

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE: RFP RES-98-045
 PAGE 1 OF 2 PAGES

2. AMENDMENT/MODIFICATION NO: 05
 3. EFFECTIVE DATE: December 31, 2000
 4. REQUISITION/PURCHASE REQ. NO.: received 11/13/00 Dated 11/9/00
 6. ISSUED BY: U.S. Nuclear Regulatory Commission
 Division of Contracts and Property Mgt.
 Attn: T-7-I-2
 IT Acquisition Management Branch
 Washington DC 20555
 7. ADMINISTERED BY (If other than Item 6):

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code):
 Purdue Research Foundation
 ATTN: Mr. Thomas B. Wright
 Sponsored Program Services
 38 Hovde Hall
 West Lafayette, IN 47907-1063
 9A. AMENDMENT OF SOLICITATION NO. (X)
 9B. DATED (SEE ITEM 11)
 10A. MODIFICATION OF CONTRACT/ORDER NO. Con# NRC-04-98-045 SBA#
 10B. DATED (SEE ITEM 13) X 07-28-1998

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): APPN: 31X0200.160 B&R: 16015110135 BOC: 252A
 RESID: C01-323 JCN: W6698 OBLIGATE: \$249,872.00

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).
 C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
 D. OTHER (Specify type of modification and authority) X FAR Clause 52.217-9, Option to Extend Term of the Contract

E. IMPORTANT: Contractor is not, is required to sign this document and return 2 copies to the issuing office.

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

MODIFICATION FOLLOWS ON THE ATTACHED PAGE

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): Peter E. Dunn, Assistant Vice President for Research
 15B. CONTRACTOR/OFFEROR: (Signature of person authorized to sign)
 15C. DATE SIGNED: JAN - 8 2001
 16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print): Mark Flynn, Contracting Officer
 16B. UNITED STATES OF AMERICA BY: (Signature of Contracting Officer)
 16C. DATE SIGNED: 12/15/00

Template-ADM-001

ADM 02

The purpose of this modification is to: (1) exercise Option Year 3 (Task 4(2)), in accordance with Section I.3, Option to Extend the Term of the Contract, thereby extending the period of performance through December 31, 2001 and increasing the total estimated amount (ceiling) for performance of the subject contract from \$736,872.00 by \$249,872.00 to \$986,744.00; (2) obligate FY2001 funds in the amount of \$249,872.00; (3) revise Section B.3, Consideration and Obligation to reflect a downward adjustment in the estimated cost for Option Year 3; and (4) modify Section C to add work requirements for Task 4(2), per the attached Statement of Work.

Accordingly, the following changes are hereby made:

1. See the attached Statement of Work for work requirements to be performed during Option Year 4 (performance of Task 4 (2)), and revisions to Section F.4, "Reporting Requirements and Deliverables" for Task 4 (2) of this contract.
2. Under Section B. Supplies or Services and Price/Costs, Subsection B.3 - Consideration and Obligation – Cost Reimbursement, paragraph (a), (d) and (f) are deleted in their entirety and substituted in lieu thereof:

"B.3 Consideration and Obligation–Cost Reimbursement

- (a) The total estimated amount of this contract ceiling is \$986,744.00, which includes the basic contract (\$303,072), Option Year 1(\$242,000), Option Year 2 (\$191,800), and Option Year 3 (\$249,872.00)"
 - (d) Option Year 3 is hereby exercised at a total estimated cost to the Government of \$249,872."
 - (f) The amount obligated by the Government with respect to this contract is \$986,744.00.
3. Under Section F - Deliveries or Performance, Paragraph, F.8 - Duration of Contract Period is hereby deleted in its entirety and substituted in lieu thereof the following:

"F.8 Duration of Contract Period (MAR 1987), Alternate 2 (MAR 1987)

This contract shall commence on July 28, 1998 and will expire on December 31, 2001. The term of this contract may be extended at the option of the Government for one additional one-year option."

The amount being obligated for this modification is \$249,872.00.

All other terms and conditions remain unchanged.

A summary of obligations to date for this contract is as follows:

Total Obligation FY98	\$303,072
Total Obligation FY99	\$242,000
Total Obligation FY00	\$191,800
Total Obligation FY01	\$249,872

Total Obligations under this contract: \$987,744

MODIFICATION 4 TO NRC-0498045 (RES-W6698) PUMA INTEGRAL TEST FACILITY

Statement of Work

Task 4 Option Year 3 - PERFORM AND ANALYZE SEPARATE-EFFECTS TESTS

The contractor will perform a series of BWR flow instability tests. The objectives of these tests are to:

- (i) Obtain experimental data on BWR RPV flow instability with no-power feedback.
- (ii) Evaluate the TRAC-M code using the obtained data and identify TRAC-M model deficiencies. This task involves preparation of an input model of the PUMA facility in either TRAC-B or TRAC-M format.

WORK REQUIREMENTS:

The contract shall perform and analyze separate-effects tests providing BWR flow instability data inside the reactor pressure vessel (RPV). These data will be used to assess the ability of the TRAC-M code to simulate two phase hydraulic instability, which involves preparation of a input model of PUMA (TRAC-M or TRAC-B format) as well as running the code and comparing the results to the data. The goal of this work is assessment and not TRAC-M thermal-hydraulic model development. The contractor shall perform experiments for typical BWRs at full power, start-up, shut down, and other situations where instabilities are likely to occur. To accomplish the objectives, three separate subtasks must be completed.

Subtask 1. Scaling

The contractor shall perform a scaling study to ensure the data obtained from experiments are prototypic of a typical BWR plant, since the PUMA facility was originally scaled for the SBWR design. If the analysis proves that scaling distortion exist with respect to a typical BWR, then these distortions shall be explained and the test conditions set to minimize them. No facility modifications will be made to rectify these distortions.

Subtask 2. Experimental Program

A test matrix and instrumentation layout will be proposed by the contractor and shall be approved by NRC before the work is initiated. The test matrix shall clearly state the operational conditions which instabilities will occur. It may be necessary to run the test facility in an effort to determine these unstable conditions. Once defined, the matrix shall also identify the instability mechanism that is being tested (Ledinegg, flow pattern transition, pressure drop, multiple channel, density wave, etc . . .).

The contractor shall ensure reasonable void measurements are made in the core region. Proper modification to the instrumentation to ensure the best void-fraction feedback measurement shall be made for the future void-power feedback instability experiment. The measurements shall include void faction at various section of the reactor, downcomer flow, temperatures, and pressures at various locations.

Subtask 3. TRAC-M Assessment

The contractor shall prepare an input model of PUMA(either in TRAC-B or TRAC-M input format), run the computer code, and compare the code results to the data.

REPORTING REQUIREMENTS AND DELIVERABLES

The contractor will prepare a final report to summarize and analyze the test data. The report should include: (1) a state-of-art survey of all the BWR instability data available in the open literature, (2) a description of the PUMA components and instrumentation involved in the tests, (3) scaling methods used for the experiment planning, (4) detailed figures showing the exact location of each instrument, (5) measurement uncertainty of each instrument, (6) test conditions such as power, pressure, temperature, void fraction, and mass flow rate, (7) comparison between the PUMA data and code results of relevant parameters that are responsible for driving the particular instability mode, and a clear description of the instability mechanism, (8) conclusions and recommendations for the model improvement, (9) the report shall be in both text and electronic format (pdf if possible), the experiment data shall be in NRC Databank format, and the computer code input deck shall be in electronic format.

PERIOD OF PERFORMANCE

Task 4.(1) shall be completed by December 31, 2001.