

2. AMENDMENT/MODIFICATION NO. 3. EFFECTIVE DATE 4. REQUISITION/PURCHASE REQ. NO. 5. PROJECT NO. (If applicable)
 M0005 See Block 16C RES-16-0150

6. ISSUED BY CODE NRCHQ 7. ADMINISTERED BY (If other than Item 6) CODE NRCHQ
 US NRC - HQ ACQUISITION MANAGEMENT DIVISION
 MAIL STOP TWFN-5E03
 ATTN ARACELIS PEREZ-ORTIZ
 WASHINGTON DC 20555-0001

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)
 ALDEN RESEARCH LABORATORY INC
 30 SHREWSBURY ST
 HOLDEN MA 015201843

9A. AMENDMENT OF SOLICITATION NO. (x)
 9B. DATED (SEE ITEM 11)
 10A. MODIFICATION OF CONTRACT/ORDER NO. X
 NRC-HQ-13-C-04-0026
 10B. DATED (SEE ITEM 13)
 03/26/2013

CODE 175795392 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) Net Increase: \$45,481.00
 2016-X0200-FEEBASED-60-60D003-11-6-213-1045-251A

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:
 D. OTHER (Specify type of modification and authority)
 X FAR 43.103(a) (3) Bilateral contract Modification (Supplemental 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 modification is to:
 (1) add an additional task (Task 3C) for work within scope of the contract, thereby increasing the total estimated price by \$45,481.00 from \$426,569.00 to \$472,050.00; (2) obligate funds in the amount of \$45,481.00 thereby increasing the total obligation from \$224,423.00 to \$269,904.00; (3) extend the period of performance through January 31, 2017; and (4) to correct the designation of the Contracting Officer's Representative (COR) in STAQS from Harold Scott to Don Algama.

Refer to continuation pages for modification details.

LIST OF CHANGES:
 Continued ...

Except as provided herein, all terms and conditions of the document referenced in Item 9 A 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)
 MARK THOMPSON

15B. CONTRACTOR/OFFEROR 15C. DATE SIGNED 16C. DATE SIGNED
 (Signature of person authorized to sign) 03/15/2016

SUNSI REVIEW COMPLETE

TEMPLATE - ADM001

MAR 28 2016

ADM002

CONTINUATION SHEET

REFERENCE NO. OF DOCUMENT BEING CONTINUED
 NRC-HQ-13-C-04-0026/M0005

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NAME OF OFFEROR OR CONTRACTOR
 ALDEN RESEARCH LABORATORY INC

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	Reason for Modification : Supplemental Agreement for work within scope Base and All Options Value: \$472,050.00 (Changed) Base and Exercised Options: \$269,904.00 (Changed) Obligated Amount for this Modification: \$45,481.00 Total Obligated Amount for this Award: \$269,904.00 (Changed) Period of Performance: 03/26/2013 - 01/31/2017 (Changed)				

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT		1. CONTRACT ID CODE	PAGE OF PAGES 1 4
2. AMENDMENT/MODIFICATION NO. M0005	3. EFFECTIVE DATE See Block 16C	4. REQUISITION/PURCHASE REQ. NO. RES-16-0150	5. PROJECT NO. (If applicable)
6. ISSUED BY US NRC - HQ ACQUISITION MANAGEMENT DIVISION MAIL STOP TWFN-5E03 ATTN ARACELIS PEREZ-ORTIZ WASHINGTON DC 20555-0001	CODE NRCHQ	7. ADMINISTERED BY (If other than Item 6) US NRC - HQ ACQUISITION MANAGEMENT DIVISION MAIL STOP TWFN-5E03 WASHINGTON DC 20555-0001	CODE NRCHQ
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) ALDEN RESEARCH LABORATORY INC 30 SHREWSBURY ST HOLDEN MA 015201843		(X) 9A. AMENDMENT OF SOLICITATION NO.	9B. DATED (SEE ITEM 11)
CODE 175795392	FACILITY CODE	X 10A. MODIFICATION OF CONTRACT/ORDER NO. NRC-HQ-13-C-04-0026	10B. DATED (SEE ITEM 13) 03/26/2013

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) Net Increase: \$45,481.00
2016-X0200-FEEBASED-60-60D003-11-6-213-1045-251A

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) FAR 43.103(a) (3) Bilateral contract Modification (Supplemental 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 modification is to:

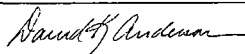
(1) add an additional task (Task 3C) for work within scope of the contract, thereby increasing the total estimated price by \$45,481.00 from \$426,569.00 to \$472,050.00; (2) obligate funds in the amount of \$45,481.00 thereby increasing the total obligation from \$224,423.00 to \$269,904.00; (3) extend the period of performance through January 31, 2017; and (4) to correct the designation of the Contracting Officer's Representative (COR) in STAQS from Harold Scott to Don Algama.

Refer to continuation pages for modification details.

LIST OF CHANGES:

Continued ...

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

15A. NAME AND TITLE OF SIGNER (Type or print) David K. Anderson, Senior Vice President	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) MARK THOMPSON
15B. CONTRACTOR/OFFEROR  (Signature of person authorized to sign)	15C. DATE SIGNED 3/10/2016
16B. UNITED STATES OF AMERICA	16C. DATE SIGNED

CONTINUATION SHEET

REFERENCE NO. OF DOCUMENT BEING CONTINUED
 NRC-HQ-13-C-04-0026/M0005

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NAME OF OFFEROR OR CONTRACTOR
 ALDEN RESEARCH LABORATORY INC

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	Reason for Modification : Supplemental Agreement for work within scope Base and All Options Value: \$472,050.00 (Changed) Base and Exercised Options: \$269,904.00 (Changed) Obligated Amount for this Modification: \$45,481.00 Total Obligated Amount for this Award: \$269,904.00 (Changed) Period of Performance: 03/26/2013 - 01/31/2017 (Changed)				

The purpose of this modification is to:

- (1) modify Task 3 by adding subtask 3C: Development and Demonstration of CFD Best Practice Guidelines and Uncertainty Estimation thereby increasing the Base and All Options Ceiling by \$45,481.00 from \$426,569.00 to \$472,050.00;
- (2) to obligate funds in the amount of \$45,481.00 thereby increasing the total obligation from \$224,423.00 to \$269,904.00;
- (3) extend the period of performance from March 25, 2016, to January 31, 2017; and
- (4) correct the designation of the Contracting Officer's Representative (COR) in STAQS from Harold Scott to Don Algama to match the information stated in Section G.1 Contracting Officer's Representative, paragraph (a).

Accordingly the following changes are hereby made:

- (1) Section B.1 Price/Cost Schedule is revised to incorporate the following:

FIXED PRICE (FP) CONTRACT LINE ITEMS (CLINS)	Description	Quantity	Unit	Unit Price	Total Price
0006	Task 3C Development and Demonstration of CFD Best Practice Guidelines and Uncertainty Estimation	1	Lot	\$45,481.00	\$45,481.00

The price schedule for task 3C is \$4,550.00 monthly for 8 months and a final payment of \$9,081.00 upon completion and acceptance. Amount for task 3C shall be shown as a separate line on monthly invoices to facilitate payment from a separate funding line.

- (2) Section B.3 Consideration and Obligation – Firm-Fixed-Price (Aug 2011) is revised to read as follows:
“The total amount of the Firm-Fixed-Price portion of this contract is \$269,904.00, and this amount is fully funded.”
- (3) Section C Description/Specifications/Statement of Work, paragraph 3.3 Task 3 is revised to incorporate the following:

Task 3C: Development and Demonstration of CFD Best Practice Guidelines and Uncertainty Estimation

In coordination with the NRC COR, the contractor shall extend the development and validation of the condensation User Defined Function (UDF) developed and utilized with the FLUENT CFD models of Facility 1 to include the phenomena of evaporation and bulk condensation. The contractor will use the updated model to complete a set of 4 sensitivity studies for at least two test sequences from a suitable test program in Facility 2. In order to accomplish this, experimental data suitable for CFD benchmarking exercises need to be identified. These experiments should include investigations of surface evaporation and bulk condensation separately. In addition, the methods used

to perform the verification and validation of the condensation UDF should be formally documented in short paper which will be submitted for peer review.

The goal of the work will be to further develop the existing condensation UDF to include evaporation and bulk condensation. The new coding will be used in a verification and validation (V&V) exercise similar to the approach used to demonstrate the condensation phenomena. The V&V results for the evaporation and condensation testing will be formally documented in a short paper suitable for publication.

Deliverables:

- 1) All final FLUENT CFD models (case and data files) used in the above studies (in electronic format, suitable for reading on NRC computer systems).
- 2) Final UDF models, for both wall evaporation and bulk condensation (in electronic format, suitable for reading on NRC computer systems).
- 3) A formal and comprehensive draft report documenting the V&V studies for both the wall evaporation and bulk condensation.
- 4) A short paper summarizing the V&V efforts for the wall condensation modeling suitable for publication."

End of Text