

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>			1. CONTRACT ID CODE	PAGE OF PAGES 1   2
2. AMENDMENT/MODIFICATION NO. Two (2)	3. EFFECTIVE DATE 1/11/91	4. REQUISITION/PURCHASE REQ. NO. RFPA89-349 dtd 12/7/90		5. PROJECT NO. (If applicable)
6. ISSUED BY U. S. Nuclear Regulatory Commission Division of Contracts & Property Management Washington, D. C. 20555	CODE	7. ADMINISTERED BY (If other than Item 6)		CODE
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) University of California, Los Angeles 405 Hilgard Avenue Los Angeles, CA 90024			(#) 9A. AMENDMENT OF SOLICITATION NO.	9B. DATED (SEE ITEM 11)
CODE			FACILITY CODE	10A. MODIFICATION OF CONTRACT/ORDER NO. X NRC-04-89-349
				10B. DATED (SEE ITEM 13) 9/30/89

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)

APFN: 31X200.601 B&R NO.: 16C1922050 FIN NO.: L13311 Obligate: - 0 -

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

(V)	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.
X	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)

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

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

Modification follows on next page.

9102140342 910202  
PDR CONTR  
NRC-04-89-349 PDR

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) HARDY DHILLON Senior Contract and Grant Officer	16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) Paul J. Edgeworth, Contracting Officer
15B. CONTRACTOR/OFFEROR <i>Hardy Dhillon</i> (Signature of person authorized to sign)	15C. DATE SIGNED 2/2/91
16B. UNITED STATES OF AMERICA BY <i>Paul J. Edgeworth</i> (Signature of Contracting Officer)	16C. DATE SIGNED 1/11/91

NRC-04-89-349  
Modification 2  
Page 2 of 2

The purpose of this modification is revise the estimated amount of the subcontract cost from \$67,746.00 to \$33,872.00 in accordance with the contractors technical proposal dated November 7, 1990 (Attachment A). Therefore Section G.4, Subcontract Approval, is revised as follows:

"Pursuant to FAR 52-244-2, entitled "Subcontracts (Cost Reimbursement and Letter Contract)", the Contractor is hereby authorized to enter into a subcontract with Applied Science Associates, Inc. on a cost-plus-fixed-free basis at an estimated amount of \$33,872.00."

All other terms and conditions including the ceiling amount of \$579,429.00 remain the same.



MECHANICAL, AEROSPACE AND  
NUCLEAR ENGINEERING DEPARTMENT  
SCHOOL OF ENGINEERING AND APPLIED SCIENCE  
405 HILCARD AVENUE  
LOS ANGELES, CALIFORNIA 90024-1597

FAX #213-206-4830

November 7, 1990

Ms. Charlene McCubbin  
Contract Administrator  
Division of Contracts and  
Property Management  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

RE: NRC Contract No. NRC-04-89-349

Dear Ms. McCubbin:

In our original proposal we estimated that the cost of our two workshops for our subcontractor would be \$67,746. The actual expenses were \$33,872.

The enclosed contract modification proposes a reprogramming of these funds; and a redistribution (between labor and travel) of sub-contract funds.

We would appreciate your approving this modification, so we can pay our subcontractor for his services.

Sincerely,

*William E. Kastenberg*  
William E. Kastenberg  
Principal Investigator

*Hardy Dhillon*  
Hardy Dhillon  
Contracts and Grants Office

PROPOSED CONTRACT MODIFICATION

TO THE

U.S. NUCLEAR REGULATORY COMMISSION

CONTRACT NUMBER: NRC-74-89-349

W.E. Kastenberg

Principal Investigator

University of California

Los Angeles, California



## PROPOSED CONTRACT MODIFICATION

### RATIONALE

In our original proposal, and contract, we estimated the cost of each Workshop to be approximately \$34,000, (\$67,746 total) which was to be subcontracted to Applied Science Associates, Inc. The cost of these two workshops was approximately \$33,875. The attached revised budgets show an increase in labor and a substantial decrease in travel, yielding a savings of \$33,874.

Because of this cost savings and the change in labor versus travel costs we request the contract modification described below.

### CHANGE IN SUBCONTRACT

The total to be subcontracted to Applied Science Associates, Inc. should now be \$33,858. The breakdown of expenses is shown on the attached budgets submitted by the subcontractor.

### CHANGE IN CONTRACT

The savings in workshop cost \$33,868 should be used for the following task, designated as TASK 3.

### Task 3. Case Studies

#### COMPETING RISKS AND UNCERTAINTY

There are several instances where the plant operators may have a choice between several actions, regarding the use of resources such as water, air or electricity, or the use of equipment, or of procedure.

Associated with these choices are risk and uncertainty. Each choice carries some risk with it, as well as some uncertainty. For these case studies, one for a PWR and one for a BWR, the competing risks and uncertainty will be evaluated.

## BWR

The Emergency Protective Guidelines (EPGs) call for flooding containment from the lower head to the core top (active top of core) prior to vessel failure. There are a number of considerations:

- a. The time it takes to flood will be plant specific, and will depend on equipment and resource availability.
- b. There is a time window where flooding will not be adequate (may not have occurred, or until a high enough level is reached) and vapor (pressure suppression) will be lost in some plants.
- c. There is a possibility of steam explosion (hydrogen generation) if there is inadequate water and the vessel fails.

When the vessel fails, these three things are important for success; timing, operator behavior, amount of molten fuel, amount of water. It can also lead to large pressure spikes, loss of water, instrumentation, with no pressure suppression available.

For this case we would assess competing risks and uncertainty, including the options of flooding the vessel, flooding the drywell and doing nothing.

## PWR

It has been suggested that pre-flooding the cavity prior to vessel failure can be a means of preventing vessel failure. It can also lead to steam generator tube rupture or surge line failure. The following questions arise:

1. Will pre-flooding prevent melthrough?
2. Should non-reactor water be used (unborated)?
3. Can water better be used in a recirculation mode through the vessel?
4. Will it have downside risks?
5. If flooding is timely, will it hold molten fuel in vessel. If not, what will happen?
6. Will the operators recognize the need for pre-flooding, and will they do it appropriately?
7. Will there be adequate information and/or instrumentation to aid the operators?

For this case we would assess competing risks and uncertainty regarding pre-flooding of the cavity with regards to operator, information/instrumentation, phenomenological and system uncertainty.

SALARIES AND WAGES:

Principal Investigator:  
W. Kastenberg  
Professor step VII (9mo. appt.)  
1 week during the summer @ 100% time 2,719  
Base \$89,600/year  
Anticipated Base \$97,871/year

Co-Principal Investigator:  
D. Okrent  
Professor above scale(9 mo. appt.)  
1 week during the summer @ 100% time 3,583  
Base \$118,100/year  
Anticipated Base \$129,002/year

Co-Principal Investigator:  
G. Apostolakis  
Professor IV (9mo. appt.)  
1 week during the summer @ 100% time 2,189  
Base \$72,100/year  
Anticipated Base \$77,600/year

Co-Principal Investigator:  
V. Dhir  
Professor V (9mo. appt.)  
1 week during the summer @ 100% time 2,355  
Base \$77,600/year  
Anticipated Base \$84,764

1 Graduate Service Research II  
7 months during academic year @ 49% time 8,506  
Base \$2,362/month  
Anticipated Base \$2,480/month

Total Salaries and Wages:

EMPLOYEE BENEFITS:

Faculty w/9mo. appt. @ 12.19% 19,351  
13.19% students @ 3.8% 1,571

Total Salaries, Wages & Benefits 20,922  
Medical Insurance \$180/Quarter/student 2,700

SUB CONTRACT TO:

APPLIED SCIENCE ASSOCIATES

See Attached Proposal

TOTAL DIRECT COST: 23,622

INDIRECT COST @ MTDC: 49% 10,000

TOTAL BUDGET: 33,874

**APPLIED SCIENCE ASSOCIATES, INC.**

P. O. Box 2868  
 Palos Verdes Peninsula, Ca. 90274  
 (213) 541-8607

D. G. SWANSON, Ph.D.  
*Vice-President*

August 5, 1990

Dr. William E. Kastenberg  
 Department of Mechanical, Nuclear and Aerospace Engineering  
 University of California  
 Boelter Hall  
 Los Angeles, Ca. 90024

Subject: Modification of Subcontract

Dear Dr. Kastenberg,

As discussed, our contract with UCLA must be modified to reflect additional work performed. At your direction, I spent my time on the following activities:

4 meetings at UCLA @ 5 hrs each*	20 hrs.
Calls to hotels to discuss facilities	19 hrs.
6 visits to 6 hotels @ 5 hrs each*	30 hrs.
Calls to all conference participants**	12 hrs.
Reading reports	3 hrs.
Meetings at Holiday Inn to discuss arrangements*	16 hrs.
Obtaining equipment (rental vs. purchase: vugraph machine, slide projector, tape recorder, video recorder, wireless microphone, connecting wires)	24 hrs.
Meeting Week (attending meeting, overseeing arrangements and facility set-up and knock-down each day)	44 hrs.
Total	168 hrs.

\* Includes travel time.

\*\* An average of two calls were made to each one and nearly everyone wanted me to read extensively from the program.

#### Summary of Charges

The Direct Cost Charges are:

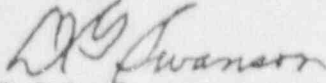
Room Rental	\$485.00
Copies	116.88
Tapes	18.50



Tips to move equipment	40.00
Travel expense	1175.35

Please advise if you require further information.

Sincerely,



D. G. Swanson

## APPLIED SCIENCE ASSOCIATES, INC.

P. O. Box 2868  
Palos Verdes Peninsula, Ca. 90274  
(213) 541-8607

D. G. SWANSON, Ph.D.  
*Vice-President*

October 17, 1990

Dr. William E. Kastenberg  
Department of Mechanical, Nuclear and Aerospace Engineering  
University of California  
Boelter Hall  
Los Angeles, Ca. 90024

Subject: Modification of Subcontract

Dear Dr. Kastenberg,

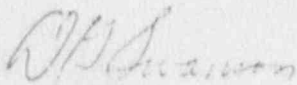
As discussed, our contract with UCLA must be modified to reflect additional work performed. At your direction, I spent my time on the following activities since our last billing on June 15, 1990:

5 meetings at UCLA @ 5 hrs each*	25 hrs.
Calls to hotels to discuss room availability	6 hrs.
Calls to paid conference participants	2 hrs.
Assistance in report preparation, listening to tapes	10 hrs.
Meetings at Holiday Inn to discuss arrangements*	5 hrs.
Meeting Week (attending meeting, assistance with arrangements and facility set-up)	32 hrs.
Total	80 hrs.

\* Includes travel time.

Please advise if you require further information.

Sincerely,

  
D. G. Swanson

APPENDIX 2

Item No. 8:

COST - FIRST WORKSHOP

Applied Science Associates, Inc. Cost Plus Fixed Fee Proposal

A. Line Item No.	B. Identification	C. Quantity	D. Total Price	e. Ref.
	Direct Labor:			
	Management	168	9408.00	1
	Project Manager: 56.00 /hr	0	0.00	
	Senior Engineer: 34.66 /hr	0	0.00	
	Engineer: 22.24 /hr	0	0.00	
	Technician: 15.00 /hr	0	0.00	
	Secretarial: 9.90 /hr	0	0.00	
1	Total Labor Cost:		9408.00	
2	Labor Overhead: 66.00 %		6209.28	6
3	Consultants Rate: 62.50 /hr	0	0.00	2
4	Materials		156.38	3
5	Travel		1175.35	4
6	Other Direct Costs:		525.00	5
7	Total - Other Direct Costs		1856.73	
8	Material Overhead: 0.00 % (On Line 7)		0.00	7
9	Total Direct Cost & Overhead		17474.01	
10	Gen and Adm O/H 2: 5.00 % (On Line 9)		873.70	
11	Total Cost (Lines 9 + 10):		18347.71	
12	Fee (on Line 9): 8.00 %		1397.92	
13	Total Cost + Fee:		19745.63	

Item No. 8:

COST - SECOND WORKSHOP

Applied Science Associates, Inc. Cost Plus Fixed Fee Proposal

A. Line Item No.	B. Identification	C. Quantity	D. Total Price	e. Ref.
	Direct Labor:			1
	Management 56.00 /hr	80	4480.00	
	Project Manager: 0.00 /hr	0	0.00	
	Senior Engineer: 34.66 /hr	0	0.00	
	Engineer: 22.24 /hr	0	0.00	
	Technician 15.00 /hr	0	0.00	
	Secretarial: 9.90 /hr	0	0.00	
1	Total Labor Cost:		4480.00	
2	Labor Overhead: 66.00 %		2956.80	6
3	Consultants Rate: 62.50 /hr	0	0.00	2
4	Materials		24.00	3
5	Travel		5029.04	4
6	Other Direct Costs:		0.00	5
7	Total - Other Direct Costs		5053.04	
8	Material Overhead: 0.00 % (On Line 7)		0.00	7
9	Total Direct Cost & Overhead		12489.84	
10	Gen and Adm O/H 2: 5.00 % (On Line 9)		624.49	
11	Total Cost (Lines 9 + 10):		13114.33	
12	Fee (on Line 9): 8.00 %		998.86	
13	Total Cost + Fee:		14113.19	