ORDER FOR SUPPLIES OR SERVICES

PAGE OF PAGES: 1 | 4

IMPORTANT: Mark all packages and papers with contract and/or order numbers. BPA NO.

1. DATE OF ORDER: SEP 20 2005	2. CONTRACT NO. (If any): GS23F0060L
3. ORDER NO.: DR-04-05-073 MODIFICATION NO.	4. REQUISITION/REFERENCE NO.: RES-05-073

5. ISSUING OFFICE (Address correspondence to)
U.S. Nuclear Regulatory Commission
Div. of Contracts
Attn: CMB2
Mail Stop T-7-I-2
Washington, DC 20555

6. SHIP TO:
a. NAME OF CONSIGNEE: U.S. Nuclear Regulatory Commission
b. STREET ADDRESS: Attn: Mirela Gavrilas, M/S T10-K8
c. CITY: Washington | d. STATE: DC | e. ZIP CODE: 20555

7. TO:
a. NAME OF CONTRACTOR: INFORMATION SYSTEMS LABORATORIES, INC
b. COMPANY NAME: ATTN: DR. JAMES F. MEYER
c. STREET ADDRESS: 11140 ROCKVILLE PIKE, SUITE 500
d. CITY: ROCKVILLE | e. STATE: MD | f. ZIP CODE: 20852

f. SHIP VIA

8. TYPE OF ORDER
[ ] a. PURCHASE — Reference your _____. 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.
[X] b. DELIVERY — Except for billing instructions on the reverse, this delivery/task 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
56015111205 N6213 252A 31X0200.560
OBLIGATE: $99,667.00

10. REQUISITIONING OFFICE RES
RES/DSARE/SMSAB

11. BUSINESS CLASSIFICATION (Check appropriate box(es))
[X] a. SMALL [ ] b. OTHER THAN SMALL [ ] c. DISADVANTAGED [ ] g. SERVICE-DISABLED VETERAN-OWNED
[ ] d. WOMEN-OWNED [ ] e. HUBZone [ ] 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)	16. DISCOUNT TERMS
a. INSPECTION	b. ACCEPTANCE		As stated	Net 30

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)
	The Contractor shall provide the Nuclear Regulatory Commission (NRC) with the following Verification and Validation Test Suite for the TRACE Code services, in accordance with the attached Statement of Work (SOW) and the terms and conditions of GS-23F-0060L.					
0001	Sr. Research Engineer	[redacted]			$37,088.00	
0002	Research Engineer	[redacted]			$62,379.00	
0003	Other Direct Costs (Reports)	[redacted]			$200.00	
	Period of Performance: 9/20/2005 through 12/31/2005.					
	Project Officer: Mirela Gavrilas, 301-415-5332					

18. SHIPPING POINT	19. GROSS SHIPPING WEIGHT	20. INVOICE NO.	$99,667.00	17(h) TOTAL (Cont. pages)

SEE BILLING INSTRUCTIONS ON REVERSE

21. MAIL INVOICE TO:
a. NAME: U.S. Nuclear Regulatory Commission
Div. of Contracts, Mail Stop T-7-I-2
b. STREET ADDRESS (or P.O. Box): Attn: DR-04-05-073
c. CITY: Washington | d. STATE: DC | e. ZIP CODE: 20555

17(i). GRAND TOTAL: $99,667.00

22. UNITED STATES OF AMERICA BY (Signature)

23. NAME (Typed): Stephen M. Pool
Contracting Officer
TITLE: CONTRACTING/ORDERING OFFICER

TEMPLATE - ADM001

SISP REVIEW COMPLETE

ADM002

TASK ORDER TERMS AND CONDITIONS NOT SPECIFIED IN THE CONTRACT

A.1 2052.215-70 KEY PERSONNEL (JAN 1993)

(a) The following individuals are considered to be essential to the successful performance of the work hereunder:

[redacted]

The contractor agrees that personnel may not be removed from the contract work or replaced without compliance with paragraphs (b) and (c) of this section.

(b) If one or more of the key personnel, for whatever reason, becomes, or is expected to become, unavailable for work under this contract for a continuous period exceeding 30 work days, or is expected to devote substantially less effort to the work than indicated in the proposal or initially anticipated, the contractor shall immediately notify the contracting officer and shall, subject to the con-currence of the contracting officer, promptly replace the personnel with personnel of at least substantially equal ability and qualifications.

(c) Each request for approval of substitutions must be in writing and contain a detailed explanation of the circumstances necessitating the proposed substitutions. The request must also contain a complete resume for the proposed substitute and other information requested or needed by the contracting officer to evaluate the proposed substitution. The contracting officer and the project officer shall evaluate the contractor's request and the contracting officer shall promptly notify the contractor of his or her decision in writing.

(d) If the contracting officer determines that suitable and timely replacement of key personnel who have been reassigned, terminated, or have otherwise become unavailable for the contract work is not reasonably forthcoming, or that the resultant reduction of productive effort would be so substantial as to impair the successful completion of the contract or the service order, the contract may be terminated by the contracting officer for default or for the convenience of the Government, as appropriate. If the contracting officer finds the contractor at fault for the condition, the contract price or fixed fee may be equitably adjusted downward to compensate the Government for any resultant delay, loss, or damage.

A.2 2052.215-71 PROJECT OFFICER AUTHORITY

(a) The contracting officer's authorized representative hereinafter referred to as the project officer for this contract is:

Name:	Mirela Gavrilas
Address:	U.S. Nuclear Regulatory Commission Mail Stop T-10-K8 Washington, DC 20555
Telephone Number:	301-415-5332

(b) Performance of the work under this contract is subject to the technical direction of the NRC project officer. The term "technical direction" is defined to include the following:

(1) Technical direction to the contractor which shifts work emphasis between areas of work or tasks, authorizes travel which was unanticipated in the Schedule (i.e., travel not contemplated in the Statement of Work or changes to specific travel identified in the Statement of Work), fills in details, or otherwise serves to accomplish the contractual statement of work.

(2) Provide advice and guidance to the contractor in the preparation of drawings, specifications, or technical portions of the work description.

(3) Review and, where required by the contract, approval of technical reports, drawings, specifications, and technical information to be delivered by the contractor to the Government under the contract.

(c) Technical direction must be within the general statement of work stated in the contract. The project officer does not have the authority to and may not issue any technical direction which:

(1) Constitutes an assignment of work outside the general scope of the contract.

(2) Constitutes a change as defined in the "Changes" clause of this contract.

(3) In any way causes an increase or decrease in the total estimated contract cost, the fixed fee, if any, or the time required for contract performance.

(4) Changes any of the expressed terms, conditions, or specifications of the contract.

(5) Terminates the contract, settles any claim or dispute arising under the contract, or issues any unilateral directive whatever.

(d) All technical directions must be issued in writing by the project officer or must be confirmed by the project officer in writing within ten (10) working days after verbal issuance. A copy of the written direction must be furnished to the contracting officer. A copy of NRC Form 445, Request for Approval of Official Foreign Travel, which has received final approval from the NRC must be furnished to the contracting officer.

(e) The contractor shall proceed promptly with the performance of technical directions duly issued by the project officer in the manner prescribed by this clause and within the project officer's authority under the provisions of this clause.

(f) If, in the opinion of the contractor, any instruction or direction issued by the project officer is within one of the categories as defined in paragraph (c) of this section, the contractor may not proceed but shall notify the contracting officer in writing within five (5) working days after the receipt of any instruction or direction and shall request the contracting officer to modify the contract accordingly. Upon receiving the notification from the contractor, the contracting officer shall issue an appropriate contract modification or advise the contractor in writing that, in the contracting officer's opinion, the technical direction is within the scope of this article and does not constitute a change under the "Changes" clause.

(g) Any unauthorized commitment or direction issued by the project officer may result in an unnecessary delay in the contractor's performance and may even result in the contractor expending funds for unallowable costs under the contract.

(h) A failure of the parties to agree upon the nature of the instruction or direction or upon the contract action to be taken with respect thereto is subject to 52.233-1 - Disputes.

(i) In addition to providing technical direction as defined in paragraph (b) of the section, the project officer shall:

(1) Monitor the contractor's technical progress, including surveillance and assessment of performance, and recommend to the contracting officer changes in requirements.

(2) Assist the contractor in the resolution of technical problems encountered during performance.

(3) Review all costs requested for reimbursement by the contractor and submit to the contracting officer recommendations for approval, disapproval, or suspension of payment for supplies and services required under this contract.

(4) Assist the contractor in obtaining the badges for the contractor personnel.

(5) Immediately notify the Personnel Security Branch, Division of Facilities and Security (PERSEC/DFS) (via e-mail) when a contractor employee no longer requires access authorization and return the individual's badge to PERSEC/DFS within three days after their termination.

A.3 SEAT BELTS

Contractors, subcontractors, and grantees, are encouraged to adopt and enforce on-the-job seat belt policies and programs for their employees when operating company-owned, rented, or personally owned vehicles.

A.4 COMPLIANCE WITH U.S. IMMIGRATION LAWS AND REGULATIONS

NRC contractors are responsible to ensure that their alien personnel are not in violation of United States Immigration and Naturalization (INS) laws and regulations, including employment authorization documents and visa requirements. Each alien employee of the Contractor must be lawfully admitted for permanent residence as evidenced by Alien Registration Receipt Card Form 1-151 or must present other evidence from the Immigration and Naturalization Services that employment will not affect his/her immigration status. The INS Office of Business Liaison (OBL) provides information to contractors to help them understand the employment eligibility verification process for non-US citizens. This information can be found on the INS website, http://www.ins.usdoj.gov/graphics/services/employerinfo/index.htm#obl.

The NRC reserves the right to deny or withdraw Contractor use or access to NRC facilities or its equipment/services, and/or take any number of contract administrative actions (e.g., disallow costs, terminate for cause) should the Contractor violate the Contractor's responsibility under this clause.

(End of Clause)

STATEMENT OF WORK FOR

DR-04-05-073
VERIFICATION AND VALIDATION TEST SUITE FOR THE TRACE CODE

I. INTRODUCTION

The TRACE code is undergoing upgrades and modifications at and accelerated pace in light of the planned 2006 release of an assessed version. As code development enters this period of increased activity, code developers need a means of broadening the range of test cases for which quantitative code performance metrics are sought. At the rate at which code updates are being generated, the only feasible means of quantitative performance testing is through the automation of figures of merit for a representative group of test problems.

II. BACKGROUND

The TRACE project was started so that the NRC could replace their existing suite of reactor system safety analysis codes (RELAP5 , TRAC-PWR, TRAC-BWR, and RAMONA) by a single code in order to reduce code maintenance and user training costs. The previous code architectures were designed in the 1970's and were subject to constraints imposed by both computer hardware and the FORTRAN 77 language. TRACE was built with a modern code architecture that is easy to maintain and extend with new models to address future safety problems. TRACE is also integrated with the Symbolic Nuclear Analysis Package (SNAP) graphical NRC analysis environment. TRACE can also be run in a coarse grained parallel processing mode and has a built in mechanism to communicate with other computer codes.

TRACE was released for beta testing in April 2003. It has undergone limited assessment and is being used for some applications within the NRC. New (or existing physical models from other predecessor codes) are replacing the original TRAC-PWR models. New reflood and condensation models are currently being implemented. Work is also underway to add a droplet field to the code and to make the numerical methods more implicit to improve code robustness and runtime performance. The NRC will also couple its other reactor analysis codes such as FRAPCON, FRAPTRAN, and MELCOR to TRACE in the future. TRACE should provide a robust and extensible platform for safety analyses well into the future.

An assessed code version will be released in 2006. Furthermore, the code will be used for ESBWR audit calculations during design certification. Code capabilities will be demonstrated through a validation test suite that will accompany the 2006 code release. A developmental assessment report will document code performance for anticipated small and large break LOCA applications.

III. OBJECTIVE

Verification and validation (V&V) problems will be identified according to test objective from the existing TRACE robustness test suite. Furthermore, an automated validation test suite comprised of 10 to 15 decks will be assembled. The suite will consist of analytical, separate effect, component, integral effect and plant problems that cover a broad range of code capabilities. In the future additional test problems will be added, as needed, to cover all

important TRACE features. SNAP input masks and AV Script postprocessing capabilities will be prepared for each validation test deck. Figures of merit that quantify code performance, e.g., extremes, inflection points, system actuation times, will be identified for each of the validation test decks. The computation of figures of merit will be automated by input deck control systems or through AV Script expansions.

IV. SCOPE OF WORK (NOT OPTIONAL)

Task 1. Cataloguing the existing robustness input decks

The TRACE code development group currently uses approximately 1,400 decks to automatically test code robustness, i.e., runs used to ensure that code functionality has not been impaired in the course of a modification to the point at which input decks do not run or runtimes are inexplicably prolonged. Many of these input decks have been inherited from predecessors of the TRACE code, and are poorly documented.

With assistance from NRC staff, the contractor shall identify the scope of existing robustness test decks, and categorize the most useful ones according to functional key words. This will enable code developers to extract those that are best suited for testing a particular modification. The contractor shall also recommend for exclusion from the robustness testing suite redundant decks, and decks that are defective. The contractor shall prepare a worksheet that lists the robustness decks according to key words. If possible, deck names will be hyperlinked to the actual input deck.

Deliverables	Level of Effort	Completion Date
spreadsheet with listing of existing decks by keywords	0.5 staff-months (50% senior engineer, 50% engineer)	2 weeks after contract award

Task 2. Identification of suitable validation tests

The contractor shall assist the NRC in identifying approximately 30 validation decks that canvas important code features needed to accurately simulate high-ranked phenomena for foreseeable TRACE applications. It is anticipated that these validation decks will be selected from existing decks, rather than developed from basic data. The validation decks must have high quality comparison features, i.e., a good experimental datum, a clear analytical solution or a well V&Ved prior computation. With assistance from NRC staff, the contractor shall prioritize 8 to 13 input decks that canvas a broad range of existing TRACE capabilities for immediate inclusion in the initial validation test suite.

Deliverables	Level of Effort	Completion Date
proposed list of 30 TRACE validation problems	0.20 staff-months (100% senior engineer)	3 weeks after contract award

list of 8 to 13 tests suitable for immediate inclusion into the validation test suite	0.05 staff-months (100% senior engineer)	3 weeks after contract award

Task 3. Identification of FOMs for validation tests

Upon receiving NRC approval of the 8 to 13 decks that will constitute the validation test suite from the second deliverable of task 2, the contractor shall assist the NRC in identifying figures of merit (FOMs) for each of the validation problems. The figures of merit shall provide an overall snapshot of code performance.

Each figure of merit shall be a single number that meets the following two requirements:
1. It corresponds to an analytical value, an experimental datum (or data) or a base code prediction that is known with sufficient certainty, accuracy and precision.
2. The corresponding TRACE code prediction can be reduced through control system logic to a unique number.

The figures of merit shall summarize initial and boundary conditions, as well as other parameters that can substantially alter code predictions. These shall be reduced to the most meaningful form by, for example, integration and differentiation. Figures of merit shall include as appropriate extremes, inflection points, system actuation times, integral break mass flow rates, integral heat losses, etc.

For each figure of merit, the contractor shall further identify numerical ranges that correspond to the following prediction agreements: excellent, good, adequate and poor.

Deliverables	Level of Effort	Completion Date
table of figures of merit for each of the 8 to 13 validation test suites that include reduced analytical solution, datum or base prediction and their corresponding agreement qualifier range	1 staff-month (75% senior engineer, 25% engineer)	2 months after contract award

Task 4. Development of validation test input decks and post processing scripts

Upon receiving NRC approval of the 8 to 13 decks of task 2, and the figures of merit of task 3, the contractor shall prepare TRACE-native input decks with SNAP masks for each of the validation test problems.

The contractor shall include in each input deck the computation of figures of merit in reduced form, and automate the writing of all figures of merit for all validation test decks into a worksheet that contains the analytic/data/base computation values and the agreement qualifier ranges. The worksheet shall include "old" code predictions (from the previously tested code

version) and new code predictions for each figure of merit of every validation test in addition to analytic/data/base prediction values.

AV scripts shall also be prepared for each validation deck to automatically generate the data curves from which figures of merit were extracted.

Deliverables	Level of Effort	Completion Date
Documented input decks with control systems for figures of merit and SNAP masks	4 staff-months (20% senior engineer, 80% engineer)	5 months after contract award
automated worksheet for code prediction evaluation	0.25 staff-months (100% engineer)	5.5 months after contract award

PERSONNEL QUALIFICATIONS

Key personnel shall have demonstrated analytical experience with LWR transients, and separate/integral effect test phenomenology. Furthermore, the timely completion of this task requires personnel with experience in testing the TRACE code. Specifically, personnel who have been involved in the development of both separate/integral effect input decks as well as the development of complete plant input decks (including advanced LWRs) for the TRACE code or its predecessors shall be assigned to carry out this work. Personnel assigned to this task shall also be familiar with the development of AV scripts. Familiarity with SNAP is desirable, but not mandatory.

V. REPORTING REQUIREMENTS

Monthly Letter Status Report

A MLSR is to be submitted to the NRC Project Manager by the 20th of the month following the month to be reported with copies provided to the following:

Division Management Analyst, (Mail Stop T-10E32)
Division of Contracts and Property Management, Office of Administration (MS T-7I2)

The MLSR will identify the title of the project, the job code, the Principal Investigator, the period of performance, the reporting period, summarize each month's technical progress, list monthly spending, total spending to date, and the remaining funds. Any administrative or technical difficulties which may affect the schedule or costs of the project shall be immediately brought to the attention of the NRC project manager.

ORGANIZATIONAL CONFLICT OF INTEREST DISCLOSURE

A. Provide descriptions of present/planned/past work for other organizations, in the same/similar technical area as the NRC project scope of work, e.g., (included but not limited to), NRC licensees, vendors, industry groups or research institutes that represent or are substantially comprised of nuclear utilities.

B. Provide name of organization, dollar value, and period of performance of the work identified in (A).

VI. DELIVERABLES AND DELIVERY SCHEDULE

Task 1 spreadsheet with listing of existing decks by keywords
2 weeks after contract award

Task 2 proposed list of 30 TRACE validation problems
3 weeks after contract award

list of 8 to 13 tests suitable for immediate inclusion into the validation test suite
3 weeks after contract award

Task 3 table of figures of merit with for each of the 8 to 13 validation test
2 month after contract award

Task 4 documented input decks with control systems for FOMs and SNAP masks
5 months after contract award

automated worksheet for code prediction evaluation
5.5 months after contract award

VII. MEETINGS AND TRAVEL REQUIREMENTS

No travel is anticipated.

VIII. LEVEL OF EFFORT

Task 1 0.50 staff-months (50% senior engineer, 50% engineer)

Task 2 0.25 staff-months (100% senior engineer)

Task 3 1.00 staff-month (75% senior engineer, 25% engineer)

Task 4 4.25 staff-months (19% senior engineer, 81% engineer)

TOTAL 6 staff-months (2 staff months senior engineer, 4 staff-months engineer)

IX. PERIOD OF PERFORMANCE

The work shall begin immediately upon receipt of the award and be completed within six months of the award date.

X. TECHNICAL DIRECTION

Technical direction will be provided by the project manager, Dr. Mirela Gavrilas, who can be reached at:

Mail Stop: T-10K08
U. S. Nuclear Regulatory Commission
Rockville, MD 20555-0001

Phone: (301) 415-5332
Fax: (301) 415-5160
Email: mxg5@nrc.gov

XI. PUBLICATIONS (IF APPLICABLE)

RES encourages the publication of the scientific results from RES sponsored programs in refereed scientific and engineering journals as appropriate. If the laboratory proposes to publish in the open literature or present the information at meeting in addition to submitting the required technical reports, approval of the proposed article or presentation should be obtained from the NRC Project Manager. The RES Project Manager shall either approve the material as submitted, approve it subject to NRC suggested revisions, or disapprove it. In any event, the RES Project Manager may disapprove or delay presentation or publication of papers on information that is subject to Commission approval that has not been ruled upon or which has been disapproved. Additional information regarding the publication of NRC sponsored research is contained in NRC Management Directives 3.8, "Unclassified Contractor and Grantee Publications in the NUREG Series," and 3.9, "NRC Staff and Contractor Speeches, Papers, and Journal Articles on Regulatory and Technical Subjects."

If the presentation or paper is in addition to the required technical reports and the RES Project Manager determines that it will benefit the RES project, the Project Manager may authorize payment of travel and publishing costs, if any, from the project funds. If the Project Manager determines that the article or presentation would not benefit the RES project, the costs associated with the preparation, presentation, or publication will be borne by the contractor. For any publication or presentations falling into this category, the NRC reserves the right to require that such presentation or publication will not identify the NRC's sponsorship of the work.

NEW STANDARDS FOR CONTRACTORS WHO PREPARE NUREG-SERIES MANUSCRIPTS

The U.S. Nuclear Regulatory Commission (NRC) began to capture most of its official records electronically on January 1, 2000. The NRC will capture each final NUREG-series publication in its native application. Therefore, commencing January 1, 2000, please submit your final manuscript that has been approved by your NRC Project Officer in both electronic and camera-ready copy.

All format guidance, as specified in NUREG-0650, Revision 2, will remain the same with one exception. You will no longer be required to include the NUREG-series designator on the bottom of each page of the manuscript. The NRC will assign this designator when we send the camera-ready copy to the printer and will place the designator on the cover, title page, and

spine. The designator for each report will no longer be assigned when the decision to prepare a publication is made. The NRC's Publishing Services Branch will inform the NRC Project Officer for the publication of the assigned designator when the final manuscript is sent to the printer.

For the electronic manuscript, prepare the text in WordPerfect 8 (or more recent), and use any of the following file types for charts, spreadsheets, and the like.

File Types to be Used for NUREG-Series Publications	
File Type	File Extension
WordPerfect®	.wpd
Microsoft® PowerPoint®	.ppt
Corel® QuattroPro®	.wb3
Corel® Presentations	.shw
Lotus® 1-2-3	.wk4
Portable Document Format	.pdf

This list is subject to change if new software packages come into common use at NRC or by our licensees or other stakeholders that participate in the electronic submission process. If a portion of your manuscript is from another source and you cannot obtain an acceptable electronic file type for this portion (e.g., an appendix from an old publication), the NRC can, if necessary, create a tagged image file format (file extension.tif) for that portion of your report.

Note that you should continue to submit original photographs, which will be scanned, since digitized photographs do not print well.

If you chose to publish a compact disk (CD) of your publication, place on the CD copies of the manuscript in both (1) a portable document format (PDF); (2) a WordPerfect 8/9 file format, and (3) an Adobe Acrobat Reader, or, alternatively, print instructions for obtaining a free copy of Adobe Acrobat Reader on the back cover insert of the jewel box.

XII. QUALITY ASSURANCE
NOT APPLICABLE.

XIII. NRC-FURNISHED MATERIALS (IF APPLICABLE)

The NRC shall provide the most recent version of the TRACE code and the existing robustness suite of approximately 1400 decks. The NRC shall also provide decks beyond the robustness suite that it wants included in the validation test suite.

XIV. REFERENCES AND ATTACHMENTS (IF APPLICABLE)
NOT APPLICABLE.