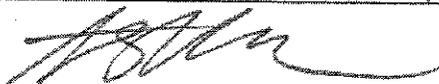


**ORDER FOR SUPPLIES OR SERVICES**

PAGE OF PAGES

1 7

**IMPORTANT: Mark all packages and papers with contract and/or order numbers.**

1. DATE OF ORDER 08/28/2008		2. CONTRACT NO. (if any) NNL05AA01B		6. SHIP TO: a. NAME OF CONSIGNEE NASA/ Langley Research Center				
3. ORDER NO. NNL08AC74T		4. REQUISITION/REFERENCE NO. 4200268164		b. STREET ADDRESS				
5. ISSUING OFFICE (Address correspondence to) NASA/Langley Research Center 9B Langley Blvd., Bldg. 1195B M/S 126 Hampton VA 23681-2199				e. CITY Hampton		d. STATE VA	e. ZIP CODE 23681-2199	
7. TO: [REDACTED]				f. SHIP VIA				
a. NAME OF CONTRACTOR SCIENCE APPLICATIONS INTL CORP				b. TYPE OF ORDER <input type="checkbox"/> a. PURCHASE <input checked="" type="checkbox"/> b. DELIVERY				
b. COMPANY NAME				REFERENCE YOUR:				
c. STREET ADDRESS 10260 CAMPUS POINT DR				Please furnish the following on the terms and conditions specified on both sides of this order and on the attached sheet, if any, including delivery as indicated.				
d. CITY SAN DIEGO		e. STATE CA	f. ZIP CODE 92121-1522	Except for billing instructions on the reverse, this delivery order is subject to instructions contained on this side only of this form and is issued subject to the terms and conditions of the above-numbered contract.				
9. ACCOUNTING AND APPROPRIATION DATA PR 4200268164				10. REQUISITIONING OFFICE NASA/Langley Research Center				
11. BUSINESS CLASSIFICATION (Check appropriate box(es)) <input type="checkbox"/> a. SMALL <input type="checkbox"/> b. OTHER THAN SMALL <input type="checkbox"/> c. DISADVANTAGED <input type="checkbox"/> g. SERVICE-DISABLED VETERAN-OWNED <input type="checkbox"/> d. WOMEN-OWNED <input type="checkbox"/> e. HUBZone <input type="checkbox"/> f. EMERGING SMALL BUSINESS						12. F.O.B. POINT Destination		
13. PLACE OF		14. GOVERNMENT B/L NO.		15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date) 01/30/2009		16. DISCOUNT TERMS NT30		
a. INSPECTION Destination		b. ACCEPTANCE Destination		17. SCHEDULE (See reverse for Rejections)				
ITEM NO. (a)	SUPPLIES OR SERVICES (b)			QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
001	INCO TERMS 1: FOB INCO TERMS 2: DESTINATION  Ares 1 Launch Vehicle Fragmentation Analysis  Continued ...						279,594.00	
18. SHIPPING POINT		19. GROSS SHIPPING WEIGHT		20. INVOICE NO.		17(h) TOTAL (Cont pages)		
21. MAIL INVOICE TO:								
a. NAME		NSSC Shared Services Center				\$0.00		
b. STREET ADDRESS (or P.O. Box)		Financial Management Division (FMD) Accounts Payable Bldg 1111, C. Road						17(i) GRAND TOTAL
c. CITY		d. STATE	e. ZIP CODE	\$279,594.00				
Stennis Space Center		MS	39529					
22. UNITED STATES OF AMERICA BY (Signature) 				23. NAME (Typed) Anthony Kram TITLE: CONTRACTING/ORDERING OFFICER				

AUTHORIZED FOR LOCAL REPRODUCTION  
PREVIOUS EDITION NOT USABLE

OPTIONAL FORM 347 (Rev. 3/2005)  
Prescribed by GSA/FAR 48 CFR 53.213(a)

**ORDER FOR SUPPLIES OR SERVICES  
SCHEDULE - CONTINUATION**

PAGE OF PAGES

2 7

**IMPORTANT:** Mark all packages and papers with contract and/or order numbers.

DATE OF ORDER  
08/28/2008

CONTRACT NO.  
NNL05AA01B

ORDER NO.  
NNL08AC74T

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY ORDERED (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)	QUANTITY ACCEPTED (G)
	<p>Task Order entitled "Ares 1 Launch Vehicle Fragmentation Analysis" in accordance with the attached task summary and the contractor's proposal dated 7/16/2008. *NOTE: This Task Order is subject to FAR 52.232-20, Limitation of Costs. The Contractor is only authorized to incur up to the cost limitation set forth in the Task Summary.</p> <p>ESTIMATED COST: ██████████ ESTIMATED FEE: ██████████ *TOTAL COST-PLUS-FIXED FEE:\$279,594.00</p> <p>Acknowledge receipt and acceptance of subject Task Order by signing below and returning to the address in Block 5:</p> <p><b>Robin Amburn Grob, Contracts Manager</b></p> <p>(Printed Name) (Title)</p> <p><i>Robin Amburn Grob</i> 8/28/08 (Signature) (Date)</p>					

TOTAL CARRIED FORWARD TO 1ST PAGE (ITEM 17(H))

**TASK ORDER SUMMARY**

1. In accordance with Paragraph B.4, of the Basic Contract (NNL05AA01B), FAR 52.232-20 "Limitation of Costs" applies at the Task Order level. In accordance with this clause, NFS 1852.232-81 is incorporated as follows:

**"CONTRACT FUNDING, (NFS 1852.232-81) (JUN 1990)**

(a) For purposes of payment of cost, exclusive of fee, in accordance with the Limitation of Funds clause, the total amount allotted by the Government to this Task Order is [REDACTED]. This allotment is for this task order and covers the following estimated period of performance: **28 August 2008 through 31 January 2009.**

(b) An additional amount of [REDACTED] is obligated under this Task Order for payment of fee.

**(End of Clause)"**

2. Perform tasks in accordance with the statement of work titled "Ares-1 Launch Vehicle Fragmentation Analysis"

**SUMMARY OF TASK ORDER VALUE / FUNDING**

TASK ORDER DOCUMENT	TASK VALUE SUMMARY			TASK FUNDING SUMMARY		
	ESTIMATED COST	FIXED FEE	TOTAL CPFF	FUNDED COST	FUNDED FEE	TOTAL FUNDED
BASE	[REDACTED]	[REDACTED]	\$279,594	[REDACTED]	[REDACTED]	\$279,594

NOTE: Period of performance for this task order is 28 August 2008 through 31 January 2009.

**Contract NNL05AA01B**  
**Task Order Statement of Work**

1. **Task Order Title:** Ares I - Launch Vehicle Fragmentation Analysis
2. **Contractual References:**
  - 2.1 **Statement of Work Reference:** This requirement is pursuant to contract NNL05AA01B, between NASA Langley Research Center and [REDACTED] Refer to the contract Statement of Work.
    - 5.3 Technical Studies
      - Technical study activities include, but are not limited to analyzing the feasibility of instrument, spacecraft and mission design; investigating mission options and associated performance expectations; analyzing system designs; analyzing technologies needed to accomplish specific goals; analyzing population and mission operations capabilities; and analyzing data handling and analysis systems.
    - 7.0 Information Management Services
      - The contractor shall provide information management services including, but not limited to, web-based information management systems in support of evaluations, assessments, and studies; databases; quality management; reference documents; and web site development and maintenance. The contractor's personal computer (PC) based system shall be compatible with a MAC based system.
    - 8.2 Administrative Support
      - In conjunction with the evaluations, assessments, and studies, the contractor shall provide support for meetings, conferences and related workshops which includes generating and distributing explanatory materials, providing logistical support as necessary, preparing and distributing documentation on conference results, and making appropriate number of copies of videos, handouts, and other materials developed during the conference. The explanatory materials include specifics about how the goals of the conference will be achieved. Logistical support includes audio-visual equipment, copiers, computers and printers. Preparing documentation on conference results ranges from a straightforward compilation of material presented at the conference to the generation of a narrative report.
  - 2.2 **Potential for Organizational Conflict of Interest (OCI):** In support of this task order, the contractor:
    - shall be required to perform studies and analyses which involve elements of systems engineering and technical direction (e.g., develop specifications and statements of work). (Potential OCI Type: Biased Ground Rules.)
    - may have access to proprietary information and various other types of non-public data. (Potential OCI type: Unequal Access to Information.)

As described in NASA FAR Supplement (NFS) 1852.209-71 (Clause H.11, Limitation of Future Contracting, contained in contract NNL05AA01B), this work may give rise to a potential conflict of interest. Therefore, the contractor shall comply with Clause H.17, Access to Sensitive Information (NFS 1852.237-72); Exhibit D, Organizational Conflict of Interest Avoidance Plan, contained in contract NNL05AA01B, and the task-specific Organizational Conflict of Interest (OCI) Plan incorporated as Attachment 2 to this order. (NOTE: The proposed/approved OCI plan will be attached at time of award.)

**3. Purpose, Objective, and Background of Work to be Performed:**

The Simulation Assisted Risk Assessment (SARA) Project supports NASA's ESMD through the use of physics-based analyses to assess failure environments associated with space exploration system failures. Probabilistic risk assessment (PRA) techniques are applied in a top-down manner to identify key risk drivers of the system. Risk drivers that depend strongly on the physics of failure, or operational state, are assessed through analysis. Appropriate analytic techniques are selected through consideration of the failure scenario's overall impact on the integrated system design through risk contribution, sensitivity of the results, uncertainty in the existing knowledge, and complexity of the physics. Simulation results are quantitatively inserted into the PRA. In addition to risk quantification, physics-based analysis adds knowledge about the response of the system to failures which guides future design and potential accident response decisions.

During FY06, [REDACTED] modeled the fragmentation of the Ares I first stage due to a complete nozzle blockage. Results of the effort include mass and velocity distributions of the bursting case along with estimates of the time for the case to burst for the nozzle blockage scenario. Due to limited geometry definition, the forward dome of the Ares I solid rocket booster (SRB) was treated as a rigid structural section.

The current effort supports the SARA Team's characterization of failure environments through focused physics-based analysis of launch vehicle fragmentation and combustion instability leading to vehicle fragmentation. This task extends the FY06 work to include effects of a deformable forward dome and representation of FTS effects.

**4. Scope of Work: The Contractor shall perform the following task requirements:****4.1 Ares I - Launch Vehicle Fragmentation Analysis****4.1.1 Effect of deformable forward SRB dome**

- Analyze the fragment field of the forward dome under case burst conditions. The specific failure scenario leading to the case/dome burst correspond to conditions at SRB ignition (Mission Elapsed Time = 0 sec) with 100% and 50% nozzle blockages. While large nozzle blockages are not the most likely failure scenarios, they provide a consistent means of generating over-pressures within the SRB.
- Distributions of fragment mass and velocity distribution, as well as fragment development time, are required.

**4.1.2 Flight Termination System (FTS) Induced Fragmentation Analysis**

- Determine the fragment mass and velocity distributions for three First Stage FTS destruct scenarios—flight conditions corresponding to MET = 0, 50, and 110 sec.
- The analysis will include a linear shaped charge (or computational analog) detonation beginning at the ends of the LSC and progressing toward the middle of the stage.
- The analysis needs to take into consideration the non-rigid FS dome included in task 4.1.1, the representative state (i.e. internal geometry) of the SRB propellant at each flight condition, and the combustion chamber pressure relief due to the SRB case fracture.

**5. Deliverables: The contractor shall provide all deliverables as specified below:**

	Description	Due Date	Format
1.	Final Report documenting SRB Dome results to include a table of resulting debris size, mass, and velocity distributions (Task 4.1.1)	Award + [REDACTED]	Email, MS Word file, with a copy on CD
2.	Animation of the SRB Dome failure (Task 4.1.1)	Award - [REDACTED]	
3.	Status Report documenting FTS induced fragmentation (Task 4.1.2)	Award + [REDACTED]	Email, MS Word file, with a copy on CD
4.	Final Report documenting FTS results to include a table of resulting debris size, mass, and velocity distributions (Task 4.1.2)	Award + [REDACTED]	Email, MS Word file, with a copy on CD
5.	Animation of the First Stage failure	Award + [REDACTED]	

The contractor shall keep the Contracting Officer's Technical Monitor (COTR), informed of task status and progress by regular correspondence or meetings. The Government has unlimited rights to all deliverables of this Order.

6. **Government Furnished Items:** The Government is prepared to provide the documentation and/or equipment/office space listed below:

GOVERNMENT FURNISHED ITEM	WHEN TO BE FURNISHED
Desktop/Workstation	As Required
Office Space	As Required

7. **Other Information Needed for Task Performance:** None
8. **Period of Performance/Schedule:** The period of performance for this task order shall be task issuance through 21 January 2009. Interim event dates may change based on direction of the Task Monitor. Changes to the completion date must be approved by the Contracting Officer.

Milestone Number	SOW Reference Paragraph	Milestones	Dates
1	*	Start Date	[REDACTED]
2	4.1.1	SRB Dome Results Final Report	[REDACTED]
3	4.1.1	SRB Dome Failure Animation	[REDACTED]
4	4.1.2	FTS Induced Fragmentation Status Report	[REDACTED]
5	4.1.2	FTS Results Final Report	[REDACTED]
6	4.1.2	Animation Upper Stage Failure	[REDACTED]
8	*	Completion Date	[REDACTED]

9. NASA Task Management:

Task Manager (TM)

TM: Donovan L. Mathias

Organization / Mail Stop (M/S): MS-258-1

Phone Number: 650-604-0836

E-Mail Address: [Donovan.L.Mathias@nasa.gov](mailto:Donovan.L.Mathias@nasa.gov)

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT		1. CONTRACT ID CODE	PAGE OF PAGES 1 1
2. AMENDMENT/MODIFICATION NO. 000001	3. EFFECTIVE DATE 01/16/2009	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (if applicable)
6. ISSUED BY NASA/Langley Research Center 9B Langley Blvd., Bldg. 1195B M/S 126 Hampton VA 23681-2199	CODE LARC	7. ADMINISTERED BY (if other than item 6) NASA/Langley Research Center 9B Langley Blvd., Bldg. 1195B M/S 126 Hampton VA 23681-2199	CODE LARC
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) SCIENCE APPLICATIONS INTEL CORP Attn: ██████████ 10260 CAMPUS POINT DR SAN DIEGO CA 92121-1522		(x) 9A. AMENDMENT OF SOLICITATION NO.	
CODE		9B. DATED (SEE ITEM 11)	
FACILITY CODE		X 10A. MODIFICATION OF CONTRACT/ORDER NO. NNL05AA01B NNL08AC74T	
		10B. DATED (SEE ITEM 13) 08/28/2008	

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)  
See Schedule

13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
X	D. OTHER (Specify type of modification and authority) Mutual Agreement

E. IMPORTANT: Contractor  is not.  is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

- The purpose of this no cost modification is to extend the period of performance from 31 January 2009 to 30 June 2009.
- All other terms and conditions remain unchanged.

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

15A. NAME AND TITLE OF SIGNER (Type or print) Robin Amburn Grob, Contracts Manager		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Ronald King	
15B. CONTRACTOR/OFFEROR <i>Robin Amburn Grob</i> (Signature of person authorized to sign)	15C. DATE SIGNED 1/16/09	16B. UNITED STATES OF AMERICA <i>Ronald King</i> (Signature of Contracting Officer)	16C. DATE SIGNED 1/16/09

**TASK ORDER SUMMARY**

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(a) For purposes of payment of cost, exclusive of fee, in accordance with the Limitation of Funds clause, the total amount allotted by the Government to this Task Order is [REDACTED]. This allotment is for this task order and covers the following estimated period of performance: 28 August 2008 through 30 June 2009.

(b) An additional amount of [REDACTED] is obligated under this Task Order for payment of fee.

(End of Clause)"

**SUMMARY OF TASK ORDER VALUE / FUNDING**

TASK ORDER DOCUMENT	TASK VALUE SUMMARY			TASK FUNDING SUMMARY		
	ESTIMATED COST	FIXED FEE	TOTAL CPFF	FUNDED COST	FUNDED FEE	TOTAL FUNDED
BASE	[REDACTED]	[REDACTED]	\$279,594	[REDACTED]	[REDACTED]	\$279,594
Mod 1	[REDACTED]	[REDACTED]	\$279,594	[REDACTED]	[REDACTED]	\$279,594

NOTE: Period of performance for this task order is 28 August 2008 through 30 June 2009.