

ORDER FOR SUPPLIES OR SERVICES

PAGE OF PAGES
1 11

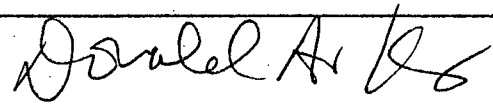
IMPORTANT: Mark all packages and papers with contract and/or order numbers.

BPA NO.

| | | | | | |
|--|--|---|----------------------|--|----------------------|
| 1. DATE OF ORDER SEP 19 2006 | | 2. CONTRACT NO. (If any) NRC-04-06-068 | | 6. SHIP TO: | |
| 3. ORDER NO. TASK ORDER 002 | | 4. REQUISITION/REFERENCE NO. RES-06-068 RES-C06-659 | | a. NAME OF CONSIGNEE U.S. Nuclear Regulatory Commission | |
| 5. ISSUING OFFICE (Address correspondence to) U.S. Nuclear Regulatory Commission Div. of Contracts Attn: Jeffrey R. Mitchell, 301-415-6465 Mail Stop T-7-I-2 Washington, DC 20555 | | | | b. STREET ADDRESS Attn: William Krotiuk Mail Stop: T10-K8 | |
| | | c. CITY Washington | | d. STATE DC | e. ZIP CODE 20555 |
| 7. TO: | | | | f. SHIP VIA | |
| a. NAME OF CONTRACTOR INFORMATION SYSTEMS LABORATORIES, INC | | | | 8. TYPE OF ORDER | |
| b. COMPANY NAME ATTN: DR. JAMES F. MEYER | | | | <input type="checkbox"/> a. PURCHASE <input checked="" type="checkbox"/> b. DELIVERY | |
| c. STREET ADDRESS 11140 ROCKVILLE PIKE, SUITE 500 | | | | 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. 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. | |
| d. CITY ROCKVILLE | | e. STATE MD | f. ZIP CODE 20852 | | |
| 9. ACCOUNTING AND APPROPRIATION DATA 66015113105 N6359 252A 31x0200.660 Obligate \$347,713.00 66015113277 N6260 252A 31x0200.660 Obligate \$176,939.00 Contractors DUNS: 107928806 | | | | 10. REQUISITIONING OFFICE RES | |
| 11. BUSINESS CLASSIFICATION (Check appropriate box(es)) | | | | | |
| <input type="checkbox"/> a. SMALL | | <input checked="" type="checkbox"/> b. OTHER THAN SMALL | | <input type="checkbox"/> c. DISADVANTAGED | |
| <input type="checkbox"/> d. WOMEN-OWNED | | <input type="checkbox"/> e. HUBZone | | <input type="checkbox"/> 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) | |
| a. INSPECTION | | b. ACCEPTANCE | | 16. DISCOUNT TERMS | |

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) |
|-----------------|---|----------------------------|-------------|----------------------|---------------|-----------------------------|
| | Issuance of Task Order No. 002, under Contract No. NRC-04-06-068. Title: "EPR Input Model Development" Period of Performance: 9/20/2006 - 12/31/2007 Estimated Reimbursable Cost: \$485,925.00 Fixed Fee: \$38,727.00 TOTAL COST AND FEE: \$524,652.00 Funding in the amount of \$524,652.00 is being provided. See attached pages for a description of the Task Order No. 2 | | | | | |

| | | | | | | | |
|---|--|--|---------------------------|--|-----------------|--------------|---|
| SEE BILLING INSTRUCTIONS ON REVERSE | 18. SHIPPING POINT | | 19. GROSS SHIPPING WEIGHT | | 20. INVOICE NO. | | 17(h) TOTAL (Cont. pages) 17(i). GRAND TOTAL |
| | 21. MAIL INVOICE TO: | | | | | | |
| | a. NAME U.S. Nuclear Regulatory Commission Payment Team, Mail Stop T-7-I-2 | | | | | | |
| | b. STREET ADDRESS (or P.O. Box) Attn: (NRC-04-06-068 Task Order 002) | | | | | | |
| | c. CITY Washington | | d. STATE DC | e. ZIP CODE 20555 | | \$524,652.00 | |
| 22. UNITED STATES OF AMERICA BY (Signature)  | | | | 23. NAME (Typed) Donald A. King Contracting Officer TITLE: CONTRACTING/ORDERING OFFICER | | | |

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PREVIOUS EDITIONS NOT USABLE
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PRESCRIBED BY GSA/FAR 48 CFR 53.213(o)

ADM002

In accordance with Section G.4, Task Order Procedures, of contract no. NRC-04-04-068, this definitizes Task Order No. 02. The effort shall be performed in accordance with the attached Statement of Work.

Task Order No. 02 shall be in effect from September 20, 2006 through December 31, 2007, with a cost ceiling of \$524,652.00. The amount of \$485,925.00 represents the estimated reimbursable costs, and the amount of \$38,727.00 represents the fixed fee.

The issuance of this task order does not amend any terms or conditions of the subject contract.

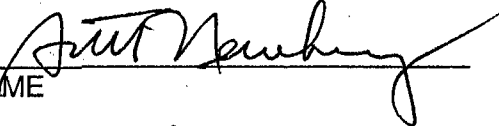
Your contacts during the course of this task order are:

Technical Matter: William Krotiuk
Project Officer
301-415-6839

Contractual Matters: Jeffrey R. Mitchell
Contract Specialist
301-415-6465

Acceptance of Task Order No. 02 should be made by having an official, authorized to bind your organization, execute three copies of this document in the space provided and return two copies to the Contract Specialist at the address identified in Block No. 5 of the OF 347. You should retain the third copy for your records.

ACCEPTANCE:


NAME

vp
TITLE

9/21/06
DATE

TASK ORDER TERMS AND CONDITIONS

NOT SPECIFIED IN THE CONTRACT

A.1 NRC Acquisition Clauses - (NRCAR) 48 CFR Ch. 20

A.2 Other Applicable Clauses

☐ See Addendum for the following in full text (if checked)

☐ 52.216-18, Ordering

☐ 52.216-19, Order Limitations

☐ 52.216-22, Indefinite Quantity

☐ 52.217-6, Option for Increased Quantity

☐ 52.217-7, Option for Increased Quantity Separately Priced Line Item

☐ 52.217-8, Option to Extend Services

☐ 52.217-9, Option to Extend the Term of the Contract

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.

**NRC-04-06-068
TASK ORDER NO. 2
STATEMENT OF WORK**

TITLE: EPR Input Model Development

JOB CODE: N6359 (Reimbursable Tasks 1 and 4)

JOB CODE: N6260 (Non-Reimbursable Tasks 2, 3 and 5)

I. BACKGROUND

As part of the review for Evolutionary Power Reactor (EPR), the NRC staff is evaluating the applicability of the computer codes that will be used to perform transient and accident evaluations for the plant. It is expected that Framatome ANP (FANP) will use SRELAP for design base accident analyses. The NRC staff will need independent audit capability to evaluate the results predicted by FANP, which is the design certification applicant for EPR.

The EPR automatic steam generator depressurization in the event of a small break loss-of-coolant accident (LOCA) is a new design feature. Current plants are insensitive to the details of steam generator heat transfer in the event of a LOCA for two reasons: (1) steam generator pressure is held constant so secondary side conditions are nearly unchanging and (2) the heat transfer area following scram is very large, therefore, the primary side temperature quickly approaches and remains within a few degrees of secondary side temperature.

The situation for EPR is somewhat different. Due to the decrease in secondary side pressure of 3 psi/min the secondary side condition continues to change. This impacts the primary side pressure, which in turn impacts the high-pressure injection (HPI) flow rate. This coupled interaction during a LOCA has not previously been studied in an integral system test facility.

Additionally, since primary to secondary heat transfer has not previously been important to LOCA analysis, to date the steam generators have been modeled in a very simple manner. The tube bundle of ~4000 tubes is represented by an equivalent single tube. The axial nodalization employs 4 nodes in upflow and 4 nodes in downflow. As part of the EPR research, nodalization studies will be performed to develop a more detailed steam generator model, which more closely matches prototypic conditions.

II. OBJECTIVE

A primary objective is to develop a TRACE input model for EPR. A secondary objective is to conduct a steam generator nodalization study to develop a more detailed input model to accurately predict primary to secondary side heat transfer during postulated LOCAs. A third objective is to conduct an analysis of selected accidents using TRACE to support the staff decision on the applicability of the TRACE code for analyzing the EPR.

The TRACE input deck development will also support the TRACE development for applicability and assessment for EPR applications. The TRACE input model will be used by NRC in the evaluation of the applicant's computer codes used for Chapter 15 transient and accident analyses.

The input models will be compatible with a PARCS code model of the reactor core for EPR.

III. SCOPE OF WORK

General Requirements for Development Assessment

Developmental assessment (also known as validation testing) is a part of code quality assurance procedures outlined in "Software Quality Assurance Procedures for NRC Thermal Hydraulic Codes," NUREG-1737. In the developmental assessment process, code-calculated results are compared either to analytical results, or experimental results, or other acceptable code calculation. In this SOW, TRACE code calculations are compared to experimental data from experimental test facilities and a report describing the results of the developmental assessment is produced. Developmental assessment shall contain the following activities:

1. Identification of the phenomena occurring in the test facility. This requires careful study of the test facility, experimental procedure, and experimental data. The report shall include a description of the facility, experimental procedure, and discussion of the measurement uncertainty, interpretation of the data, and the effect of the uncertainty on the data and their interpretation.
2. Development of the input deck. This requires familiarity with the TRACE User Guide and an understanding of the phenomena (see item above) in order to capture important phenomena governing the process. The report shall include nodalization diagrams, as needed, a listing of the input deck, and discussion and justification of options used to construct the input deck.
3. Development of the acceptance criteria. Acceptance criteria permit acceptance of results calculated by the code when compared to experimental data. It requires careful study of the experimental data to distinguish measurement uncertainty from random behavior of the data, especially during two-phase flow. As explained in NUREG-1737, the acceptance criteria can be qualitative or quantitative. Appendix C of NUREG-1737 presents a sample acceptance criterion. The report shall include a discussion of the development of the acceptance criteria used for this project.
4. Comparison of Code Calculations with the Test Data. This requires running the code with a selected version of the code and comparing the results with test data. If comparisons indicate that the acceptance criteria are met, then the code results are acceptable. If they do not meet the acceptance criteria, sensitivity calculations may be required. Sensitivity calculations may be needed in order to capture phenomena more accurately. These calculations are performed using different nodalization schemes or choosing more appropriate options. Changes to the input deck to perform sensitivity calculations should be discussed and justified. If sensitivity calculations indicate a better agreement with the test data and that acceptance criteria are met, new user guidelines better capturing the phenomena should be prepared. The report shall include discussions of comparisons of code calculations with the test data, including whether or not acceptance criteria are met. If the criteria are not met, the report shall also include discussion of the need for sensitivity calculations, and if sensitivity calculations are performed, the report shall also include a description of the calculated results and new user guidelines, if applicable.

5. Identification of Code Deficiencies. This requires knowledge of the TRACE code, itself. If the comparisons of the results are poor (i.e., results do not meet the acceptance criteria) and sensitivity calculations cannot improve predictions, then there may be a bug in the code or deficiencies in the code physical models, themselves. The report shall identify potential deficiencies to the extent possible and make recommendations for code improvements.

Task 1. EPR Input Model Development (Reimbursable JCN6359)

Develop TRACE input describing the EPR design. This input should be suitable for analysis of LOCAs and design basis transients including main steam line break and steam generator tube rupture. Interface to the PARCS three dimensional reactor power computer code will be included in addition to the point kinetics option. Acquire all information (drawings, design description, SRELAP input deck and notebook, etc.) necessary and compile information necessary to model EPR. Include information necessary to model the reactor coolant system, steam generators, and engineered safety features. Information needed to model the reactor protection and engineered safety features actuation and control logic should also be included. Provide lists of information requirements to the Project Manager for transmittal to FANP.

Task 2. Experimental Facility Input Model Development (Non-Reimbursable JCN6260)

Modify existing TRACE input models, as provided by the NRC, for up to two experimental test facilities. The experimental test facilities will be identified by the NRC Project Manager. These facilities will be used to assess TRACE for LOCAs with special attention to steam generator thermal-hydraulics. The assessments to be performed are described in Task 3 of this Statement of Work.

Task 3. TRACE Assessment Using Experimental Test Data (Non-Reimbursable JCN6260)

Perform steam generator nodalization studies to determine the need for an improved TRACE steam generator model with more detailed multi-tube modeling with finer axial nodalization.

For each experimental test facility:

Simulate five to eight tests using the TRACE code and the input models developed under Task 2. The NRC Project Manager will identify the suite of tests and the appropriate version of the TRACE code. Compare the code predicted results to the applicable experimental data. The contractor shall develop AVScript inputs for each test run so that the same test condition can be simulated easily with newer versions of the TRACE code. Perform nodalization studies to ensure that each model achieves a properly converged result as the noding sizes are decreased.

Present preliminary assessment results to the NRC staff for discussion, prior to submittal of a draft assessment report.

Using the general guidelines above, produce a consolidated TRACE assessment report that documents the results of the test runs. The report should (1) contain short descriptions of the relevant parameters of the test facility and all the test runs, (2) describe the phenomena occurring in each individual test run, (3) discuss why the input deck with selected nodalization and options should capture the phenomena, (4) discuss comparisons of the TRACE calculations

with the test data, (5) provide details of the TRACE calculations and discuss the acceptability of these calculations, (6) identify any code related problems and new user guidelines, if applicable, (7) include an appendix with the calculation notebook in electronic format, (8) describe the quality of the test documentation and data acquisition adequacy, and (9) list and describe the principal and subsidiary figures of merit.

Any problems with the execution of the TRACE code shall be communicated to the NRC Project Manager. The NRC staff will resolve these problems within a period of time which will be negotiated. If the correction of these errors causes some delays in delivery of final products, the NRC Project Manager will initiate appropriate modifications as necessary. The report will be prepared first in a draft form for review by NRC. It will be issued in a final form after the contractor resolves the comments. This combined report should be compiled and delivered in Framemaker format and use templates provided by NRC sufficient for insertion into the TRACE Development Assessment Manual.

The contractor is permitted to purchase 3 copies of Framemaker 7.0 (or newer) for purposes of this project.

Task 4. Analysis and Evaluation (Reimbursable JCN6359)

Prepare an analysis of selected EPR accidents. Compare these results to those of FANP and evaluate differences and the causes of the differences. The specific analyses to be performed will be specified by the Project Manager.

Task 5. Project Management (Non-Reimbursable under JCN6260)

The contractor will provide planning, administration, and management of this project at its premises. The contractor will review all deliverables for technical accuracy and quality. The contractor will provide status reporting as needed by NRC. The contractor will prepare for and attend meetings such as Advisory Committee for Reactor Safety (ACRS) meetings and project review meetings as requested by NRC.

IV. REPORTING REQUIREMENTS

1. ISL shall prepare a draft and final assessment report as described in section V., Deliverables and Delivery Schedule.
2. Monthly Letter Status Report (MLSR)

An 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 of Contracts, Contracting Officer (Mail Stop: T7-I2)

The MLSR will identify the title of the project, the job code, the Principal Investigator, the period of performance, the reporting period, and 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. SCHEDULE AND DELIVERABLES

| Deliverable | Due Date |
|---|---|
| TRACE input decks for one or two experimental test facilities, with improved steam generator nodalization model | 5 months after initiation of task order |
| For each experimental test facility, a draft TRACE Development Assessment report and calculation notebook | 7 months after initiation of task order |
| For each experimental test facility, a final TRACE Development Assessment report, calculation notebook, and AVScripts | 1 month after receipt of comments from NRC on draft report and notebook |
| TRACE EPR base input deck with improved steam generator nodalization model | 9 months after initiation of task order |
| Analysis of select EPR accidents using the TRACE EPR input model as directed by the NRC Project Manager | 12 months after initiation of task order |

The contractor shall review technical reports to ensure they are of high quality. The format of technical reports should follow generally accepted technical writing practices (see NUREG-650, Revision 2, "Publishing Documents in the NUREG Series"). The author must consider the audience who will read the document; link ideas in sentences and paragraphs to create an easy-to-follow logical transition; and ensure consistency of terminology, format, and style throughout. The reports should be well-focused (i.e., they should not be too wordy and the prose should flow in a logical manner). The author must provide necessary information to avoid prose where logic would be incomplete. Technical reports should not include policy, administrative, managerial, or fiscal information unsuitable for wide dissemination. They should not contain proposals for additional work and words should be carefully selected to avoid marketing of contractor capabilities.

VI. MEETINGS AND TRAVEL REQUIREMENTS

ISL will plan on attending meetings at the NRC office in Rockville, Maryland.

VII. PERIOD OF PERFORMANCE

The period of performance: September 20, 2006 through December 31, 2007.

VIII. TECHNICAL DIRECTION

The NRC Project Manager, William Krotiuk, is responsible for ensuring that services required under this project are delivered in accordance with the terms of the SOW.

Mr. Krotiuk can be reached at:

Mail Stop T10-K8
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
Phone: (301) 415-6839
FAX: (301) 415-5062
email: wjk@nrc.gov

All technical direction instructions to the contractor shall be issued through the Project Manager. Technical direction will be provided from the Technical Monitor through the Project Manager. Technical direction includes interpreting technical specifications, providing needed details, and suggesting possible lines of inquiry. Technical direction shall not constitute new work or affect overall project cost or period of performance. Technical direction will be provided in writing, and confirmed in writing by the contractor with a copy placed in the NRC office project file.

The NRC Technical Monitor for this Task Order is Peter Cochran. Mr. Cochran can be reached at:

Mail Stop T10-K8
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
Phone: (301) 415-5887
FAX: (301) 415-5062
email: pac2@nrc.gov

IX. PUBLICATIONS

RES encourages the publication of scientific results from RES-sponsored programs in refereed scientific and engineering journals, as appropriate. If the contractor proposes to publish in the open literature or present the information at meetings in addition to submitting the required technical reports, approval of the proposed article or presentation must be obtained from the NRC Project Manager in advance of submitting abstracts, papers, or presentation material. 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 and 3.9).

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

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

6. Data reports on one or two experimental test facilities, for 5 to 8 tests per facility.
7. Available TRACE input decks for the experimental tests.
8. AVScript training, if necessary
9. Framemaker DA report template

XII. TECHNICAL AND OTHER SPECIAL QUALIFICATIONS REQUIRED

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

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. CONFLICT OF INTEREST

List any work in the proposal that is similar to that previously performed or is to be performed by the contractor on behalf of another sponsor that might give rise to an apparent (perceived) or actual organizational conflict of interest, including duplication of effort.

XIV. LICENSE FEE RECOVERY

Some of the work specified in this SOW is license fee recoverable.