

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1 CONTRACT ID CODE NRC-04-98-045	PAGE OF PAGES 1 2
2 AMENDMENT/MODIFICATION NO 8	3 EFFECTIVE DATE 1-1-2003	4 REQUISITION/PURCHASE REQ NO RES-C03-017	5 PROJECT NO (If applicable)	
6 ISSUED BY U.S. Nuclear Regulatory Commission Div of Contracts Two White Flint North - MS T-7-I-2 Washington, DC 20555	CODE 3100	7 ADMINISTERED BY (If other than Item 6) U.S. Nuclear Regulatory Commission Div of Contracts Two White Flint North - MS T-7-I-2 Washington, DC 20555		
8 NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) Purdue Research Foundation Attn: Mr. Thomas B. Wright Sponsored Program Administration 1063 Hovde Hall West Lafayette IN 47907-1063		(X) 9A. AMENDMENT OF SOLICITATION NO	9B DATED (SEE ITEM 11)	
CODE		10A MODIFICATION OF CONTRACT/ORDER NO NRC-04-98-045		10B DATED (SEE ITEM 13)
FACILITY CODE		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)

B&R No.: 36015110205; Job Code: W6698; BOC: 252A;
Appropriation No.: 31X0200.000; Amount Obligated: \$50,000

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)
X	C THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF FAR 52.243-2 Changes
	D OTHER (Specify type of modification and authority)

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)

Please see the attached pages.

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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) Michael R. Ludwig Associate Director Sponsored Program Administration	15B CONTRACT OFFICER	15C DATE SIGNED FEB 10 2008	16A NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Stephen M. Pool Contracting Officer	16B UNITED STATES OF AMERICA	16C DATE SIGNED 01-28-2003
(Signature of person authorized to sign)		(Signature of Contracting Officer)			

STANDARD FORM 30 (REV 10-83)

TEMPLATE - ADM001

ADM002

CONTINUATION PAGE

The purpose of this contract modification is to incorporate a within scope change to the contract SOW and to adjust the contract estimated cost accordingly. Hence the contract is modified as follows:

1. Section C of the contract is modified to add the tasks described in the attached SOW.
2. The contract estimated cost is increased by \$51,603 from \$1,176,719 to \$1,228,322. \$50,000 in incremental funding is hereby allotted. As a result, Sections B.3(a) and (d) of the contract are changed to read:
"(a) The total estimated cost of this contract is \$1,228,322. This amount includes all tasks and optional years up to date.
(c)The amount obligated by the Government on this contract is \$1,226,719."
3. The contract duration in Section F is changed to run from July 28, 1998 to March 31, 2003.
4. All other terms and conditions remain unchanged.

STATEMENT OF WORK
MODIFICATION ⁸ TO NRC-0498045 (RES-W6698)
PUMA INTEGRAL TEST FACILITY

I. BACKGROUND

In 1993, the Purdue University Multi-Dimensional Integral Test Assembly (PUMA) at Purdue University was designed and constructed for obtaining test data for the Simplified Boiling Water Reactor (SBWR), which is designed by General Electric (GE) Company. PUMA can also be configured to obtain separate effects test data. The test data can be used to verify and validate NRC thermal-hydraulic (T/H) system codes, such as RELAP5 and TRAC. T/H system codes are used to calculate the expected behavior of nuclear power plants for a broad range of normal operating conditions and accident scenarios. The codes rely on numerous models and correlations to predict a wide range of reactor physical phenomena. Many of the models are not based on first principles and are empirical or semi-empirical correlations developed from basic and separate-effects test data. Therefore, data from separate-effects and integral-effects tests are needed for assessing the code. Separate-effects test data is used to assess the basic models and correlations in the code. Integral-effects test data is used to assess the code's ability to predict overall system behavior and interactions. A comparison between the code calculation and the test data determines the strengths and weaknesses of the code in predicting basic phenomena and overall system behavior under conditions relevant to the scenario under consideration. The purpose of this contract modification is to obtain instability test data for normal BWR reactor and to validate the TRAC-M system code.

II. OBJECTIVES

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

1. Obtain experimental data on BWR RPV flow instability with power feedback.
2. Develop TRAC-M input models to assess TRAC-M code using the obtained data and identify TRAC-M model deficiencies.

III. SCOPE OF WORK

The contract shall perform and analyze separate-effects tests to provide BWR flow instability data with power feedback 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 flow instability, which involves preparation input models in TRAC-M format, running the code, and assessing the code performance. 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, Two separate tasks must be performed.

Task 1 Power Feedback Instability Experiment

Normal BWR inlet loss coefficients shall be used during the experiments involving instability with power feedback. The heater power shall be controlled based on the reactor kinetics calculation, where the void feedback and fuel conduction time lag are included. The contractor shall ensure suitable void-fraction feedback measurement for the void-power feedback

instability experiment. The measurements shall include void fraction at various section of the reactor, downcomer flow, temperatures, and pressures at various locations.

Task 2 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, compare the code results to the data, drawing conclusions concerning code performance and reasons for any discrepancies.

REPORTING REQUIREMENTS AND DELIVERABLES

The contractor shall prepare reports to summarize and analyze the test data. The reports should include: (1) state-of-the-art survey of all the BWR instability data available in the open literature; (2) 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 model improvement; and (9) the reports shall be in both text and electronic format (pdf if possible), the experimental data shall be in NRC Databank format, and the computer code input decks shall be in electronic format.

LEVEL OF EFFORT: 3 months of facility and staff time.

PERIOD OF PERFORMANCE: Task 1 shall be completed in 3 months and status report for Task 2 is required by 3/31/ 2003.