



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

December 1, 2000

Information Systems Laboratories, Inc.
ATTN: Nancy L. Aguinaldo
11140 Rockville Pike, Suite 500
Rockville, MD 20852

SUBJECT: MODIFICATION NO. 7 TO TASK ORDER NO. 2 ENTITLED, "RELAP5
THERMAL-HYDRAULIC CODE MODIFICATIONS" UNDER CONTRACT NO.
NRC-04-97-039

Dear Ms. Aguinaldo:

The purpose of this modification is to (1) incorporate a within-scope change for performance of additional modifications to the RELAP5 code to upgrade the code model, improve code robustness, and provide improved documentation in accordance with the attached statement of work and ISL's proposal dated November 17, 2000, both hereby incorporated; (2) increase the task order ceiling by \$1,103,236.00 from \$1,185,719.00 to \$2,288,955.00 to accommodate the change, (3) extend the period of performance, and (4) provide incremental funding in the amount of \$200,000.00.

Paragraph 2 of the definitization letter is deleted in its entirety and the following is substituted in lieu thereof:

"The period of performance for Task Order No. 2 is October 27, 1999, through November 30, 2001. The total estimated cost for full performance of this task order is \$2,288,955.00, of which the amount of \$2,139,220.00 represents reimbursable costs and the amount of \$149,735.00 represents the fixed fee.

The amount currently obligated by the Government with respect to this task order is \$1,329,986.00, of which \$1,242,983.00 represents reimbursable costs and the amount of \$87,003.00 represents the fixed fee. It is estimated that the amount currently allotted will cover performance through January 31, 2001."

Accounting Data for Modification No. 7 to Task Order No. 2 is as follows:

Commitment No:	RES-C01-332
APPN No:	31X0200.160
B&R No:	16015110110
JOB CODE:	W6706
BOC No:	252A
Obligated Amount:	\$200,000.00

The obligated amount of this task order shall at no time exceed the task order ceiling. When and if the amount(s) paid and payable to the Contractor hereunder shall equal the obligated amount, the Contractor shall not be obligated to continue performance of the work unless and

until the Contracting Officer shall increase the amount obligated with respect to this task order. Any work undertaken by the Contractor in excess of the obligated amount specified below is done so at the Contractor's sole risk.

A summary of obligations for this task order, from award date through the date of this action is given below:

Total FY00 Obligation Amount:	\$1,069,986.00
Total FY01 Obligation Amount:	\$ 260,000.00

Cumulative total of NRC obligations:	\$1,329,986.00
--------------------------------------	----------------

This modification obligates FY01 funds in the amount of \$200,000.00.

Please indicate your acceptance of Modification No. 7 to Task Order No. 2 by having an official authorized to bind your organization execute three copies of this document, by signing in the space provided, and return two copies to the Contract Specialist. You should retain the third copy for your records.

All other terms and conditions of this task order remain unchanged.


Should you have any questions, regarding this modification, please contact Sally Adams, Contract Specialist, on (301) 415-6588.

Sincerely,



Mark J. Flynn, Contracting Officer
Information Technology Acquisition
Management Branch
Division of Contracts and Property Management
Office of Administration

ACCEPTED:


NAME
James F. Meyer V.P.
TITLE
12/4/00
DATE

STATEMENT OF WORK - FY2001
RELAP5 Code Maintenance
Continued

Task Order #2

2.1 RELAP5

2.1.1 (b) Interfacial Temperature Model

An improved interfacial temperature model has been developed by Prof. Ransom of Purdue University last year. This model uses an exponential under-relaxation of the interfacial temperature to its steady-state value as determined by the saturation pressure that could have large changes when the noncondensable gases first appear in the volume. This task shall install this model into the RELAP5 code to improve the code robustness when large pressure changes occur.

Estimated Completion Date: 1/31/2001
Estimated Level of Effort: 1.5 staff-months

2.1.1 (c) Interfacial Temperature Model with Non-condensable Mixtures

An interfacial temperature model for noncondensable-steam mixtures has been installed in the code that takes into account the depletion of steam near the interface as a result of condensation. This task shall modify this model to be consistent with the improvements made in Subtask 2.1.1 (b) above. After these changes are working satisfactorily, the model shall be modified to work with evaporating flows and other flow regimes in which the model is physically realistic.

Estimated Completion Date: 3/31/2001
Estimated Level of Effort: 5 staff-months

Note: Subtasks 2.1.1 (b) & (c) were previously deleted from the FY2000 SOW in TO#2, Mod1, dated 3/3/2000.

2.1.2 (c) Low Pressure Subcooled Boiling Model Improvement

Koncar and Mavko from JSI in Slovenia (User Problem NRC 1999-045) simulated subcooled boiling experiments in vertical flow at high and low pressure conditions using the RELAP5/MOD3.2 and RELAP5/MO3.2.2 Gamma codes. They found that the most influential parameter affecting the void fraction evolution at low pressure conditions is the pumping factor e , which determines the ratio between evaporation heat flux and pumping heat flux. This factor is highly overestimated in the RELAP5 code. An improved model was developed earlier at INEEL. It was removed from RELAP5 by INEEL during the transition. This task shall restore this capability.

Estimated Completion Date: 10/31/2000
Estimated Level of Effort: 1.5 staff-months

2.1.2 (d) Speed-up Steam Tables

New high accuracy steam tables have been developed for RELAP5. Code robustness has been greatly improved, but at a cost of slower running time. The code with the improved steam tables runs at about one-half the speed of the old code. In order for users to accept the steam table improvements, it is necessary to reduce the running time penalty associated with the new steam tables. CAMP members did express a strong desire, during the Spring 2000 meeting, for this running time improvement. This task shall improve the running speed of RELAP5 with the new steam tables.

Estimated completion Date: 12/31/2000
Estimated Level of Effort: 2 staff-months

2.1.3 (b) Internal Code Documentation

A recommended format for code comments inside a subroutine has previously been defined. Although these comments have been added to subroutines that have been modified for other reasons, a significant number of subroutines still remain to be worked on. This task shall add such comments to the remaining subroutines.

Estimated Completion Date: 3/31/2001
Estimated Level of Effort: 1.5 staff-months

2.1.4 (b) Assessment Manual

The Developmental Assessment Manual, Volume III, is grossly out of date. It was last updated and published in 1985. It has been scanned into electronic form, but still requires extensive rewriting to explain the results of the latest DA, which compares MOD3.2 and MOD3.3 results.

This task shall update the manual; the task includes documenting the DA process and the results of running a full range of developmental assessment problems using RELAP5/MOD3.3 in a revised, electronic version of the RELAP5 Developmental Assessment Manual.

Estimated Completion Date: 7/31/2001
Estimated Level of Effort: 3 staff-months

2.1.4 (c) Improvements in Auto-validation (AV) Script

The existing AV script provides plots of calculated variables versus time or against each other (e.g. pressure vs. vapor volume). Other type of plots are often needed when performing code assessment. For example, the RELAP5 DA Manual has 19 profile and 7 scatter plots which cannot be generated with the present AV script. The scatter plot is widely used for assessment of correlations.

Profile and scatter plots require different input information than time plots and different logic to extract the plotting information. This task shall provide profile and scatter plotting capabilities, most likely in the form of two new AV scripts; one for profile plots and another for scatter plots. The AV script updates shall be made so that they work for RELAP5, as well as for TRAC-M.

Estimated Completion Date: 5/30/2001
Estimated Level of Effort: 4 staff-months

2.1.4 (d) MOD3.3 Assessment

Under this subtask, the full DA shall be completed for RELAP5/MOD3.3 that includes additional modification planned for the early part of FY2001. Levels 1, 2 and 3 cases will be run and results archived to the QA files. Code modifications will be made as needed to address problems identified by the assessment. Results of this subtask will also provide input to Subtask 2.1.4 (b), Assessment Manual.

Estimated Completion Date: 5/31/2001
Estimated Level of Effort: 4 staff-months

2.1.4 (e) Complete Programmer's Manual

It is important to have the Programmer's Manual completed so that the less-experienced programmers will have something besides the coding and the more experienced programmers to turn to for training. First drafts of a few appendices in the Programmer's Manual have been completed. The remaining appendices and the main body of the manual shall be completed in this subtask.

Estimated Completion Date: 9/30/2001
Estimated Level of Effort: 6 staff-months

: Note: Subtask 2.1.4 (e) was previously deleted from the FY2000 SOW in TO#2, Mod1, dated 3/3/2000.

2.2 SNAP

2.2.5 JAVA SNAP

This task is to extend the JAVA SNAP Model Editor to function with the TRAC-M components and to properly translate RELAP5 code inputs to the TRAC-M code inputs. This task is consisted of the following four subtasks:

(a) Assessment, Testing and Debugging of the SNAP User Interface Features

Ensure the correctness, robustness and usability of the SNAP Model Editor user interface by performing usability assessments and tests. Debug and enhance

the SNAP user interface as needed to correct deficiencies identified by these tests.

Estimated completion Date: 11/30/2001
Estimated Level of Effort: 8 staff-months

- (b) Additional TRAC-M Capabilities, and Improved RELAP5 to TRAC-M Input Deck Translation.

Expand the capabilities of the SNAP Model Editor to handle multidimensional heat structures and 1D components inside 3D vessels. Perform testing, debugging and make enhancement to improve SNAP's ability to perform RELAP5 to TRAC-M input translation.

Estimated Completion Date: 4/30/2001
Estimated Level of Effort: 7.5 staff-months

- (c) Support and Testing of Interfaces to SNAP Modules, External Wizards, and TRAC-M

Perform testing, debugging and make enhancements to improve the SNAP Model Editor interfaces with TRAC-M, other SNAP modules, and the database. Ensure that the SNAP Model Editor functions correctly with these systems in a distributed, networked environment. Develop a specification for adding expert assistants (WIZARDS) to SNAP, and test this specification by developing a basic WIZARDS for entering initial conditions into SNAP.

Estimated Completion Date: 11/30/00
Estimated Level of Effort: 4.5 staff-months

- (d) Add Help and Documentation Capabilities

Add a Help system and Documentation Capabilities to the SNAP Model Editor, as well as improved error checking for TRAC-M input processing. Provide user assistance and training at the Spring and the Fall CAMP meetings.

Estimated Completion Date: 11/30/2001
Estimated Level of Effort: 5 staff-months

2.4 Pressurized Thermal Shock

- 2.4.1 Provide up to 10.25 staff-months support for RELAP5 calculations of the PTS transients as directed by NRC staff.

Estimated completion Date: 9/30/2001
Estimated Level of Effort: 10.25 staff-months