AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. Contract ID Code	Page 1 Of 8
Cost Plus Fixed Fee	

2. Amendment/Modification No.	3. Effective Date	4. Requisition/Purchase Req No.	5. Project No. (If applicable)
P00004	2014FEB25	SEE SCHEDULE	

6. Issued By Code W56HZV

U.S. ARMY CONTRACTING COMMAND
JUSTIN EAGLE
WARREN, MICHIGAN 48397-5000
HTTP://CONTRACTING.TACOM.ARMY.MIL

EMAIL: JUSTIN.S.EAGLE@US.ARMY.MIL

7. Administered By (If other than Item 6) Code S3915A

DCMA PHILADELPHIA
700 ROBBINS AVENUE, BLDG 4-A
P.O. BOX 11427
PHILADELPHIA PA 19111-0427

8. Name And Address Of Contractor (No., Street, City, County, State and Zip Code)

MATERIALS SCIENCES CORPORATION
135 ROCK RD
HORSHAM, PA 19044-2303

Code 5E807 | Facility Code

☐ **9A. Amendment Of Solicitation No.**

9B. Dated (See Item 11)

☒ **10A. Modification Of Contract/Order No.**
W56HZV-12-C-0056

10B. Dated (See Item 13)
2011DEC16

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 amendments: (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 ACKNOWLEDGMENT 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)

ACRN: AC NET INCREASE: $26,024.00

13. THIS ITEM ONLY APPLIES TO MODIFICATIONS OF CONTRACTS/ORDERS
It Modifies The Contract/Order No. As Described In Item 14.

☐ **A. This Change Order is Issued Pursuant To: 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 data, 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:**

☐ **D. Other (Specify type of modification and authority)**

E. IMPORTANT: Contractor ☐ **is not,** ☒ **is required to sign this document and return _____ copies to the Issuing Office.**

14. Description Of Amendment/Modification (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

SEE SECOND PAGE FOR DESCRIPTION

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)		16A. Name And Title Of Contracting Officer (Type or print)	
		LYNN M. BYRNE LYNN.M.BYRNE@US.ARMY.MIL (586)282-6553	
15B. Contractor/Offeror	**15C. Date Signed**	**16B. United States Of America**	**16C. Date Signed**
_____ (Signature of person authorized to sign)		By /SIGNED/ (Signature of Contracting Officer)	2014FEB25

SECTION A - SUPPLEMENTAL INFORMATION

Buyer Name: JUSTIN EAGLE
Buyer Office Symbol/Telephone Number: CCTA-ASG/(586)282-9637
Type of Contract: Cost Plus Fixed Fee
Kind of Contract: Research and Development Contracts
Type of Business: Other Small Business Performing in U.S.
Surveillance Criticality Designator: C
Weapon System: No Identified Army Weapons Systems
Contract Expiration Date: 2014JAN31

*** End of Narrative A0000 ***

W56HZV-12-C-0056 P00004

PROGRAM: Phase II SBIR for Development, Test and Evaluation of High Pressure Layflat Hose

PURPOSE OF MODIFICATION: Funding Action to incorporate additional Scope for Commercial Hose Assessment in accordance with FAR 52.243-2 Changes - Cost Reimbursement.

Negotiated Value:	$725,999.00
This Action:	$ 26,024.00
Total Negotiated Value:	$752,023.00

Obligated Amount:	$725,999.00
This Action:	$ 26,024.00
Total Obligated Amount:	$752,023.00

1. The purpose of bilateral modification P00004 is to obligate $26,024.00 for additional scope to be incorporated for Commercial Hose Assessment.

2. As a resulf of Modification P00004, the following changes are hereby made:

a) Section B

i. SubCLIN 000103 is established and funded in the amount of $26,024.00.

ii. Narrative B001 on CLIN 0001 is revised as follows:

* Increased the amount of Est. Cost $24,208.00 from $675,348.00 to $699,556.00
* Increased the amount of Fixed Fee $1,816.00 from $50,651.00 to $52,467.00
* Increased the Total Amount $26,024.00 from $725,999.00 to $752,023.00

b) Section C - Paragraph C.5 Commercial Hose Assessment is added.

c) Section G - Updated to show the appliable accounting data.

3. As a result, the obligated amount is increased by $26,024.00 from $725,999.00 to $752,023.00.

4. Except as provided herein, all other terms and conditions remain unchanged and in full force and effect.

*** END OF NARRATIVE A0004 ***

Name of Offeror or Contractor: MATERIALS SCIENCES CORPORATION

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	SECTION B - SUPPLIES OR SERVICES AND PRICES/COSTS				
0001	SERVICES LINE ITEM	1	LO	Estimated Cost Fixed Fee Not to Exceed (Funding)	$ 699,556.00 $ 52,467.00 $ 752,023.00
	SERVICE REQUESTED: 2010.2(C) PH II SBIR A09-185 CLIN CONTRACT TYPE: Cost Plus Fixed Fee				
	The contractor shall furnish all the supplies and services to accomplish the tasks specified in Section C - Description/Specification/Work Statement. Est. Cost: $699,556.00 Fixed Fee: $ 52,476.00 Total Amount: $752,023.00 (End of narrative B001)				
	Inspection and Acceptance INSPECTION: Destination ACCEPTANCE: Destination				
	Deliveries or Performance DLVR SCH REL CD: 001 — QUANTITY: 1 — PERF COMPL DATE: UNDEFINITIZED $ 752,023.00				
000101	SERVICES LINE ITEM PRON: R312C142R3 PRON AMD: 01 ACRN: AA AMS CD: 665502M4000 (AMOUNT: $ 349,977.00)				
000102	SERVICES LINE ITEM PRON: R322C198R3 PRON AMD: 02 ACRN: AB AMS CD: 665502M40 (AMOUNT: $ 376,022.00)				
000103	SERVICES LINE ITEM				

Name of Offeror or Contractor: MATERIALS SCIENCES CORPORATION

ITEM NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	PRON: P146R0072T PRON AMD: 01 ACRN: AC (AMOUNT: $ 26,024.00)				

SECTION C - DESCRIPTION/SPECIFICATIONS/WORK STATEMENT

C.1 Background

Under Phase I the contractor developed and tested prototype sections of a six inch layflat hose.

C.2 Objective.

The objective of this Phase II contract is to continue the development, test and evaluation of the high pressure layflat hose that was begun under Phase I. During Phase II, the contractor shall continue to evaluate the use of a hybrid yarn approach, 4D axial braiding technologies, and manufacturing techniques to achieve an affordable, layflat high pressure hose and end fittings. During all phases of hose development under this contract, the contractor shall focus on materials selection and manufacturing methods and process(es) that help ensure affordability of the end product. Although high operating pressures in the range of 600 to 700 psi would be ideal, affordability is a high priority. To help ensure affordability, the contractor shall evaluate hose cost and performance through modeling, simulation and prototype development for a range of operating pressures.

C.3 Tasks:

C.3.1 Design Development & Analysis:
The contractor shall conduct comprehensive studies of fiber material selection, hybridization, yarn denier, twist, reinforcement patterns, jacket fabric types, and gemoetries to achieve optimal hose design. The comprehensive study shall be performed using methods such as discrete yarn level and fabric modeling.

C.3.1.1 The hose design shall meet the following criteria:

	Threshold	Objective
Working Pressure	500 psi	700 psi
Burst to Working Safety Factor	3 to 1	3 to 1
Working temperature	130 degrees F	130 degrees F
Long Term Storage temp	160 degrees F	160 degrees F
Elongation at working pressure	less than 2%	less than 1%
Hose Twist at working pressure	less than 2%	less than 1%
Weight	less than 3 lbs/foot	less than 2 lbs/foot
Cost per foot	$50	$30

C.3.1.2 Additionally, the hose shall:
Be layflat so that it can be stored on reels;
Have durable exterior suitable for use in military applications (deployed over rugged terrain; used in severe environmental conditions such as direct exposure to sun).

C.3.2 Utilizing the results of the studies in C.3.1, the contractor shall design and fabricate a minimum of four (4) prototype hose configurations of six (6) inch diameter.

C.3.2.1 In accordance with CDRL A007 and the performance schedule in Section F of this contract, the contractor shall submit a draft test plan to the COR. The test plan for the prototype hoses shall include burst testing, elongation and compatibility with military fuels that are identified in MIL-PRF-370. The burst testing shall follow industry practices (see MIL-PRF-370) for establishing hose length for the burst testing and follow accepted industry burst procedures. Elongation shall be measured by pressurizing a section of hose to rated working pressure and measuring the change in hose length. The rated working pressure for the prototype hose shall be established based on a 3 to 1 safety factor; burst to working pressure. Fuels compatibility shall be performed by following applicable ASTM test procedures as defined in MIL-PRF-370J (see paragraph 3.4.2 Fuel and water compatibility). If the materials used in hose fabrication have previously been tested and found compatible with military fuels, appropriate documentation showing fuels compatibility testing is acceptable.

C.3.2.2 After receipt of COR concurrence with the test plan, the contractor shall test a minimum of four (4) prototype hoses. Testing shall be completed within the timeframe specified in Section F of this contract.

C.3.2.3 After completion of the testing, the contractor shall prepare a detailed report of all hose development and testing and submit it in accordance with CDRL A003 and the performance schedule in Section F of this contract.

C.3.3 The contractor shall hold a design review in accordance with the performance schedule in Section F of this contract, to discuss the results of the hose testing conducted in paragraph C.3.2.2, and present recommendations for further hose development. The contractor shall coordinate the date and time of the design review with the COR. The design review may be held via a phone conference call. The contractor shall take meeting minutes and include them in the next monthly status report.

C.3.3.1 Based on the discussions at the design review, including input from the COR, the contractor shall down-select a minimum threshold of one (1), with an objective of two (2) hose designs from the four (4) developed and tested under this contract, for further evaluation and testing. The contractor shall assess actual performance of the down-selected prototype hose(s) compared to the hose design criteria in paragraph C.3.1 and identify all areas where the actual performance is less than the threshold performance requirements on the down-selected hose. The contractor shall continue to develop the hose design on the down-selected hose(s) in order to meet the threshold design criteria in paragraph C.3.1.

C.3.3.2 The contractor shall fabricate sufficient length of hose required to perform cycle testing, elongation testing, hydraulic performance (theoretical analysis is acceptable) and burst testing on the design(s) down-selected in C.3.3.1.

C.3.3.3 In accordance with CDRL A007 and the performance schedule in Section F of this contract, the contractor shall submit a Test Plan for testing the down-selected hose(s) to the COR. For cycle testing, a section of down-selected hose shall be subject to alternate bending (routed clockwise over one roller and counterclockwise over the other) around a 3-inch radius and a 36-inch radius roller assembly. The number of bending cycles across the roller assemblies shall be 100. Following the bending cycles, the hose shall be subjected to a total of 20 pressure cycles where the hose is filled with water and pressurized to working pressure and then back down to 10 psi (min) for a total of 20 cycles. Following the pressure cycling, the hose shall be pressurized until it bursts and the burst pressure recorded. A minimum of four (4) sample sections from each of the down-selected hose(s) shall be cycle tested. Elongation testing shall be conducted by measuring the length of a section of hose filled with water and pressurized to a maximum of 10 psi. The hose section shall then be pressurized to working pressure and the length of the hose shall be measured. The change in length shall be documented. The minimum length of hose for elongation testing shall be 50 feet. If not previously performed, (see paragraph C.3.2.1) the contractor shall perform fuels compatibility testing. The contractor shall evaluate the hydraulic performance of the down-selected hose(s). Theoretical analysis is acceptable. The contractor shall test the down-selected design(s) according to the test plan and Section F of this contract.

C.3.3.4 In accordance with CDRL A003 and the performance schedule in Section F of this contract, the contractor shall submit the results of this testing in a draft test report to the COR.

C.3.3.5 The contractor shall deliver a small length (approximately 12 inches) of each of the prototype hose(s) to the COR, no later than (NLT) 30 days prior to the final completion date of the contract.

C.3.4 The contractor shall perform an operating pressure versus cost analysis for the down-selected hose designs.

C.3.4.1 The contractor shall document the cost per foot of the down-selected hoses developed under this contract. The contractor shall document the cost per foot for six inch diameter layflay hoses currently available on the commercial market, and project the cost versus operating pressure of the down-selected hose design(s) using the contractors hose modeling and analysis tools. The rated working pressure shall be based on a burst to working ratio of 3 to 1. The contractor shall include layflat six inch diameter hoses currently available on the commercial market, such as MIL-PRF 370 Type C hose, in this analysis. The analysis shall include the projected cost of hoses that fall between the highest rated working pressure layflat hose currently available on the commercial market up to 700 psi, at pressure intervals of approximately every 75 psi. Estimated costs per foot are appropriate for this effort. Firm cost quotes from hose manufacturers are not required.

C.3.4.2 The contractor shall submit a draft report with the results of the analysis in accordance with CDRL A006 and the performance schedule in Section F of the contract.

C.4 Deliverables/Performance

C.4.1 Data: The contractor shall submit monthly progress reports in accordance with CDRL A001. Each report shall identify all project efforts that were in progress for any part of the reporting period and will provide a brief status for each. Each report shall identify work accomplished and dollars expended. Each report shall identify any problems encountered, together with the contractors planned solution and will identify any significant milestones completed during the period.

C.4.1.1 Information contained in monthly progress reports shall not be in the subsequent monthly progress reports unless duplication is required to clearly document an effort that overlaps the timeframe of each report.

C.4.2 Data: The contractor shall submit a Research and Development (R&D) Project Summary not later than 30 days prior to the contract completion date, in accordance with CDRL A002.

C.4.3 Data: The contractor shall submit Test Reports in accordance with paragraphs C.3.2.3 and C.3.3.4 and CDRL A003.

C.4.4 Data: In accordance with CDRL A004, the contractor shall submit a monthly Performance and Cost Report commencing 60 days after contract award. The cost reports shall report all total costs incurred to date, list of parts/materials ordered, with specific reference to the cost incurred since the last performance and cost report.

C.4.5 Data: The contractor shall submit briefing charts of the SBIR project in accordance with CDRL A005.

C.4.6 Data: The contractor shall submit a Scientific and Technical Report; Operating Pressure vs. Cost Analysis in accordance with paragraph C.3.4.2 and CDRL A006.)

C.4.7 Data: The contractor shall submit a Scientific and Technical Report; Test Plans in accordance with paragraphs C.3.2.1 and C.3.3.3 and CDRL A007.

C.4.8 Final Technical Report: In accordance with CDRL A008, the contractor shall submit a Draft/Final Technical Report.

C.5 Commercial Hose Assessment

C.5.1 Market research: Identify available commercial hose manufacturers with products in the 200 to 400 psi operating range (3:1 burst pressure), 6-inch to 8-inch diameter, layflat configuration that meet the requirements outlined in MIL-PRF-370J.

C.5.2 Select Candidates: Determine the candidate hose assemblies for assessment and make recommendation to Government for approval.

C.5.3 Obtain Candidate hose assemblies: Procure approved candidate hose assemblies from vendors.

C.5.4 Inspection: Inspect and document candidate hose assemblies to include manufacturing process, jacket construction, jacket materials, etc.

C.5.5 Develop test procedures: Develop test procedures for assessing candidate commercial hose assemblies. Test criteria shall include: stress/stain versus operating pressure; elongation (axial and hoop direction) versus pressure; burst pressure.

C.5.6 Burst Test: Conduct burst test of candidate hose assemblies.

C.5.7 Report: In accordance with CDRL A001, the contractor shall document the results of the inspection (C.5.4), test procedures (C.5.5), and burst tests (C.5.6) in MSWord, Powerpoint or similar commercial software format. Contractor reporting format is acceptable.

C.5.8 Period of Performance: 60 days from award of contract.

C.5.9 Estimate cost based on testing 5 candidate hose assemblies.

*Underlined text added by Modification P00004

*** END OF NARRATIVE C0002 ***

Name of Offeror or Contractor: MATERIALS SCIENCES CORPORATION

SECTION G - CONTRACT ADMINISTRATION DATA

LINE ITEM	PRON/ AMS CD/ MIPR/ GFEBS ATA	OBLG STAT	JO NO/ ACCT ASSIGN	ACRN	PRIOR AMOUNT	INCREASE/ DECREASE	CUMULATIVE AMOUNT
000103	P146R0072T	1	A.0015166.2.2.1.6	AC	$ 0.00	$ 26,024.00	$ 26,024.00
					NET CHANGE	$ 26,024.00	

ACRN	ACCOUNTING CLASSIFICATION	INCREASE/ DECREASE
AC	021 201420152040 A5XDP 654804L41RJL7 2550 L035344365 A.0015166.2.2.1.6 021001	$ 26,024.00
	NET CHANGE	$ 26,024.00

	PRIOR AMOUNT OF AWARD	INCREASE/DECREASE AMOUNT	CUMULATIVE OBLIG AMT
NET CHANGE FOR AWARD:	$ 725,999.00	$ 26,024.00	$ 752,023.00

LINE ITEM	ACRN	EDI/SFIS ACCOUNTING CLASSIFICATION
000103	AC	021 201420152040 A5XDP 654804L41RJL7 2550 L035344365 A.0015166.2.2.1.6 021001