ORDER FOR SUPPLIES OR SERVICES

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

BPA NO.

1. DATE OF ORDER	2. CONTRACT NO. (If any)
03-02-2007	**NRC-04-02-054**

3. ORDER NO.	MODIFICATION NO.	4. REQUISITION/REFERENCE NO.
T015		RES-02-054 dtd 7/31 RES-C07-120 **(FFS #)**

6. SHIP TO:

a. NAME OF CONSIGNEE
U.S. Nuclear Regulatory Commission

5. ISSUING OFFICE (Address correspondence to)
U.S. Nuclear Regulatory Commission
Div. of Contracts
Attn: H. (Eddie) Colón, 301-415-7135
Mail Stop T-7-I-2
Washington, DC 20555

b. STREET ADDRESS
Attn: Michael B. Rubin
Mail Stop: T10-E46
11555 Rockville Pike

c. CITY	d. STATE	e. ZIP CODE
Rockville	MD	20852

7. TO:

a.NAME OF CONTRACTOR

INFORMATION SYSTEMS LABORATORIES

f. SHIP VIA

b. COMPANY NAME
ATTN.: MR. JAMES F. MEYER, MANAGER

8. TYPE OF ORDER

c. STREET ADDRESS
11140 ROCKVILLE PIKE STE 500

☐ 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.

☒ b. DELIVERY

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.

d. CITY	e. STATE	f. ZIP CODE
ROCKVILLE	MD	208523106

9. ACCOUNTING AND APPROPRIATION DATA
76015111205   N6364   252A   31X0200.760
OBLIGATE: $101,000.00
DUNS #: 107928806

10. REQUISITIONING OFFICE   RES

DRASP

11. BUSINESS CLASSIFICATION (Check appropriate box(es))

☐ a. SMALL   ☒ b. OTHER THAN SMALL   ☐ c. DISADVANTAGED   ☐ g. SERVICE-DISABLED VETERAN-OWNED

☐ d. WOMEN-OWNED   ☐ e. HUBZone   ☐ f. EMERGING SMALLBUSINESS

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		N/A	Net 30

17. SCHEDULE (See reverse for Rejections)   See CONTINUATION Page

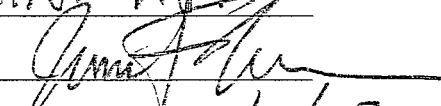| ITEM NO. (a)	SUPPLIES OR SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	TASK ORDER NO. 015 entitled "**RATRAD ENHANCEMENT & IMPROVEMENTS II**" Reference is made to your proposal dated 1/29/2007 in response to this effort. This confirms the email authorization provided to ISL on March 2, 2007 to begin work under the subject task order, effective March 2, 2007 with a temporary ceiling of $12,300, and confirms the reduction in the cost ceiling by $39, from $101,039 to $101,000. In accordance with Section G.4 entitled "Task Order Procedures" of the subject contract, this order definitizes Task Order No. 015. This effort shall be performed in accordance with the enclosed SOW, and the terms and conditions of Contract No. NRC-04-02-054. Task Order No. 015 shall be effective March 2, 2007 - September 1, 2007 with a total cost ceiling of $101,000.00. The amount of $93,562 represents the reimbursable costs the amount of $7,477 represents the fixed fee.					

18. SHIPPING POINT	19. GROSS SHIPPING WEIGHT	20. INVOICE NO.	

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: (**NRC-04-02-054-T015**)
SUBMIT INVOICES IN TRIPLICATE

c. CITY	d. STATE	e. ZIP CODE
Washington	DC	20555

17(h) TOTAL (Cont. pages)

17(i). GRAND TOTAL
$101,000.00

22. UNITED STATES OF AMERICA BY (Signature)	23. NAME (Typed)
	Heriberto Colón, Jr. Contracting Officer TITLE: CONTRACTING/ORDERING OFFICER

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

DATE OF ORDER	CONTRACT NO.		ORDER NO.
03-02-2007	**NRC-04-02-054**		**T015**

ITEM NO. (A)	SUPPLIES OR SERVICES (B)	QUANTITY ORDERED (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)	QUANTITY ACCEPTED (G)
	The issuance of this task order does not amend any other terms or conditions of the subject contract.					
	Please indicate your acceptance of this Task Order No. 015 **ACCEPTED**:					
	Name _James F. Meyer_					
	Title _Senior V.P._					
	Signature _(signature)_					
	Date _4/13/07_					

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

STATEMENT OF WORK
NRC-04-02-054 TASK ORDER NO. 15

TITLE: RADTRAD Enhancements and Improvements II

I.   BACKGROUND

A Simplified Model for RADionuclide Transport and Removal And Dose Estimation (RADTRAD) is a code which models release and transport of fission products. This code was developed to model the accident alternative source terms (AST) described in NUREG-1465, "Accident Source Terms for Light-Water Nuclear Power Plants." Further guidance for implementing an AST is provided in Regulatory Guide 1.183, 'Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," dated July, 2000. In addition, on March 7, 2006, NRR issued Regulatory Issue Summary 2006-04 which described recent experience with implementation of AST.

A user need letter dated July 28, 1998, identified the need for RADTRAD code enhancements. A subsequent NRR/RES effort established a prioritized list of problem areas and enhancements to the code. In a letter dated November 26, 1999, RES informed NRR that development of RADTRAD was completed. This revision incorporated a portion of the previously identified list. It included a major change to the user interface for the code and an update of the documentation. Following this effort, the nuclear industry (ITS Corporation) made changes to the RES version of the code. In March 2000 ITS Corporation issued Version 3.02 to correct problems with the user interface. NRR assessed both of these code revisions and still found the code to be incomplete.

A user need dated May 30, 2000, emphasized the need for further development and maintenance of the code. On March 1, 2004, RES released Version 3.04 Preliminary 1b. However, its implementation was suspended due to the lack of funds.

To continue to ensure protection of public health and safety, the NRR staff should employ the best available knowledge in reviewing physical phenomena relevant to implementation of AST. Also, to ensure evaluation of licensing amendment requests in an effective, efficient, realistic and timely manner, the staff should have at its disposal well-refined analytical tools like RADTRAD code. Without such tools, NRR staff will be challenged in its reviews of license amendment requests. RES support of this code is critical to NRR's ability to assess dose consequences of design basis accidents.

II.   OBJECTIVE

The objective of this task order is to enhance and improve the RADTRAD code to meet NRR's needs. There are two general areas in RADTRAD that need improvement: (1) input/output, and (2) inclusion of appropriate physical models.

III.   SCOPE OF WORK

The user interface continuously creates several nuisance errors that hamper productivity. The cause of these errors is not easily identified since the error messages are cryptic. Typically, the

user must re-enter all input to get the code to execute. Users spend a great deal of time trying to debug these problems. As an example, the most current official version (i.e., version 3.03) of the code contains an editor that appears to generate code errors when it is used to modify input.

A discussion of included physical models should provide for appropriate choice of code options regarding fission product transport and deposition. In particular, deposition models for aerosols and gaseous iodine should be included. A verification and validation matrix is needed to check the new options along with test cases to perform future confirmatory analyses.

The specific needs include the following.

1. Ability to put in a user specific source term through the graphical user interface (GUI). Only the interface needs to have the capability to accept Ci/MWt for each radionuclide. This process is time consuming and error prone when the user has to edit the ASCII file.

2. Ability to track the dose contribution from each release pathway and display this information. Right now Version 3.10 allows multiple pathways (x/q's) which substantially decrease the number of runs (by as much as a factor of 8). The implementation of multiple dose pathways in Version 3.10 is good, but should include an output of pathway-dependent calculated doses.

3. Capability to print activity and dose on a per nuclide basis (just as allowed by Version 3.04). Version 3.10 may already have some of these capabilities.

4. Include an error flag if the nuclide inventory files (NIF files) do not match the order of the nuclides in the dose conversion file.

5. Improved code output. NRR can provide a requirement document detailing the type of code output needed and the preferred format.

6. The code needs to be able to model steam generator tube rupture and main steam line break accidents. This would require the code to model multiple source compartments and source term release rates. Release rates need to be specified in Ci/unit time or fraction per unit time. The GUI needs to be expanded to make this intuitive and efficient.

7. Since the code will replace HABIT (an old DOS based dose code) it needs to be able to model and provide output for the TID-14844 source term as well as for the alternative source term.

8. The code should be able to automatically stop containment sprays when the spray decontamination factor reaches its cutoff value.

9. Allow printout of core fission product inventories in terms of mass.

10. Provide an integral RIF and NIF file editor that can work for the traditional design basis accident assumptions as inputs. For example, for an fuel handling accident, ask the user for the number of damaged rods, the peaking factor, the decay time, pool decontamination factor, etc. Then have the code generate the RIF and NIF based on the users's inputs. This editor

should also be able to generate reactor coolant system activities, including iodine spiking. There should be a user interface for this.

11. Modify the output to suppress the actual input file content while leaving the user-readable input summary intact. There is no reason to print both.

12. Fix the bug in the printing routine that permanently changes the default printer (and its setups) on the workstation. HINT: the COMMDLG "switch" in Visual Basic may have been incorrectly set.

13. Provide the option for more than one environment and more than one control room.

14. Allow input of separate aerosol settling velocities in different volumes as well as time-dependent settling velocities in each volume.

15. The pathway "INACTIVE" switch should not delete the path from the model. Similarly, can the code ignore a compartment for which all inputs and outputs are set to zero?

16. Enable arrow key movement between cells in entry tables. One shouldn't have to use the mouse to move from cell to cell. The left-to-right and then down action of the "Tab" key is not the natural entry order on most of these tables.

17. Revise the NIF and DCF files to incorporate a selection of nuclides more supportive of design basis calculations (i.e., get rid of the transuranics and add xenons and kryptons).

18. Create a new pre-defined compartment type "sink" that will serve as an end node without the need for assigning a volume, etc.

19. Create a new pre-defined compartment type "split" that allows for splitting the transfer from a single compartment to input to two or more flow branches. The branching fraction would be input by the user.

20. Modify the SOURCE TERM text box on the individual compartment forms to allow separate entries for aerosol, elemental, organic, and noble gas. The first three can be identified once in the SOURCE TERM dialog. However, these settings apply to the entire problem. The modification would allow the analyst to assign noble gases to the CNMT atmosphere and not the CNMT sump. It would allow simultaneous modeling of CNMT leakage and ECCS leakage.

21. Add "what is this" context sensitive help and tool tips.

22. Change the file handling to allow NEW, OPEN EXISTING CASE, COPY EXISTING, CLOSE, REVERT options. Require the user to enter a file name at start of the edit. Then, suppress the manual save before you can press CALCULATE and the multiple "are you sure" messages by having the CALCULATE button automatically save the file.

23. Provide means for the RIF file to distinguish between different design basis gap fractions, e.g., 8% I-131 vs. 5% for others.

24. All filtration inputs should allow flow and efficiency to be varied by time. Current flow is fixed. It is not unusual for a plant design to automatically start two trains of filters and fans, only to cut back to one train by subsequent operator action.

25. Provide the capability for a user-identified nuclide that would be defined by user entered, name, Ci, DCFs, and lambdas in a dialog. This would allow analysis of special cases, e.g., Watts Bar's tritium production core, without editing the NIF, RIF and INP files.

26. Most if not all numeric input cells should allow user designated units, where appropriate. A drop down dialog listing unit choices could be positioned next to the input field. It shouldn't be necessary for the user to do unit conversion offline.

27. Put in the variable stepwise (time step) checking engine to effectively use Powers' new steam line deposition model.

IV.   REPORTING REQUIREMENTS

1.   Monthly Letter Status Report (MLSR)

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, Office of Administration - an electronic copy only to Joyce Fields, email address jaf1@nrc.gov and to Beverly Anker, email address bfa@nrc.gov.

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.

V.   DELIVERABLES AND DELIVERY SCHEDULE

Task	Est. Due Date*	Comments / Product
1. Input / Output issues	1 month from start of task order	- improved code's user friendliness - increased flexibility for user specified parameters, like source term, time step, time/node dependent decontamination factors etc. - improved flexibility in using various models and options - flexibility in user specified outputs
2. Review of physical models	1.5 months from start of task order	- priority list of models and options critical for AST reviews - establishing criteria for validation and verification (V&V) process - defining range of applicability of FP transport and deposition models, primarily for various forms of iodine - recommendations for best available models, and values of crucial parameters, for various accident scenarios
3. Beta version of modified code	3 months from start of task order	- testing of code's features and options - review of V&V status - establishing sufficient level of V&V - sample inputs testing all of the code's options - performing calculation demonstrating code's options, capabilities and limitations
4. New version of RADTRAD	4.5 months from start of task order	- all high priority features implemented and tested - list of all of the V&V comparisons - establishing library of sample inputs - establishing library of available operating plants inputs
5. Revised manual / user's guide	6 months from start of task order	- description of new features / models - V&V process documented - description of models applicability and limitations - user's guide including recommended options

* Actual due dates are to be coordinated with and accepted by the NRC Project Officer.

VI.   MEETINGS AND TRAVEL REQUIREMENTS

No travel is anticipated.

VII.   PERIOD OF PERFORMANCE

The period of performance of this Task Order is <u>March 2, 2007 through September 1, 2007</u>.

VIII.   TECHNICAL DIRECTION

Technical direction will be provided by the Project Manager and Technical Monitor, Michael B. Rubin, who can be reached at:

> Mail Stop: (T-10 K08)
> U. S. Nuclear Regulatory Commission
> Washington   DC   20555-0001
> Phone: (301) 415-7002
> Fax: (301) 415-5160
> Email: (<u>jls4@nrc.gov</u>)

IX.   PUBLICATIONS

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.

<u>NEW STANDARDS FOR CONTRACTORS WHO PREPARE NUREG-SERIES MANUSCRIPTS</u>

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

6

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.

X.   QUALITY ASSURANCE

Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106-554) directs the Office of Management and Budget (OMB) to issue government-wide guidelines (FR Vol. 67, No. 36, pp. 8452-8460) that "provide policy and

procedural guidance to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by federal agencies." NRC Information Quality Guidelines are provided in FR Vol. 67, No. 190, pp. 61695-61699.

The Contractor shall cite contractor quality assurance procedures used in the conduct of this work that provide for compliance with OMB and NRC guidelines.

XI.   NRC-FURNISHED MATERIALS

The NRC will provide the latest official version 3.03 and version 3.04b preliminary of RADTRAD. NRC will also provide version 3.10 of Alion Science and Technology if necessary.

XII.   TECHNICAL AND OTHER SPECIAL QUALIFICATIONS REQUIRED

ISL shall provide personnel that are experienced in RADTRAD code and input deck development.

It is the responsibility of the contractor to assign technical staff, employees, subcontractors, or specialists who have the required educational background, experience, or combination thereof to meet the technical objectives of the work specified in this SOW. The NRC will rely on representations made by the contractor concerning the qualifications of the personnel assigned to this task order including assurance that all information contained in the technical and cost proposal, including resumes, is accurate and truthful. In addition, the contractor and personnel assigned to this work must be approved for handling and working with proprietary information.

The use of key personnel and any proposed change to key personnel on this contract is subject to the NRC Project Manager's approval. This includes proposed use of principal persons (i.e., key contributors) during the life of the contract.

For any work to be subcontracted or performed by consultants ISL shall obtain the NRC Project Manager's written approval of the subcontractor or consultant prior to initiation of the subcontract effort. Conflict of interest considerations shall apply to any subcontracted effort.

XIII.   REFERENCES AND ATTACHMENTS

None.

XIV.   LICENSE FEE RECOVERY

The work specified in this SOW is not license fee recoverable.