

2. AMENDMENT/MODIFICATION NO. M003	3. EFFECTIVE DATE 5-5-2005	4. REQUISITION/PURCHASE REQ. NO. RES-04-063	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 Attn: Debbie Neff Washington, DC 20555	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 Attn: Debbie Neff Washington, DC 20555	3100

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)  PENNSYLVANIA STATE UNIVERSITY SYSTEM  408 OLD MAIN  UNIVERSITY PARK PA 168022150  CODE 003403953 FACILITY CODE	(X) 9A. AMENDMENT OF SOLICITATION NO.  9B. DATED (SEE ITEM 11)  10A. MODIFICATION OF CONTRACT/ORDER NO. NRC-04-04-063  10B. DATED (SEE ITEM 13) 05-04-2004
---	--

**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 on 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) RES-C05-379 31X0200 56015111205 Y6945 252A \$338,000  
RES-C05-354 no funds

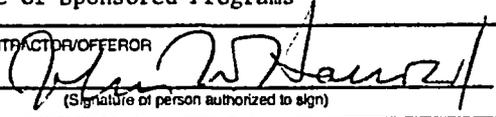
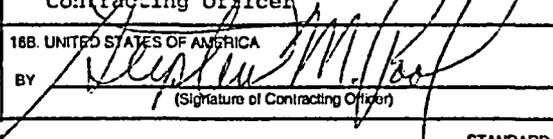
**13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.**

(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: Changes - Cost reimbursement 52.243-2 Alt V
	D. OTHER (Specify type of modification and authority)

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

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible)  
The purpose of this modification is to modify the scope of task 2, add task 5 to the SOW, combine task 2, 3, 4, and 5 into a final 14 month performance period, and adjust the contract estimated costs and performance period. As a result, the contract is modified as shown on the attached continuation pages.

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) John W. Hanold, Senior Associate Director Office of Sponsored Programs	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Stephen M. Pool Contracting Officer
15B. CONTRACTOR/OFFEROR  (Signature of person authorized to sign)	15C. DATE SIGNED 5/26/05
16B. UNITED STATES OF AMERICA BY  (Signature of Contracting Officer)	16C. DATE SIGNED 5/2/05

TEMPLATE - ADM001

SISP REVIEW COMPLETE

ADM002

CONTINUATION PAGE

1. Option year 1 (task 2) was exercised by contract modification no. 1 and extended the period of performance to October 30, 2005. In lieu of exercising option year 2 (task 3 & 4) as previously set forth, the Government is hereby authorizing commencement of tasks 3 and 4 as modified in the attached revised Statement of Work. The period of performance for the remaining work under this contract is extended until June 30, 2006. Task 5 is also added to the contract as set forth in the attached Statement of Work.

2. As a result of the above, the contract estimated costs is adjusted as shown below:

EST. COST	FROM:	By:	TO:
Task 1	\$260,589	0	\$260,589
Task 2	\$506,999 (Mod 1)	combined w/3&4	
Task 3 & 4	\$568,571	\$-313,570	\$762,000
Task 5	0	+\$10,886	\$10,886
Total	\$1,336,159	\$-302,684	\$1,033,475

3. \$338,000 is hereby allotted to the contract. Section B.3 is replaced by the following revised B.3:

**B.3 CONSIDERATION AND OBLIGATION--COST REIMBURSEMENT (JUN 1988) ALTERNATE I (JUN 1988)**

- (a) The total estimated cost to the Government for full performance under this contract is \$1,033,475.
- (b) The amount presently obligated by the Government with respect to this contract is \$783,589.
- (c) It is estimated that the amount currently allotted will cover performance through September 15, 2005.

4. In addition, Section F.6 is replaced with the revised section below:

**F.6 DURATION OF CONTRACT PERIOD (MAR 1987)**

This contract shall commence on May 5, 2004 and will expire June 30, 2006.

5. Section F.7 is replaced with the revised section below:

**F.7 DELIVERABLES AND DELIVERY SCHEDULE**

**Task 1**

- 1. A test matrix for 10 steam cooling only tests shall be submitted within 6 months after contract award.

2. Test procedures for steam cooling tests only shall be submitted to the NRC within 6 months after contract award.
3. A quick look report for each valid steam cooling only shall be submitted within one month after each test.
4. An updated version of the facility description report for the steam cooling tests without droplet injection including the data uncertainty and qualification shall be submitted within 6 months of the completion of the test series.
5. All of the qualified test data shall be provided in CDs in the NRC data bank format within one month after the last valid test.
6. A Test Data and Analysis Report on the steam cooling without droplet injection tests shall be submitted within one year after the completion of the test series.

Task 2

1. A test matrix for steam cooling with droplet injections and additional reflood tests shall be submitted by July 1, 2005.
2. A test procedure for steam cooling with droplet injections and additional reflood tests shall be submitted by July 1, 2005.
3. A quick look report for each valid steam cooling test with droplet injection shall be submitted within one month after each test.
4. An updated version of the facility description report for the steam cooling tests including the data uncertainty and qualification shall be submitted by December 1, 2005.
5. All of the qualified test data shall be provided in CDs in the NRC data bank format within one month after the last valid test.
6. A Test Data and Analysis Report on the steam cooling tests with and without droplet injection shall be submitted by March 31, 2006.

Task 3

1. A test matrix for high temperature reflood tests shall be submitted by August 1, 2005.
2. A test procedure for high temperature reflood tests shall be submitted by August 1, 2005.
3. A quick look report for each valid high temperature reflood test shall be submitted within one month after each test.
4. An updated version of the facility description report for the high temperature reflood tests including the data uncertainty and qualification shall be submitted by December 1, 2005.
5. All of the qualified test data shall be provided in CDs in the NRC data bank format within one month after the last valid test.
6. A Test Data and Analysis Report on the high temperature reflood tests shall be submitted by March 31, 2006.

Task 4

1. A Final Test Analysis Report which covers all the experiments and the associated analysis from the RBHT program shall be submitted to the NRC by March 31, 2006. The emphasis shall be on the key findings of the program which would support the NRC code development and assessment efforts. A draft of this report shall be submitted to the NRC as a NUREG/CR report.

2. A final RBHT Test Facility Description Report shall be an integrated report which describes the facility description for each of the different test series which were performed at the facility. The report shall support the Final Test Data and Analysis Report for the RBHT Program and provide documentation for the facility in one single report. A draft of this report shall be submitted to the NRC as a NUREG/CR report by March 31, 2006.

## STATEMENT OF WORK

Contract No. NRC-04-04-063

Contractor: Pennsylvania State University

Job Code No: Y6945

Contract Title: Rod Bundle Heat Transfer (RBHT) Test Program - Phase 3

Contract Performance Period: October 1, 2004 through June 30, 2006

### Modified Work Scope Description:

The NRC has decided to combine Options Years 1 and 2 (Tasks 2, 3, and 4) into one final performance period, but the work scope of Task 3 is greatly reduced. Specifically, only three high temperature reflood tests should be conducted instead of the original 10 tests. Task 4 of preparing a final data analysis report and a final facility description report is also correspondingly reduced because a fewer number of reflood tests needs to be analyzed although the number of steam cooling tests is not reduced significantly. In order to run 3 reflood tests this fiscal year, the number of steam cooling tests is reduced from 24 to 20. Therefore, the revised test scope to be completed by the end of this fiscal year is as follows:

1. 20 steam cooling tests without droplet injection (This represents 10 more tests than the original 10 tests specified for the base period.),
2. 20 steam cooling tests with droplet injection (This is Task 2. However, the number of tests has been reduced from 24 to 20.), and
3. 3 high temperature reflood tests (This is Task 3. However, the number of tests has been reduced from 10 to 3.).

The test data reduction and analyses shall be completed in early 2006, and a final data analysis report shall be submitted as a NUREG/CR report by the end of June 2006.

In addition, Task 5 is added as follows:

### Task 5 Support for Korea Institute of Nuclear Safety (KINS)

The NRC signed a cooperative agreement with Korea Institute of Nuclear Safety (KINS), entitled "Implementing Agreement for the Reflood Heat Transfer Model Development between the United States Nuclear Regulatory Commission and the Korea Institute of Nuclear Safety", to be effective for three years starting from August 23, 2004. PSU shall support the NRC to fulfill this agreement. In particular, PSU shall provide KINS with reports, test data, and test condition summary sheets for all reflood tests conducted in 2002. The test numbers of which test data and test condition summary sheets to be sent to KINS are shown in the attached Table 1. The reports to be sent to KINS should include the RBHT test plan and design, the test facility description, and future reflood analysis reports. In addition, some technical consultations may need to be provided.

Data Analysis and Reporting

Data analysis and reporting requirements remain the same as described in the current contract document signed on May 5, 2004, except that the number of tests to be analyzed is reduced as indicated above.

**TABLE 1 REFLOOD TESTS CONDUCTED  
IN THE ROD BUNDLE HEAT TRANSFER TEST FACILITY IN 2002**

Run No.	Pressure psia	Flooding Rate inch/sec	Peak Power KW/ft	Initial Temp. deg F	Inlet Subcooling deg F
753	14.7	1.5	0.278	1200	75
861	20	1	0.4	1400	75
937	20	1	0.4	1400	20
945	40	1	0.4	1400	20
973	40	1	0.4	1400	20
1088	40	1	0.4	1400	20
1096	20	1	0.4	1400	20
1103	20	1	0.4	1400	150
1108	20	1	0.4	1400	150
1132	20	6	0.7	1600	150
1143	20	6	0.7	1600	150
1155	20	6	0.7	1600	20
1160	40	6	0.7	1600	150
1170	40	6	0.7	1600	20
1178	40	6	0.7	1600	171
1183	40	6	0.7	1600	96
1196	40	6	0.7	1600	96
1202	40	6	0.7	1600	42
1223	40	6	0.7	1600	20
1228	20	6	0.7	1600	42
1248	40	10	0.7	1700	133
1252	40	6	0.7	1600	150
1280	20	6	0.7	1600	150
1285	40	6	0.7	1600	150

1291	60	6	0.7	1600	150
1295	60	6	0.7	1600	42
1300	40	3	0.7	1600	136
1310	20	0.58	0.4	1400	20
1319	40	0.59	0.4	1400	20
1340	20	1	0.4	1400	20
1346	40	1	0.4	1400	20
1351	40	1	0.4	1400	20
1356	20	1	0.4	1400	20
1361	20	1	0.4	1400	20
1378	40	1	0.4	1400	20
1383	40	1	0.4	1400	20
1389	40	1	0.4	1400	20
1402	40	1	0.4	1400	20
1407	40	3	0.7	1600	41