AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

BPA NO.	1. CONTRACT ID CODE	PAGE	OF PAGE
		1	2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable)
11	9-12-2003	see below	

6. ISSUED BY CODE

U.S. Nuclear Regulatory Commission
Division of Contracts and Property Mgt.
Attn: T-7-I-2 , S. Pool 301-415-8168
Contract Management Center No. 2
Washington DC 20555

7. ADMINISTERED BY (If other than Item 6) CODE

U.S. Nuclear Regulatory Commission
Div of Contracts and Property Mgmt
Two White Flint North - MS T-7-I-2

Washington, DC 20555

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)

Information Systems Laboratory, Inc.
11140 Rockville Pike, Suite 500
Rockville,

MD 20852

CODE FACILITY CODE

(X)	9A. AMENDMENT OF SOLICITATION NO.
	RS-RES-01-063
	9B. DATED (SEE ITEM 11)
	10A. MODIFICATION OF CONTRACT/ORDER NO. NRC-04-02-054
X	10B. DATED (SEE ITEM 13) 12-04-2001

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 of 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) see below

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

(X)	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).
X	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: FAR 52.243-5 Changes
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor ☐ is not, ☒ is required to sign this document and return two copies to the issuing office.

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

APPN and Acctg data is as follows:

RES-C03-451 31X0200 36060401710 F6702 252A $78,892
RES-C03-452 31X0200 36060401710 F6942 252A $59,960
RES-C03-453 31X0200 36060401710 F6943 252A $41,148

This mod also include no dollar obligation actions requested under RES-C03-457 and RES-C03-072.

See attached continuation pages for contract modification language

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)
James F. Meyer, V.P.	Stephen M. Pool
15B. CONTRACTOR/OFFEROR (Signature of person authorized to sign)	15C. DATE SIGNED 9/15/03
16B. UNITED STATES OF AMERICA BY (Signature of Contracting Officer)	16C. DATE SIGNED 09-12-2003

STANDARD FORM 30 (REV. 10-83)

TEMPLATE - ADM

ADM002

CONTINUATION PAGE

The purpose of this modification is to add equipment to (1) the Contractor Acquired Government Property clause (2) incorporate a within scope change to Section C.4.1 of the basic contract and (3) to exercise the final option year for Task Order Area CLIN 15. Accordingly, the contract is hereby modified as follows:

1. The tasks set forth in the contractor's proposal dated 8/21/2003 as well as those on the attached SOW as hereby incorporated into Section C.4.1 (9) of this contract.

2. CLIN 0015 for the final option year for Section C.5, the Task Ordering Areas of Work, is hereby exercised.

3. As a result of the above, the contract estimated cost and fee as well as the Maximum Ordering Limitation for Task orders is hereby increased as shown below:

	From:	By:	To:
Estimated Costs	$2,637,656	$208,105	$2,845,761
Fixed Fee	$ 200,145	$ 16,630	$ 216,775
CPFF	$2,837,801	$224,735	$3,062,536
Maximum Ordering Limitation	$4,845,209	$968,882	$5,814,091

4. Also, as a result Section F.6 is replaced by the following section:

F.6 DURATION OF CONTRACT PERIOD (MAR 1987) ALTERNATE 4 (JUN 1988)

The period of performance CLINs 1, 2, 4, 5, 7, and 8 commenced on December 4, 2001 and will expire on December 3, 2004. The ordering period for CLINs 3, 6, 9, 12 and 15 commenced on December 4, 2001 and will expire on December 3, 2006. Any orders issued during this period shall be completed within the time specified in the order, unless otherwise specified herein. (See 52.216-18 - Ordering.) The term of this contract may be extended at the option of the Government for an additional 2 option years for CLINs 10, 11, 13 and 14.

5. $180,000 is hereby allotted to this contract. As a result of the above, Sections B.4 is replaced with the following new section:

B.4 CONSIDERATION AND OBLIGATION--COST PLUS FIXED FEE (JUN 1988) ALTERNATE I (JUN 1991)

This clause applies only to CLINs 1, 2, 4, 5, 7, 8, 10, 11, 13, and 14.

(a) The total estimated cost to the Government for full performance of this contract is $3,062,536, of which the sum of $2,845,761 represents the estimated reimbursable costs, and of which $216,775 represents the fixed fee.

(b) There shall be no adjustment in the amount of the Contractor's fixed fee by reason of differences between any estimate of cost for performance of the work under this contract and the actual cost for performance of that work.

(c) The amount currently obligated by the Government with respect to this contract is $1,974,469. As of invoice no. 20 cost recovery in amount of $197,400 has been applied to the cost appropriation of this contract. Therefore, the total funding obligated by the NRC and applied to the contract throught cost recovery is $2,171,869. Of this amount, the sum of $197,400 was applied to the estimated costs thru cost recovery and $1,820,738 represents the obligated funds earmarked for reimbursement of costs, and $153,731 represents the funds earmarked for the fixed fee.

(d) It is estimated that the amount currently allotted will cover performance through October 31, 2003.

6. As a result of the above, Section B.5 is replaced with the following new section:

B.5 CONSIDERATION AND OBLIGATION--TASK ORDERS (AUG 1989) ALTERNATE 1 (JUN 1991)

This clause only applies to CLINs 3, 6, 9, 12, and 15.

(a) The Maximum Ordering Limitation (MOL) for products and services ordered, delivered and accepted under this contract is $5,814,091. The Contracting Officer may place orders with the contractor during the contract period provided the aggregate amount of such orders does not exceed the MOL.

(b) The amount obligated by the Government on the basic contract for task orders is $48,927. This amount has been allotted to Task Order No. 2. The task order minimum guarantee of $162,668 has been satified by the issuance of task orders 1, 2 and 3.

(c) A total estimated cost as well as any fee, if any, will be negotiated for each task order and will be incorporated as a ceiling in the resultant task order. The Contractor shall comply with the provisions of 52.232-20 - Limitation of Cost for fully funded task orders and 52.232-22 - Limitation of Funds for incrementally funded task orders, issued hereunder.

7. The following list of equipment is added to the clause at Section H.8. (see mod 2) and is authorized for purchase as government property.

5. One PC workstation with the following configuration:

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Two 3.0 GHz Pentium 4 Xeon processors
2 GB RDRAM
DVD-R/W data backup
Fortran compiler
100 GB of storage
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6. One Linux PC file server for the ISL Idaho Falls workstation network.

7. One hard drive for government-owned IBM PC.

8. NAG and Lahey fortran95 compilers for the Rockville office. These compilers are needed to compile TRAC-M on linux and Windows platforms.

9. Ten FrameMaker upgrades from Version 6 to Version 7 and two FrameMaker Version 7 packages. This includes 5 copies for Idaho Falls staff and 7 copies for Rockville staff.

Attachment

STATEMENT OF WORK
MODIFICATION NO. 11
BASE CONTRACT

The USNRC is anticipating that the TRACE (a.k.a. TRAC-M) code will be needed to analyze transients for advanced reactor designs, including the Simplified Boiling Water Reactor (ESBWR). Additional capabilities will be needed in TRACE to model the containment and the containment safety systems of this advanced design. The containment building of ESBWR is based on a compact design which utilizes an Isolation Condenser (IC) unit and several Passive Containment Cooling (PCC) units along with a Gravity Driven Cooling System (GDCS) Pool and a Suppression Pool (SP).

The NRC wishes to modify the TRACE code to implement an IC/PCC component and a framework for the heat transfer correlations to predict heat transfer rates between the surrounding pools and the fluid inside these components. This framework for heat transfer correlations will allow the NRC staff to participate in choosing the best correlations to simulate the IC/PCC unit performances and the conditions in the suppression pool under the conditions expected during the ESBWR transients.

This statement of work identifies three tasks listed below. A brief discussion of the technical approach for each task follows.

Task 1: Development of an IC/PCC Component

Existing TRACE components are sufficiently flexible to build the thermal-hydraulic model of an IC or PCC unit. Two single cell PIPE components that represent the bottom and top headers, a multiple cell PIPE component that represents the tube bundle, and a heat structure component that represents the tube walls can be brought together to build a proper thermal-hydraulic model of an IC or PCC unit. The OFFTAKE option can be used at the steam/noncondensible vent lines coming off the cylinder located at the bottom of the tube bundle while a general table of water level vs. void fraction is used to determine the level of condensate relative to the vent line penetration. However, it is desirable to have a composite TRACE component that brings together these components so that the code user only needs to provide the input for this composite component. The approach to developing this composite component will be to spawn the fundamental components (i.e. PIPE, HTSTR) with attributes that distinguish them as parts of an IC or PCC unit. Both the ASCII output and the graphics dump of an IC/PCC component will consist of the data from the fundamental components of which it is made.

First, the requirements and the design of this component will be documented and submitted for approval before the component is implemented. Upon NRC approval, the component will be implemented. The final documentation will include verification test results, and changes to the input manual to include input specifications of this new component.

Deliverables are a code update to incorporate the IC/PCC component and a completion report.

Estimated Level of Effort: 6 staff-weeks
Estimated Completion Date: 9/30/03

Task 2: Development of a Framework to Implement Heat Transfer and Wall Drag Correlations

a) Current heat transfer correlations for wall condensation are not suitable to predict heat transfer rates inside the IC, PCCS, and suppression pool of an ESBWR containment. Therefore, new correlations are needed for accurate predictions of these heat transfer rates. Logic implemented in the current heat transfer correlations of TRACE is too complex and a new framework to re-implement the new correlations (and the existing correlations later on) is needed. This new framework should implement the heat transfer logic (that distinguishes the topology of a fluid volume in a given set of flow regimes and component types/attributes) across different levels. The heat transfer correlations (selected by NRC Staff) to predict heat transfer rates in the IC/PCC systems and the Suppression Pool will be implemented in this new framework. A similar framework has been implemented for the interfacial drag model. The higher level logic (i.e. selection of flow regimes and component types/attributes) from the interfacial drag model can be re-used to ensure that the wall heat transfer and the interfacial drag models are consistent in their evaluation of flow regimes.

b) Initial attempts to simulate wall condensation experiments revealed that the wall drag models in TRACE were not adequate for co-current downward flows of a liquid film and gas/steam mixture core. Currently, TRACE partitions the total pressure drop between the phases based on the momentum flux of each phase. For separated flows such as in the tubes of an IC/PCC component, new approaches will be needed. The new approaches for film flow pressure drop should also consider interfacial drag at the film surface between the two fields. The framework for the interfacial drag model will be modified to implement this additional consideration.

c) The code updates that incorporate the above models will be verified by exercising test problems that target the implemented models as well as a broader testing which includes all of the test problems in the TRACE test suite available from the TRACE Developer web site.

The NRC staff is expected to participate extensively in identifying, development and implementation of the heat transfer and drag models discussed above.

Deliverables are code updates and modifications to the TRACE Theory and Models Manual.

Estimated Level of Effort: 2 staff-weeks each for a), b) and c). Total of 6 staff-weeks
Estimated Completion Date: 11/30/03

Task 3: Assessment of the New Condensation Model

The new correlations in the code will be tested by simulating condensation tests conducted at MIT, UCB, and NASA. Data from both MIT and UCB experiments were obtained by simulating reactor plant conditions. The data from the NASA experiment will be used to validate the code outside the plant conditions. The same test cases from the assessment of the RELAP5 wall condensation model will be repeated here for the assessment of TRACE models: 27 cases of the UCB experiment, 18 cases of the MIT experiment, and 4 cases of the NASA experiment (see the report titled "Assessment of RELAP5/MOD3.2 Condensation Models" by Rex Shumway, January 1995). The references for these experiments are listed below.

1) S. Z. Kuhn, V. E. Schrock, and P. F. Peterson, "Final Report on U. C. Berkeley Single Tube Condensation Studies," UCB-NE-4201, Rev. 2, August 1994.

2) M. Siddique, "The Effects of Noncondensable Gases on Steam Condensation Under Forced Convection Conditions," Ph.D. Thesis for Department of Nuclear Engineering, MIT, January 1992.

3) J. H. Goodykoontz and R. G. Dorsch, "Local Heat Transfer Coefficients and Static Pressures for Condensation of High-Velocity Steam Within a Tube," NASA TN D-3953, May 1967.

Deliverables are an assessment report and the AV script input needed to re-run the assessment cases.

Estimated Level of Effort: 8 staff-weeks
Estimated Completion Date: 2/28/04