acceptance tests, demonstrates that design requirements in the ICD are satisfied, and ensures that S/C and launch vehicle ordnance sub-systems will not be unintentionally triggered by electromagnetic disturbances generated by the S/C, launch vehicle, Range or other external sources. This is to ensure payload, launch vehicle, and Range are compatible and that payload electromagnetic (EM) energy exposure requirements will not be exceeded.

DATA REQUIREMENTS:

At a minimum, the following data items shall be delivered in approved electronic formats:

- (A) An EMC Control Plan including EMC management processes, design guidelines, test requirements and standards used by the launch vehicle program per fleet and as changed.
- (B) A Spacecraft/Launch Vehicle EM Compatibility Analysis which should include:
 - (i) Identification of test levels for S/C and launch vehicle susceptibility, intentional and unintentional emissions.
 - (ii) Field strengths expected from known ground and external emitters.
 - (iii) Calculation of EMI safety margins between S/C and launch vehicle hardware susceptibility levels and S/C, launch vehicle and external emissions sources.
- (C) A Lightning Effects Analysis detailing:
 - (i) The methods by which S/C and launch vehicle hardware will be protected from direct and indirect lightning effects.
 - (ii) The operational procedures and retest criteria to be used during lightning events.
- (D) An RF Compatibility Analysis to ensure all communication systems will operate as intended without fundamental or harmonic interference from other transmission systems onboard or external to the vehicle stack.
- (E) An EED Compatibility Analysis per fleet and as assessed/changed per mission detailing
 - (i) Identification of EED Sub-System components and wiring
 - (ii) Identification of discrete EED trigger/firing circuits inclusive of circuit topologies, component identification and circuit parameters.

- (iii) Identification of potential failure modes on EED devices and command/control circuits from electromagnetic sources.
- (iv) Verification Analysis using CAE tools, Franklin analysis or other appropriate method, demonstrate EEDs and all ordnance circuitry meet NASA and Range requirements for EMI safety margins.
- (v) Descriptive contractor recommendations to mitigate any risks identified by this analysis.

CDRL DESCRIPTION**Number: C4-11****MISSION UNIQUE SOFTWARE****DESCRIPTION/PURPOSE:**

Ensure the mission unique software is consistent with the analyses and data products delivered under CDRLs C4-2, C4-3, C4-6, C4-7, and C4-9.

DATA REQUIREMENTS:

- (A) Provide a report describing the methods used to check validity of the mission unique software (by reference if previously supplied).
- (B) Provide a memorandum or report documenting the results of mission unique software validation tests. At a minimum, this report shall include comparison of hardware-in-the-loop flight simulation test results with all required event sequences and the target insertion state.
- (C) Copy, in electronic format (ASCII text), of all mission constants, data loads, or I-loads for the mission. This data shall match the flight values used in the vehicle flight program.

CDRL DESCRIPTION

Number: C4-12

QUICK LOOK FLIGHT REPORT

DESCRIPTION/PURPOSE:

After each launch, a quick look post-flight analysis shall be performed using preliminary evaluations of all available vehicle telemetry and insertion performance. A briefing may satisfy the intent of this report.

DATA REQUIREMENTS:

The data report shall include:

- (A) Preliminary trajectory and performance data
- (B) Orbital accuracy estimates
- (C) Preliminary vehicle subsystem system performance
- (D) Preliminary evaluations

A quick look post-flight analysis or briefing will be submitted or performed no later than L+30 days.

CDRL DESCRIPTION

Number: C4-13

FINAL FLIGHT REPORT

DESCRIPTION/PURPOSE:

After each launch, a final post-flight report shall be provided. This report will support the NASA Contracting Officer's mission success determination.

DATA REQUIREMENTS:

- (A) This report shall include, in its entirety, the Contractor's internal post-flight report produced for each mission.

This report shall also include:

- (i) Orbit elements determined from vehicle guidance data
 - (ii) Vehicle data indicating payload separation
 - (iii) Pre-flight prediction of expected flight environments (i.e., acoustic/vibration, quasi-static acceleration, thermal, and pressure). Generic vehicle environmental data may be submitted unless mission unique environmental requirements are identified in the ICD
 - (iv) Post flight determination of actual flight environments
 - (v) Explanation of significant differences between the predicted and actual flight environments
 - (vi) Vehicle sequence and attitudes data
 - (vii) Payload tracking and telemetry data that is interleaved in the launch vehicle data stream
- (B) This report shall also specifically address each ICD orbital parameter and environmental condition using flight data, ground observations, or other data sources in accordance with the determination methods proposed by the Contractor under CDRL C2-5.

CDRL DESCRIPTION

Number: C5-1

VEHICLE DATA PACKAGE

DESCRIPTION/PURPOSE:

This item is a data package of vehicle hardware and software changes that are neither dictated by payload requirements nor represent fleet-wide changes.

DATA REQUIREMENTS:

Package shall include, as a minimum:

- (A) A description of the item, the modification, and the purpose of the modification
- (B) For all hardware changes, an indentured part list of the item, which shall define the difference between the assigned configuration and the as-built configuration and supporting rationale for differences. For purposes of this requirement, the as-built configuration excludes standard usage hardware (e.g., nuts, bolts, washers, shims, and pins). The as-built configuration list shall contain:
 - (i) Deliverable equipment part name, number, and serial number
 - (ii) Quantity
 - (iii) Drawing number or traceability code
 - (iv) Drawing dash number, change letter and unincorporated Engineering Orders (EOs)
 - (v) For EEE parts: circuit reference designators, part numbers, part manufacturers, and part lot data codes/serial numbers
- (C) For software changes, a copy of all change documentation shall be provided, along with a laboratory and field testing plan
- (D) Test Report/Data/Conclusions - A copy of the test procedures, a description of all changes since item qualification, a description of major fabrication anomalies and their disposition, a copy of the test data, a copy of any test failure reports and their disposition, and final approval signatures. For ordnance, inspection data records and a copy of the lot test data shall also be submitted.

CDRL DESCRIPTION

Number: C5-1 (cont)

- (E) Operating Time/Cycle - Status at the time of delivery of accumulated operating time and/or critical cycles history of parts designated as time/cycle critical
- (F) Allowable (specification requirement) and remaining operating time and/or cycles from point of delivery

CDRL DESCRIPTION

Number: C5-2

MISSION UNIQUE HARDWARE TEST PLAN

DESCRIPTION/PURPOSE:

This plan describes the qualification, test and analysis effort for mission unique hardware.

DATA REQUIREMENTS:

The mission unique hardware test plan shall include, as a minimum:

- (A) Description, sequence, configuration, factors of safety, and success criteria for all tests and analyses that support qualification of mission unique hardware
- (B) A verification matrix of requirements versus tests/analyses
- (C) Reference to or description of any applicable industry standards used to support testing

CDRL DESCRIPTION

Number: C5-3

MISSION UNIQUE HARDWARE TEST REPORT

DESCRIPTION/PURPOSE:

This plan describes the qualification and acceptance test results for mission unique hardware.

DATA REQUIREMENTS:

The mission unique hardware test report shall include, as a minimum:

- (A) Sequence, configuration, setup, and results for all tests described in the mission unique hardware test plan (CDRL C5-2)
- (B) A compliance matrix of test requirements versus tests successfully completed
- (C) Reference to or description of any applicable industry standards used to support testing
- (D) Detailed description of any test failures, anomalies, open items, and closure plan

CDRL DESCRIPTION

Number: C5-4

MISSION UNIQUE DRAWINGS

DESCRIPTION/PURPOSE:

This data item identifies the mission unique configuration.

DATA REQUIREMENTS:

All Launch Vehicle and Ground Support equipment mission unique drawings showing all sub-tier mission specific installations, including all mechanical and electrical interfaces. This shall include, but is not limited to:

- (A) Upper stage and payload adapter mission specific drawings showing all sub-tier mission unique installations, including all payload mechanical interfaces.
- (B) All payload adapter and fairing installation drawings showing all sub-tier mission unique installations.
- (C) Top-level vehicle system specification drawings showing all sub-tier mission unique installations.
- (D) All schematics harness drawings, and assembly drawings for mission unique electrical hardware.
- (E) A drawing tree showing all mission specific drawings.

CDRL DESCRIPTION

Number: C5-5

INTEGRATED PROCEDURES

DESCRIPTION/PURPOSE:

Site procedures for various operations that involve the payload and/or the launch vehicle/payload interfaces.

DATA REQUIREMENTS:

Provide as a minimum, the following integrated procedures (If applicable):

- (A) Payload/ launch vehicle electrical interface verification test
- (B) Payload encapsulation and transport
- (C) Payload/launch vehicle mate (includes payload adapter and vehicle mates, if separate)
- (D) Launch vehicle electrical readiness/flight simulation
- (E) Fairing installation
- (F) Combined system test/final readiness test
- (G) A list of all procedures used for vehicle and integrated processing with brief description of their purpose.

Procedures shall have incorporated all mission specific requirements and must be provided to NASA forty-five (45) days prior to use for coordination, review and comments. Final, coordinated procedures, ready for NASA approval, must be provided to NASA 1 week prior to use.

CDRL DESCRIPTION

Number: C6-1

VEHICLE AND GSE TELEMETRY FORMATS

DESCRIPTION/PURPOSE:

To provide all telemetry (RF and hardware) formats for vehicle systems, GSE and sub-systems testing, including detailed description of formats that will allow NASA to process, display and verify all launch vehicle and GSE telemetry (RF and hardware).

DATA REQUIREMENTS:

The raw vehicle and GSE telemetry (RF and hardware) formats shall include as a minimum:

- (A) PCM Data Stream Description: this file will describe the format of the Pulse Code Modulation (PCM) telemetry data stream. A new file must be delivered if the formatting of the PCM data stream is modified. It must include:
 - (i) Bit rate in bits per second
 - (ii) Location and description of sync word
 - (iii) Number of minor frames in major frame
 - (iv) Size of minor frame
 - (v) Number of bits per word or syllable
- (B) Measurement Description File: this file must be standard ASCII text or another format easily read with a personal computer using commercially available software. A new file must be delivered if any measurement or calibration changes are made to the launch vehicle and/or GSE telemetry stream. It must include:
 - (i) Measurement ID
 - (ii) Measurement description
 - (iii) Engineering units of measurement
 - (iv) Location of measurement in minor frame
 - (v) Word step rate of measurement if supercommutated
 - (vi) Size of measurement in bits or bytes

CDRL DESCRIPTION

Number: C6-1(cont)

- (vii) Type of measurement
 - (viii) Initial minor frame number where measurement is found
 - (ix) Frame step rate of measurement if found in more than 1 minor frame
 - (x) Special conversion algorithm from raw to engineering units if not standard polynomial
 - (xi) Calibration coefficients for conversion from raw to engineering units
 - (xii) Bit number in word if measurement is a discrete
 - (xiii) List of guidance modes that measurement is valid
 - (xiv) Method of determining guidance modes
 - (xv) Measurement mask if required
- (C) Description of rules used to format measurement description file including:
- (i) Description of each field in file
 - (ii) Description of all codes or abbreviations
 - (iii) Method of determining revision level or revision date
- (D) *Non-PCM Data Stream Description: This file will describe the format of the data stream location and description of all measurements, and the calibration data required to convert from raw to engineering units.*
- (E) A list of flight events which will occur for each mission and the nominal time for event occurrence. If event can occur at variable times, this must include a description for determining event time during flight. This list must be delivered for every mission.
- (F) A list of predicted position and velocity state vectors for significant events during flight. This list must include, at a minimum, the end of all powered flight phases and payload separation. A description of the coordinate system used to provide the state vectors must also be included. This list must be delivered for every mission.
- (G) A list of vehicle attitude measurements and description of format used. All files must be delivered using an electronic medium.

CDRL DESCRIPTION

Number: C6-2

VEHICLE AND GSE TELEMETRY (TEST, PRE-LAUNCH, AND LAUNCH)

DESCRIPTION/PURPOSE:

To provide real time launch vehicle and GSE telemetry (RF and Hardwire) to the NASA designated NASA LSP Data Center which will allow NASA to perform independent data processing and analysis.

DATA REQUIREMENTS:

Provide as a minimum:

- (A) All real time launch vehicle and GSE telemetry (RF and hardwire) test data to the NASA designated NASA LSP Data Center for all system and sub-system testing upon request. This data must be able to be time correlated in a manner that enables time synchronization and must conform to the standards defined in IRIG Standard 106-07.
- (B) All real time launch vehicle and GSE telemetry (RF and Hardwire) to the NASA designated NASA LSP Data Center from the start of Launch Countdown through all phases of powered flight up to LOS. This data must be able to be time correlated in a manner that enables time synchronization and must conform to the standards defined in IRIG Standard 106-07.

ATTACHMENT D3

SUPPLEMENTAL DATA REQUIREMENTS LIST (SDRL)

The SDRL identifies the non-CDRL documents generated in the course of production, integration, test, pre-launch, and launch activities that shall be provided to NASA. These items shall be delivered to NASA upon request within ten (10) days. Where there is not a direct match between an SDRL item and the Contractor's standard documentation, the Contractor's documentation will be acceptable provided it contains equivalent data requirements.

ITEM	DESCRIPTION
S1: Documentation	
S1-1	Launch Service User's Guide and Facility Information
S1-2	Mission Integration Meeting Documentation
S1-3	Program Master Schedule and Launch Vehicle Planning Manifest
S3: Safety & Mission Assurance	
S3-1	Reserved
S3-2	Reserved
S3-3	As-Built Configuration List
S3-4	Safety Data Package
S4: Analysis	
S4-1	Mission Battery Budget Analysis
S4-2	Reserved
S5: Engineering	
S5-1	Vehicle Test Procedures
S6: Telemetry and Communications	
S6-1	Telemetry Test Data
S6-2	End to End Link Test Plan
S6-3	Recorded Launch Vehicle and GSE Telemetry (Test, Pre-Launch, Launch)
S6-4	Data Flow Diagrams, Schedules and Down Range Asset Status

Table D3-A: SDRL Index

SDRL DESCRIPTION

Number: S1-1

LAUNCH SERVICE USER'S GUIDE AND FACILITY INFORMATION

DESCRIPTION/PURPOSE:

The Launch Service User's Guide and facility information to provide customers with information and capabilities regarding launch services and facilities.

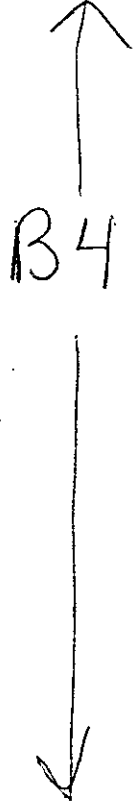
DATA REQUIREMENTS:

Provide the commercially available Launch Service User's Guide and information on the LSC provided facilities, including:

- (A) Payload GSE Space and Capabilities
- (B) Crane Size and Hook Height
- (C) Electrical Service
- (D) Environment, i.e., cleanliness level, relative humidity
- (E) Environment Monitoring Equipment
- (F) Temperature
- (G) Hazardous Capability
- (H) Power
- (I) Processing Space Floor Capability
- (J) Processing Space Size
- (K) Support Space
- (L) Grounding Provisions
- (M) Communications Capabilities
- (N) Security Systems
- (O) Mechanical Support Equipment (Lifts, etc)

Enclosed are the Falcon 1 and Falcon 9 launch vehicle Payload User's Guides for reference only. Please note that content may change.



The following information is provided to supplement the Launch Vehicle User's Guides.




SDRL S1-1 Data Request	B4	B4
(A) Payload GSE Space and Capabilities	 B4	B4

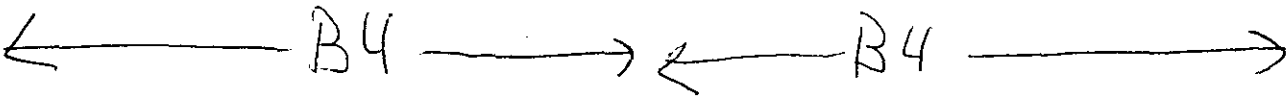
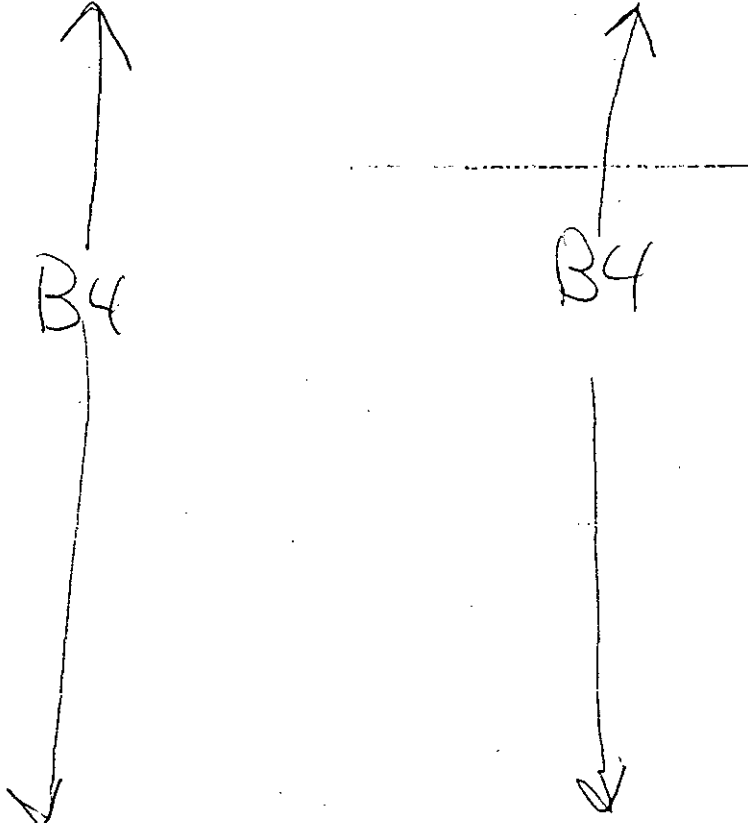
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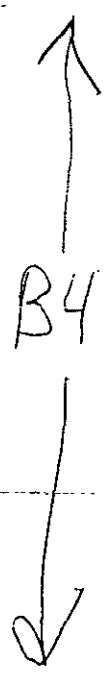

Attachment D3: Supplemental Data Requirements List





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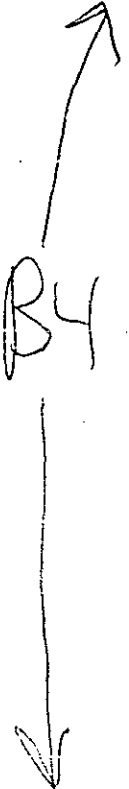

SDRL S1-1 Data Request	<p>B4</p>	<p>B4</p>
<p>(B) Crane Size and Hook Height</p>		
<p>(C) Electrical Service</p>	<p>B4</p>	<p>B4</p>

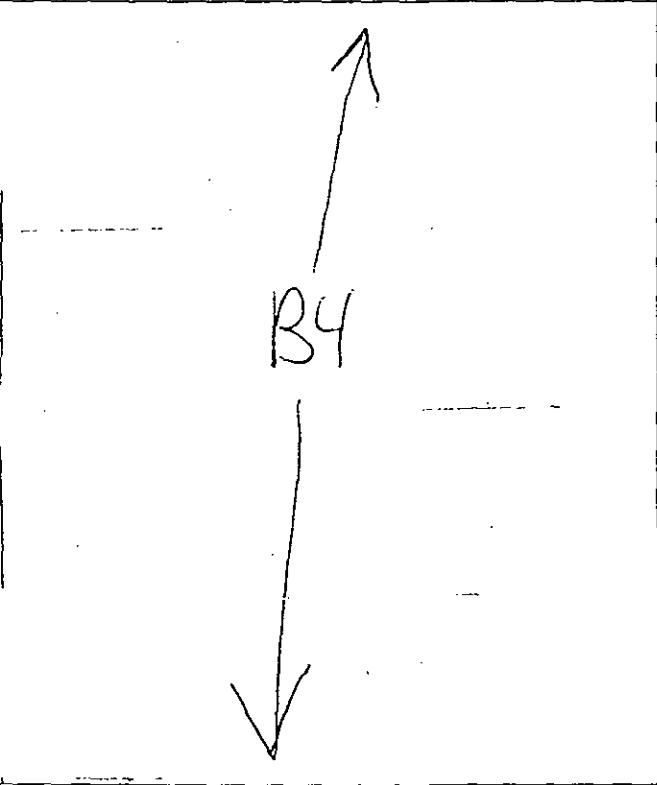
SDRL S1-1 Data Request	B4	B4
(D) Environment, i.e. cleanliness level, relative humidity	 B4	 B4 
(E) Environmental Monitoring Equipment		B4

SDRL S1-1 Data Request	B4 B4
(F) Temperature	
(G) Hazardous Capability	

SDRL S1-1 Data Request		B4 B4	B4
			
(H) Power			B4

SDRL S1-1 Data Request	B4	B4
	B4	
(I) Processing Space Floor Capability	 B4 	 B4 
(J) Processing Space Size	B4	B4

SDRL S1-1 Data Request	B4	B4
	B4	
(K) Support Space		

SDRL S1-1 Data Request	B4	B4
		
(L) Grounding Provisions	B4	B4

SDRL S1-1 Data Request		
(M) Communications Capabilities	<div>B4</div> <div>↑</div> <div>B4</div> <div>↓</div>	<div>B4</div> <div>B4</div>

SDRL S1-1 Data Request	
(N) Security Systems	<div>B4</div> <div>B4</div>
(O) Mechanical Support Equipment (Lifts, etc)	<div>B4</div> <div>B4</div>

SDRL DESCRIPTION

Number: S1-2

MISSION INTEGRATION MEETING DOCUMENTATION

DESCRIPTION/PURPOSE:

To provide presentation and handout material, minutes, and accompanying action item lists from each mission integration meeting (e.g., MIWG kick-off, telecons, working groups, and technical interchange).

DATA REQUIREMENTS:

Mission integration meeting documentation shall include:

- (A) Presentation packages and hand-out materials provided at the meeting for NASA attendees
- (B) Agendas (delivered prior to meeting)
- (C) *Minutes from each Mission integration meeting*
- (D) List of attendees
- (E) Agreements from each Mission integration meeting
- (F) An action item list maintained and updated by the Contractor. The list shall include:
 - (i) Due Date
 - (ii) Subject
 - (iii) Assigned tracking number for each action item
 - (iv) Person or organization responsible for completing the action
 - (v) Status of action (i.e., open, closed, or deleted)
 - (vi) Decisions/resolutions of action items as determined by joint NASA/Contractor mission integration team

SDRL DESCRIPTION

Number: S1-3

PROGRAM MASTER SCHEDULE AND LAUNCH VEHICLE PLANNING MANIFEST

DESCRIPTION/PURPOSE:

The contractor shall develop and provide a Program Master Schedule to include sub-tier schedules, production schedules, and launch operations schedules for each launch service. In addition, a Launch Vehicle Planning Manifest shall be provided which forecasts launch services for a period of no less than five (5) years. To the extent possible, each release should be consistent with the overall Manifest Policy. The contractor shall address mitigation steps for when these submittals are not consistent with the Manifest Policy.

DATA REQUIREMENTS:

Documentation shall be delivered in a mutually acceptable format.

SDRL DESCRIPTION

Number: S3-1

Reserved

SDRL DESCRIPTION

Number: S3-2

Reserved

SDRL DESCRIPTION

Number: S3-3

AS BUILT CONFIGURATION LIST

DESCRIPTION/PURPOSE:

A document describing the as-built configuration of each launch vehicle.

DATA REQUIREMENTS:

Bill of Materials identifying assemblies (as designed, as built, effectivity)
Part Fabrication Record – this includes the completed Work Order as well as the Work Order status report. The completed Work Order is the record of accomplishment for fabrication and test of the part/assembly including dates of accomplishment, quality inspections, completion of configuration management review. The Work Order status report is the details – showing material and operations status, including the revision of hardware issued for the work order and the desired revision.
Flight software and firmware: current versions and releases are identified.

Note – SpaceX maintains Bill of Materials/ Work Order status report information in electronic format through its Visual Resource Planning and TeamCenter program lifecycle management tools. Completed work orders are stored at SpaceX in the online “Quality Records” filing system. Software and firmware, as well as vehicle build, are stored in online at SpaceX. Special consideration will be made to provide electronic (e.g. shared drive, etc) access to the ABCL information.

SDRL DESCRIPTION

Number: S3-4

SAFETY DATA PACKAGE

DESCRIPTION/PURPOSE:

This item covers the submission of system safety documentation required to be delivered to the applicable Federal or Commercial Range Safety Organizations for launch vehicle operations for NASA Missions under this contract. This includes, but is not limited to, United States Air Force (USAF) Eastern/Western Ranges, Reagan Test Site, Kodiak Island Launch Complex, and Wallops Flight Facility.

DATA REQUIREMENTS:

Contactors performing launch vehicle operations for NASA under this contract shall make available to NASA the launch processing site required system safety documentation for launch vehicle systems and associated ground support equipment (e.g. Tailored Requirements, MSPSP, Hazard Reports, Ground Operations Plan, Test Plans, Nondestructive Examination (NDE) Test Plans). All Range required documentation shall also be available to NASA upon request.

The contractor shall update the system safety documentation and any technical analyses as necessary to keep the data current.

This shall also include all agreements, determinations, interpretations, waivers, deviations, Equivalent Level of Safety (ELS), mishaps and close calls documented for the launch processing site safety organization.

SDRL DESCRIPTION

Number: S4-1

MISSION BATTERY BUDGET ANALYSIS

DESCRIPTION/PURPOSE:

This analysis verifies sufficient energy and peak load margin exists to satisfy both vehicle and payload requirements.

DATA REQUIREMENTS:

Contractor formats acceptable.

SDRL DESCRIPTION

Number: S4-2

Reserved

SDRL DESCRIPTION

Number: S5-1

VEHICLE TEST PROCEDURES

DESCRIPTION/PURPOSE:

Procedures for various operations involving launch vehicle processing, testing, and checkout.

DATA REQUIREMENTS:

Launch Service Contractor (LSC) shall provide a list of all launch vehicle test or processing procedures.

Provide upon request the following vehicle processing procedures:

The Falcon 1/1e Procedure List

Procedure Number	Description
1.10	FTS Open-loop checks
1.20	RF Checks
1.30	Range Interface Checks
1.40	1st stage Engine Alignment
1.50	1st stage TVC Performance
1.60	2nd stage TVC Functional
1.65	Stage Sep Bottle Fill
1.70	Main Valve Timing/Purge checks
1.85	Recovery System Charging and Activation
1.90	Vehicle hold-down
1.100	Initial Pad Preps
1.105	Final Pad Preps
1.120	Countdown
2.10	Stage Deliveries
2.20	Kestrel Build Up
2.30	1st Stage Check-out
2.35	Recovery Ordnance Install
2.40	2nd Stage Check-out
2.45	Fairing/PLA Check-out
2.50	TEA-TEB Canister Installation
2.55	Interstage Closeout
2.60	Stage Mate
2.70	HITL

Procedure Number	Description
------------------	-------------

2.80	Merlin Engine Closeout
2.90	FTS System Level Checkout
2.95	FTS Pad Checkout
2.100	Tunnel Cover Install
2.120	Encapsulation
2.125	Avionics Bay Closeout
2.130	Payload to Vehicle Mate
2.140	Ordnance Install
2.145	1st Stage TEA-TEB Install
2.150	Rollout and Connect
2.160	Erect
2.165	QD Mechanical Connect
2.170	Vehicle QD Leak Check
2.175	2nd Stage Lanyard and Tether Connect
2.180	Vehicle Align to Local Vertical
2.200	Optical Azimuth Alignment
3.10	LV Power Up/Down
3.20	Vehicle Pneumatics
3.30	RP-1 Drainback
3.40	Tank Purge
3.50	Post Static Fire Inspection
3.60	2nd Stage TVC Performance Check
3.70	2nd Stage TVC Polarity Check
3.80	Stage 2 TVC alignment
3.90	Bring down vehicle and roll into hangar
3.100	FTS Battery Charging
3.120	QD Disconnect
3.125	Merlin Purge Test
3.130	1st Stage Corrosion Inspections
3.140	Falcon Integrated Vehicle Checkouts
3.150	Terminal Count Dry Run
3.170	1st Stage TEA-TEB Changeout
3.180	TEA-TEB Flush
3.190	Firmware Update and Verify
3.200	1st Stage Polarity Check
3.210	Falcon 1 Ignition Inhibit Test
3.220	Vehicle Short-Term Storage
3.230	Drag On Instrumentation Installation and Removal
3.240	Hangar RF Receiving Equipment Setup
3.250	Stage 2 Combined Offload
3.260	Long Term Storage
Procedure Number	Description

4.10	EGSE Checkout
4.30	Hydraulic GSE Proof, Leak, functional
4.31	Hydraulic Accumulator Check and Fill
4.35	Launch Mount Maintenance Erection
4.40	LOX Proof and Leak
4.41	RP-1 Proof and Leak
4.42	Helium System Proof and Leak
4.45	GN2 Proof and Leak
4.46	Water Proof and Leak
4.47	TVC Proof and Leak
4.50	Launch Site Consumables Management
4.51	Fluid GSE Pre-connect Flush
4.60	Launch Site Setup/Shutdown
4.61	RP-1 Filtering and Heating
4.62	RP-1 Steam Heating
4.70	GCS System Setup
4.80	Payload Environment Monitoring
4.90	Launch Camera Setup
4.95	Facility Vehicle Hold Down Test
5.20	PAA Integration

The Falcon 9 Block 1/Block 2 Procedure List

Procedure Number	Description
1.030	Optical Azimuth Alignment
1.080	1st Stage Engine Alignment
1.090	1st Stage TVC Polarity Check
1.110	2nd stage TVC Functional
1.140	Vehicle Rollout and Launch Preparations
1.150	Final Preps for Launch (Vehicle and Pad)
1.160	Countdown
2.010	Stage Delivery, Unpack & Inspect
2.015	MVac Skirt Delivery, Unpack & Inspect
2.040	1st Stage Avionics Check-out
2.050	1st Stage Propulsion Check-out
2.060	2nd Stage Avionics Check-out
2.070	2nd Stage Propulsion Check-out
2.080	2nd Stage Polarity
2.100	TEA-TEB Canister Installation
2.110	Interstage Closeout
2.115	MVac Skirt Install

Procedure Number	Description
2.120	Interstage to 1st Stage Mate
2.125	Stage Mate
2.130	Hardware-In-The-Loop
2.140	1st Stage Aft Closeout
2.170	Tunnel Cover Install
2.175	1st Stage Avionics Bay Closeout
2.180	2nd Stage Aft Closeout
2.185	2nd Stage Forward Section Closeout
2.195	Separation System Checkout
2.xxx	Payload Fairing Delivery, Unpack, Inspect
2.xxx	Fairing/Payload Adapter Checkout
2.200	Encapsulated Payload to Vehicle Mate
2.210	1st Stage Recovery System Install
2.213	Recovery System Charging and Activation
2.220	Falcon 9 Tank Purges
2.230	Vehicle to TE Installation
2.235	2nd Stage QD Install
2.240	Vehicle QD Install
2.245	Vehicle QD Leak Checks
2.917	FTS L-28 Day Pre-Flight Battery Test
2.930	FTS L-10 Day Pre-Flight Ordnance Interrupter Test and Installation
2.935	FTS L-10 Day Pre-Flight Safe and Arm Device Test and Installation
2.950	FTS Antenna System, DTB, CRD and Battery Installation
2.953	FTS Flexible Contained Detonable Cord Installation
2.955	FTS Linear Shaped Charge Installation
2.970	FTS RF System Check
2.973	LPI Pull Test and Installation
2.975	FTS Open Loop Test
2.980	Final Ordnance Connect and Pin Pull
3.015	Vehicle Weight and CG
3.020	Vehicle Power Up / Down
3.030	Vehicle Pneumatics
3.040	Post Static Fire Inspection
3.045	Falcon 9 TVC Bleed In
3.050	2nd Stage TVC Performance Check
3.060	Stage 2 TVC Alignment
3.075	1st & 2nd Stage Engine Fuel Drain & IPA Flush
3.085	1st Stage TVC Single Engine Functional
3.090	Ignition Inhibit Test
3.100	Vehicle De-erect and Recycle
3.120	FTS Battery Charging
Procedure	Description

Number	
3.140	Terminal Count Dry Run
3.145	Software Dry Runs
3.150	LC-40 Fluid Systems Hurricane Preparations
3.160	LC-40 Vehicle and Hangar GSE Hurricane Preparations
3.180	Aft Thermal Shield Installation
3.190	Integrated Vehicle Removal From TE
3.200	1st Stage / 2nd Stage De-Mate
3.2xx	Encapsulated Payload De-Mate
3.310	2nd Stage IMU to Porro Prism Alignment
4.010	GCS Startup
4.020	Stage Support Rack Checkout
4.040	Launch Camera Setup
4.060	LC-40 Safety System Inspections
4.210	Hangar Grounding Systems Checkout
4.220	Complex 40 Catenary System Inspection
4.230	Hangar Crane Inspection, Testing and Maintenance
4.310	Hangar Leak Check Cart Checkouts
4.413	Payload Environments Monitoring
4.420	General Site Operations
4.450	TE Hydraulics Operations
4.500	Launch Site Setup
4.513	RP-1 System Storage Tank Replenish
4.514	RP-1 System Storage Recirculation/Conditioning
4.583	LN2 Storage Tank Replenish
4.593	TEA-TEB Run Tank Replenish
4.900	Ordnance Handling Instructions

SDRL DESCRIPTION

Number: S6-1

TELEMETRY TEST DATA

DESCRIPTION/PURPOSE:

To provide raw telemetry signals, on electronic medium, that are representative of the launch vehicle and GSE telemetry allowing NASA to process, display and verify launch vehicle and GSE telemetry prior to launch vehicle testing.

DATA REQUIREMENTS:

Provide as a minimum:

- (A) An electronic copy representative of the telemetry signals of the launch vehicle and GSE.
- (B) Data on the electronic copy shall be time correlated in a manner that enables time synchronization of all telemetry data and must conform to IRIG Standard 106-07.

SDRL DESCRIPTION

Number: S6-2

END TO END LINK TEST PLAN

DESCRIPTION/PURPOSE:

To provide a test plan that verifies the telemetry (RF and hardwire), voice communication channels and video links from the Contractor's site to NASA's designated NASA LSP Data Center. The plan will describe the telemetry links from the launch vehicle through the Range and down range deployable telemetry receiving assets specific to that mission. This plan will verify NASA's ability to receive, process, display and verify telemetry, voice communication channels and video from the Contractor's site prior to launch vehicle testing.

DATA REQUIREMENTS:

The end-to-end link test plan shall address how the Contractor will test all links from the Contractor's site to NASA's designated NASA LSP Data Center. The plan shall address scope; organizations involved and points of contact for each; facilities used and/or involved; detailed information on telemetry signals, voice communication channels and video sources and transmission rates. The plan shall identify and/or suggest orbiting or ground locations and/or mobile assets to meet LSP telemetry coverage requirements prior to launch. The plan shall describe the coordination/scheduling/conducting of pre-launch data flow tests to ensure real-time connectivity of voice and data paths between the down range assets and the NASA designated NASA LSP Data Center.

SDRL DESCRIPTION

Number: S6-3

RECORDED LAUNCH VEHICLE AND GSE TELEMETRY (TEST, PRE-LAUNCH, LAUNCH)

DESCRIPTION/PURPOSE:

To provide a copy of all launch vehicle and GSE telemetry (RF and Hardwire) allowing NASA to perform independent data processing and analysis.

DATA REQUIREMENTS:

To provide:

- (A) A copy of all system and sub-system test telemetry (RF and hardwire) data on a compatible media or in an electronic format and corresponding processing software, if an electronic copy is provided. Telemetry data must be time correlated in a manner enabling time synchronization of all telemetry and conforming to the standards defined in IRIG Standard 106-07.
- (B) Electronic copy of the raw telemetry (RF and hardwire) data recorded from all phases of powered flight from two (2) minutes prior to stage ignition through 5 seconds after shutdown. The payload separation event from 40 seconds prior to and 5 seconds after separation shall also be included.
- (C) All RF signal strengths as a function of time from launch until completion of vehicle safing.

SDRL DESCRIPTION

Number: S6-4

DATA FLOW DIAGRAMS, SCHEDULES AND DOWN RANGE ASSET STATUS

DESCRIPTION/PURPOSE:

To provide data flow path diagrams, schedules and down range asset status allowing NASA to verify status/readiness of critical assets and data flow planning/coordination.

DATA REQUIREMENTS:

Provide data flow path diagrams, schedules and down range asset status between the NASA designated NASA LSP Data Center and down range assets to NLT fifteen (15) calendar days prior to launch and at the Flight Readiness Review.

ATTACHMENT D4

SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING PLAN

SpaceX qualifies as a small business concern; accordingly, it is not required by law to implement a small business and small disadvantage business subcontracting plan.

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE	PAGE 1 of 2
2. AMENDMENT/MODIFICATION NO. 002	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE NO. 4200369828	5. PROJECT NO. (If applicable) NLSII-S		
6. ISSUED BY John F. Kennedy Space Center, NASA Procurement Office/Expendable Launch Services Support Office Attn: OP-LS/Helena Wilkas Kennedy Space Center, Florida 32899		CODE OP-LS	7. ADMINISTERED BY (If other than Item 6) CODE Same as Block 6		
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and Zip Code) Space Exploration Technologies 1 Rocket Road Hawthorne, CA 90250 (310) 363-6229			<input type="checkbox"/> 9A. AMENDMENT OF SOLICITATION NO. <input type="checkbox"/> 9B. DATED (SEE ITEM 11) <input checked="" type="checkbox"/> 10A. MODIFICATION OF CONTRACT/ORDER NO. NNK10LB02B <input type="checkbox"/> 10B. DATED (SEE ITEM 13) September 24, 2010		
CODE 3VBL8		FACILITY CODE			

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

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

12. ACCOUNTING AND APPROPRIATION DATA (If required)

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

<input type="checkbox"/>	A	THIS CHANGE ORDER IS ISSUED PURSUANT TO (Specify authority)
<input type="checkbox"/>	B	THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (Such as changes in paying office, appropriation data, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
<input checked="" type="checkbox"/>	C	THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: NFS 1852.232-77 Limitation of Funds (Fixed-Price Contract)(Mar 1989) and FAR 52.243-1 Changes-Fixed Price (Aug 1987) Alt 1 (Apr 1989)
<input type="checkbox"/>	D	OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor ☒ is not, ☐ is required to sign this document and return 4 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

See Page 2

Except as provided herein, all terms and conditions of the document referenced in Item 8A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15a. NAME AND TITLE OF SIGNER (Type or print)		16a. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) John Vondenhuevel Contracting Officer	
15b. CONTRACTOR/OFFEROR	15c. DATE SIGNED	16b. UNITED STATES OF AMERICA	16c. DATE SIGNED
BY _____ (Signature of person authorized to sign)		BY _____ (Signature of Contracting Officer)	

(Item 14 Continued)

The purpose of this modification is to definitize Task Assignment NLSII-S-001, increase contract value, and provide funding for the Task Assignment.

Accordingly,

- A. Section B, Clause 2.1 Total Contract Amount is added to reflect a total firm-fixed-price of \$ 84 for all definitized work under this contract.
- B. Section B, Clause 6.0 SPECIAL TASK ASSIGNMENTS (STUDIES AND ANALYSES) (CLIN 10) – DEFINITIZED is added to reflect definitized Task Assignment NLSII-S-001. The total hours are increased from 84 and the total firm-fixed-price for CLIN 10 is increased from \$ 84.
- C. Section B, TABLE OF CONTENTS, is revised to add Section 2.1 Total Contract Amount and Section 6.0 SPECIAL TASK ASSIGNMENTS (STUDIES AND ANALYSES) (CLIN 10) – DEFINITIZED.
- D. The following contract change pages are provided and incorporated herein:

Section B: pages B-i, B-15.1, B-16, and B-16.1
- E. Except as provided herein, all other terms and conditions of Contract NNK10LB02B remain unchanged and in full force and effect.

The parties hereto agree that this supplemental agreement represents a complete and equitable adjustment for the definitization of Task Assignment NLSII-S-001 listed in this contract modification, including all revisions, authorized under CLIN 10 of this contract. The Contractor hereby releases the Government from any and all liability under this contract for further equitable adjustments attributable to such facts or circumstances giving rise to Task Assignment NLSII-S-001 listed in this contract modification, that were agreed to as written.

(End of Modification 002)

SECTION B

STANDARD FORM 1449 CONTINUATION

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configuration, vendor, or design, after mission ATP, shall be at no increase to the contract price and subject to the written approval of the Contracting Officer. New launch vehicle certification plans and revisions to existing certification plans may be proposed for inclusion into the contract when submitting Launch Service

2.0 TOTAL AWARD AMOUNT

The guaranteed minimum value of this contract is \$20,000. The maximum potential value of contract number NNK10LB02B is \$15,000,000,000. The total maximum potential value of all NLS contracts combined is \$15,000,000,000.

2.1 Total Contract Amount

The total firm-fixed-price for all definitized work under this contract is
This amount includes CLIN 10.

B4

3.0 RESERVED

3.1 Reserved

3.2 Reserved

Table B-11: Reserved

3.3 Reserved

Table B-12: Reserved

4.0 MOST FAVORED CUSTOMER

The Contractor hereby certifies the CLIN prices for standard launch services (including standard mission integration) under this contract are no higher than the lowest price charged to any other commercial or U.S. Government customer for an equivalent launch service during the twelve (12) months both preceding and following contract award, or placement of a launch service task order. The Government shall be entitled to a one-time reduction in contract price for each standard launch service failing to meet this certification. The price credit will be equal to the difference between the standard launch service price under this contract and the lower price awarded for an equivalent launch service.

5.0 IDIQ LAUNCH SERVICE AND PRICE UPDATES

Successful Offerors who receive NLS IDIQ contract awards may propose additional IDIQ NTE launch services and prices via the On-Ramp and Technology Insertion clause, Section C, Clause 2.0. IDIQ contract holders will not be entitled to unilaterally adjust NTE prices or delete launch services already in the contract. Contractor initiated changes to the launch vehicle configuration, vendor, or design shall be subject to the launch vehicle certification requirements of Section C, Clause 3.0. Contractor initiated changes to the launch vehicle

proposals pursuant to Section C, Clause 14.0, and shall be subject to the written approval of the Contracting Officer.

6.0 SPECIAL TASK ASSIGNMENTS (STUDIES AND ANALYSES) (CLIN10) - DEFINITIZED

Task Assignment No.	Description	Hours	Firm Fixed Price
NLSII-S-001	Solar Probe Plus Launch Vehicle Performance Analysis	B4	B4
Total		B4	B4

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