

P1-24

OMB No.

AWARD/CONTRACT		1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 350)	RATING	PAGE OF PAGES 1 35
2. CONTRACT (Proc. Inst. Ident.) NO. NRC-04-94-044		3. EFFECTIVE DATE JAN 28 1994	4. REQUISITION/PURCHASE REQUEST/PROJECT NO. RES-93-110	
5. ISSUED BY U.S. Nuclear Regulatory Commission Division of Contracts & Property Mgmt Mail Stop P-1042 Washington, DC 20555		CODE	6. ADMINISTERED BY (If other than Item 5) U.S. Nuclear Regulatory Commission Div. of Contracts & Property Mgmt. Mail Stop P-902 Washington, DC 20555	
7. NAME AND ADDRESS OF CONTRACTOR (No., street, city, county, State, and ZIP Code) California Institute of Technology Pasadena, CA 91125		8. DELIVERY <input type="checkbox"/> FOB ORIGIN <input checked="" type="checkbox"/> OTHER (See below)		
		9. DISCOUNT FOR PROMPT PAYMENT NET		
		10. SUBMIT INVOICES TO (4 copies unless otherwise specified) THE ADDRESS SHOWN IN: ITEM Block #6		
CODE	FACILITY CODE			

11. SHIP TO/MARK FOR Refer to Section F.5 herein	CODE	12. PAYMENT WILL BE MADE BY U.S. Nuclear Regulatory Commission Division of Accounting and Finance GOV/COM Accounting Section Washington, DC 20555	CODE
13. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: <input type="checkbox"/> 10 USC 2304(c)() <input checked="" type="checkbox"/> 41 USC 253(c)(1)		14. ACCOUNTING AND APPROPRIATION DATA W6142 4-6019-202300 BOC:252B JXU200 OBLIGATED AMT: \$191,000.	
15A. ITEM NO.	15B. SUPPLIES/SERVICES	15C. QUANTITY	15D. UNIT PRICE
			15E. UNIT PRICE
			15F. AMOUNT

The U.S. Nuclear Regulatory Commission hereby accepts the California Institute of Technology's technical proposal to perform the services specified herein entitled "Hydrogen Combustion Research."

This is an incrementally funded cost-reimbursement type contract.

15G. TOTAL AMOUNT OF CONTRACT > \$ 356,292.00

(x)	SEC.	DESCRIPTION	PAGE(S)	(x)	SEC.	DESCRIPTION	PAGE(S)
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CONTRACTING OFFICER WILL COMPLETE ITEM 17 OR 18 AS APPLICABLE

17. <input checked="" type="checkbox"/> CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is required to sign this document and return 3 copies to issuing office.) Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)	18. <input type="checkbox"/> AWARD (Contractor is not required to sign this document.) Your offer on Solicitation Number including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your offer, and (b) this award/contract. No further contractual document is necessary.
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19A. NAME AND TITLE OF SIGNER (type or print) Earl J. Freise Director, Sponsored Research	20A. NAME OF CONTRACTING OFFICER Mary H. Mace
19B. NAME OF CONTRACTOR Calif. Institute of Technology	19C. DATE SIGNED 1/25/94
BY <i>Earl J. Freise</i> (Signature of person authorized to sign)	20B. UNITED STATES OF AMERICA BY <i>Mary H. Mace</i> (Signature of Contracting Officer)
	20C. DATE SIGNED 1/28/94

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ADMINISTRATIVE CHANGES

The following administrative changes are hereby made:

- 1) Under Section B.3, add to the clause title, ALTERNATE I (JUN 1988)
- 2) Under Section B.3(a), insert the amount of \$356,292.
- 3) Under Section B.3(b), insert the amount of \$101,000.
- 4) Under Section B.3, add:
 - (c) It is estimated that the amount currently allotted will cover performance through January 30, 1995.
- 5) Under Section E.1, delete FAR Clause 52.246-8 in its entirety and substitute with FAR Clause 52.246-9, Inspection of Research and Development (Short Form) APR 1984.
- 6) Under Section F.3, first paragraph, first sentence is revised to read:

The contractor shall provide a quarterly Technical Progress Report to the project officer and the contracting officer.
- 7) Section F.4, NRCAR 2052.212-73 FINANCIAL STATUS REPORT - ALTERNATE 1 (JAN 1993) is replaced with NRCAR 2052.212-72 FINANCIAL STATUS REPORT
- 8) Under Section F.5(a) insert the following:

U.S. Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
Attn: Asimos Malliakos, Mail Stop NLS-344
Washington, D.C. 20555
- 9) Under Section F.5(b) insert the following:

U.S. Nuclear Regulatory Commission
Division of Contracts and Property Management
Attn: Contracting Officer, Mail Stop P-1042
Washington D.C. 20555
- 10) Under Section F.6, insert the "effective date" and "24 months thereafter" in the respective blanks.

- 11) Under Section G.1, insert the following:

Asimios Malliakos
 U.S. Nuclear Regulatory Commission
 Office of Nuclear Regulatory Research
 Mail Stop NLS-344
 Washington, D.C. 20555

Telephone: (301) 492-3562

- 12) Section G.3, is revised to read as follows:

- (a) The contractor is reimbursed for allowable indirect costs in accordance with the following predetermined rates :

<u>Period</u>	<u>Rate</u>
1/94 - 12/94	32% staff benefits rate
1/94 - 12/94	58% overhead rate
1/95 - 12/95	34% staff benefits rate
1/95 - 12/95	58% overhead rate

- (b) In the event that indirect rates developed by the cognizant audit activity for the period 1/95 - 12/95 on the basis of actual allowable costs are less than the ceiling rates, the rates established by the cognizant audits must apply. The Government may not be obligated to pay any additional amounts for indirect costs above the ceiling rates set forth above for the applicable period.

- 13) Under Section G.4, insert the following:

California Institute of Technology
 Cashier, MC 102-6
 1201 E. California Boulevard
 Pasadena, CA 91125

- 14) Section G.5 is added to read as follows:

G.5 TECHNICAL DIRECTIONS

Copies of all technical directions issued in writing by the project officer shall be furnished to the administrative and technical representatives of the contractor.

- 15) Section H.2 is deleted in its entirety.

- 16) Under Section H.3, insert the following:

Joseph E. Shepherd, Ph.D. - Principal Investigator

- 17) Under Section H.4, paragraph (c) is revised as follows:

The principal investigator(s) shall coordinate all such publications with, and transmit a copy of the proposed article or paper to, the NRC Contracting Officer or Project Officer, preferably thirty (30) days in advance, but no later than simultaneously with submission for publication. The NRC agrees to review and provide comments within thirty (30) days after receipt of a proposed publication. Contractor agrees to consider comments and suggestions submitted by NRC but retains the sole right to determine whether such changes or deletions will be made. In any event, Contractor agrees to include a disclaimer that the results and conclusions of the paper are strictly those of the author and do not necessarily reflect the views or positions of the NRC. Technical progress reports shall not be published without the prior approval by the NRC.

- 18) Section H.5 is revised to read as follows:

H.5 SAFETY, HEALTH, AND FIRE PROTECTION

The Contractor shall take all reasonable precautions in the performance of the work under this contract to protect the health and safety of its employees and of members of the public, including NRC employees and contractor personnel, and to minimize danger from all hazards to life and property and shall comply with all applicable Federal, State, and local health, safety, and fire protection regulations and requirements (including reporting requirements). In the event that the contractor fails to comply with these regulations or requirements, the contracting officer may, without prejudice to any other legal or contractual rights of the Commission, issue an order stopping all or any part of the work; thereafter, a start order for resumption of work may be issued at the discretion of the contracting officer. The contractor shall make no claim for an extension of time or for compensation or damages by reason of, or in connection with, this type of work stoppage.

19) Section H.7 is added and reads as follows:

H.6 CONTRACTOR ACQUIRED GOVERNMENT EQUIPMENT/PROPERTY
(JUNE 1988)

The Contractor is authorized to acquire and/or fabricate the equipment/property listed below for use in the performance of this contract. The equipment/property is subject to the provisions of the "Government Property" clause.

1. Pressure Vessel Modification
2. New Drive Section
3. Vacuum Pump
4. Mixing Pump
5. Heating System
6. Modified Diaphragm Closure
7. Burner for Steam/Hydrogen Source
8. Pressure Transducers

20) Under Section I, is revised as follows:

- a) FAR Clause 52.203-10 is deleted and replaced with FAR Clause 52.203-12.
- b) FAR Clause 52.215-27 is deleted.
- c) FAR Clause 52.215-39 is deleted.
- d) FAR Clause 52.227-12 is deleted and replaced with FAR Clause 52.227-11.
- e) FAR Clause 52.227-17 is deleted and replaced with FAR Clause 52.227-14, Alternate IV.

21) Under Section J.1, the following attachments are added:

<u>Attachment Number</u>	<u>Title</u>
7	NRCAR Clause 2052.212-72 FINACIAL STATUS REPORT
8	Contractor Spending Plan

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PART I - THE SCHEDULE

SECTION B - SUPPLIES OR SERVICES AND PRICES/COSTS

B.1 PROJECT TITLE

The title of this project is as follows:

Hydrogen Combustion Research

[End of Clause]

B.2 BRIEF DESCRIPTION OF WORK (MAR 1987)

The contractor shall study diffusion flame stability, transient high-temperature jet initiation of detonation, and jet combustion initiation near flammability limits to provide better understanding of hydrogen combustion aspects of phenomena associated with severe accidents.

[End of Clause]

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

- (a) The total estimated cost to the Government for full performance under this contract is ____*____.
- (b) The amount obligated by the Government with respect to this contract is ____*____.

[End of Clause]

*To be incorporated into any resultant contract

SECTION C - DESCRIPTION/SPECIFICATIONS/WORK STATEMENT

C.1 STATEMENT OF WORK

C.1.1 Background

During a severe accident one of the major challenges to containment integrity and equipment survivability is the pressure and temperature increase of the containment atmosphere associated with the combustion of large quantities of hydrogen. The NRC has sponsored significant research to address the issue over the past ten years. As a result of this research, both experimental and analytical, much has been learned about the combustion and control of hydrogen-air and hydrogen-air-steam mixtures. However, certain areas of combustion phenomenology pertinent to reactor safety are not yet understood with sufficient certainty that accurate predictions of combustion behavior can be made.

During a severe accident hydrogen generated as a result of Zr-H₂O reactions may be released as a high temperature jet or plume. In the presence of an ignition source or as a result of self ignition the hydrogen or hydrogen-steam jet may burn as a diffusion flame (e.g., pilot flame/bunsen burner). Combustion of hydrogen released in this manner is different from premixed global deflagrations in that the energy is released over the time scale of the release (tens of seconds to tens of minutes) thus reducing the concomitant pressure increase.

Additionally during a high pressure melt ejection the entrainment of hot debris into the jet may influence the combustion of the mixture in the bulk containment. Finally, one of the mechanisms postulated for initiating detonations is the expansion of a high speed jet into an explosive mixture. The relationship between the jet characteristics and the reacting atmosphere are not sufficiently understood to predict this phenomena.

The proposed experiments will use a technique of combusting premixed rich and lean mixtures in separate vessels followed by deliberate mixing to initiate combustion. This will enable the creation of much higher temperatures (1000-3000 K) than could be readily obtained by conventional heat exchanger techniques. The natural heat transfer processes within the explosion vessels and the timing of combustion and mixing processes will be used to vary the temperatures of the gases. Dispersing metal or inert dusts within one vessel prior to combustion will allow the creation of particulate-laden atmospheres, which will simulate the process of high-pressure melt ejection during a DCH event. Pressure and temperature measurements and photographic recordings shall be used to determine the nature of the combustion phenomena.

C.2 CONTRACT OBJECTIVE

The objective of this research is to study diffusion flame stability, transient high-temperature jet initiation of detonation, and jet combustion initiation near flammability limits to provide better understanding of hydrogen combustion aspects of phenomena associated with severe accidents.

C.3 SCOPE OF WORK

a. Task 1 - Facility Construction

The facility (shown in Fig. 1), which is almost complete and will be transferred and construction shall be completed by the contractor. It is based on two vessels (rated at 600 PSI) which are approximately 30 inches in diameter and 48 inches long with a capacity of 0.43 cubic meter. The first vessel shall be used as a supply or reservoir tank for the jet fluid and the second tank shall be used as a dump or receiving tank. The vessels shall be connected by a test section and initially separated by a rupture disk which could be broken mechanically at a preset time during the experiment. A high-temperature and pressure mixture of H_2-H_2O shall be created in the supply vessel by burning a fuel-rich H_2-O_2 mixture. In the receiving vessel, either a H_2 -air- H_2O mixture at moderate temperatures (290-370 K) shall be used (for detonation initiation and near-limit oxidation studies) or a high-temperature H_2 -air mixture (created by burning a lean $H_2-O_2-N_2$ mixture) shall be used for diffusion flame stability studies.

A feasibility study of this type of experiment has been carried out. The thermodynamic equilibrium computations of flame temperature and explosion pressure suggest that a wide range of jet compositions, between 10% and 100% steam, can be produced from readily flammable H_2-O_2 mixtures. Numerical predictions of heat transfer and venting processes were based on a simple two-compartment model of the facility shown in Figure 1. Correlations for heat transfer were calibrated against existing experimental data from previous hydrogen combustion studies. Supersonic jets can be produced as long as the pressure ratio (supply/receiver) is greater than about two, a condition that could exist for 1-10 seconds depending on the specific test configuration. The longest test times can be produced by using an initially subatmospheric dump tank and a superatmospheric starting pressure in the supply vessel.

C.3 (Continued)

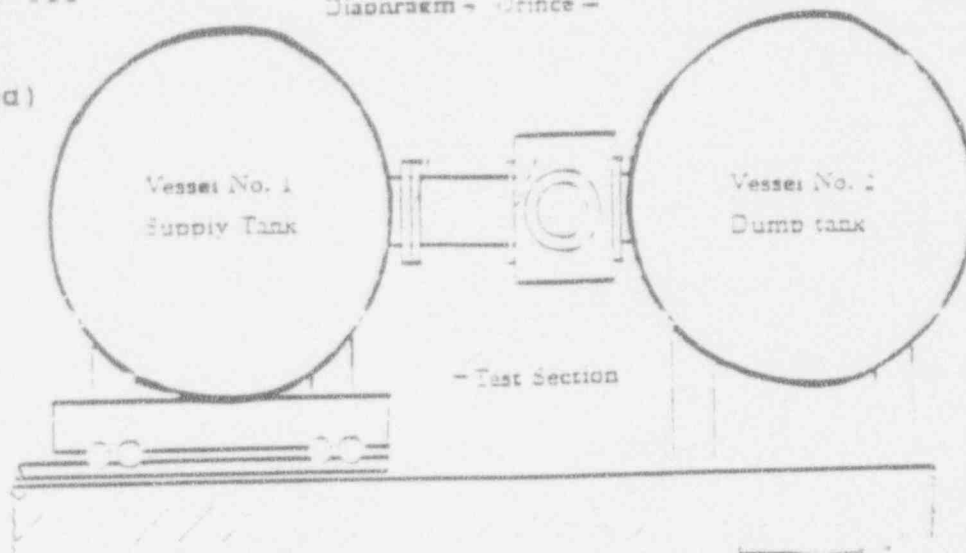


Figure 1. Schematic diagram of the proposed facility for studying transient combustion. Each vessel has a capacity of .427 cubic meter and is able to withstand pressures up to 600 psia.

It is possible to control the jet and atmosphere parameters over a substantial range by changing both the initial conditions and the timing of the events of combustion and rupturing the diaphragm between the vessels. The natural heat transfer processes within the supply vessel will result in the cooldown of the supply gases following combustion. Combustion gases will cool to about 800 K (the lower limit of the autoignition temperature) in about 3-5 seconds for the gas mixtures of interest. By rupturing the diaphragm at some time (between 0-5 seconds) after the supply vessel has been burned, the initial jet temperature can be varied. Initial supply pressure can be independently controlled by varying the precombustion pressure in the supply vessel.

Each vessel shall be evacuated and then filled using the method of partial pressures to fix the composition using a high-accuracy (Heise) static pressure gauge. The gases H_2 , O_2 and N_2 shall be technical grade material from commercial gas suppliers delivered from K-size bottles and two-stage regulators. A small (25 Kw) boiler shall be used to supply steam and preheat the receiving vessel. Combustion shall be initiated in the vessels by using a low energy (less than 5 mJ) electrical spark (from an EG&G HV trigger module).

Transient pressures within the vessels shall be measured by using thermally-protected (metal felt filters) strain-gauge transducers and a multiplexed digital recording system interfaced to a microcomputer. Transient temperatures shall be measured by using bare thermocouples (type K) within the

C.3 (Continued)

vessel and recorded by the data acquisition system after being amplified. For the mixtures of interest, the estimated combustion times are 5 - 100 ms and the characteristic cooldown and venting times are 1-10 s. Transients on these times scales can be readily resolved by using 1Khz sampling rates. For detonation initiation studies, piezoelectric transducers and a higher-speed transient digitizer (up to 5 Mhz) shall be used to measure possible shock and detonation pressure transients.

In order to produce particle-gas mixtures within the vessels for DCH simulations, particles shall be dispersed within the supply vessel prior to combustion. The particles shall be placed in a cup within the vessel before the experiment and prior to gas ignition, lofted by an air blast from a nozzle positioned above the cup. Either inert particles such as sand or combustion particles such as iron or other metals shall be used.

The transient jet shall be injected into the dump vessel through a nozzle (0.1-1 inch in diameter) and a test section which has external optical access (opposed 4 inch diameter ports). Direct and shadowgraph photography shall be obtained using both single frame spark photographs and a scientific (Hycam-type) 16 mm movie camera which is capable of obtaining pictures up to 10,000 frames per second. The photographs shall be used together with the temperature and pressure measurements to determine autoignition and stability of the diffusion flames. Fast-response thermocouples located downstream of the nozzle will be particularly useful in determining if a flame has been stabilized.

b. Task 2 - Diffusion Flame Stability

High temperature (800-3000 K) mixtures of hydrogen and steam shall be injected into hot (400-1000 K) mixtures of steam and air. Flame stability limits shall be determined as a function of the jet orifice diameter (1-10 mm), steam and hydrogen concentrations in the jet and atmosphere, and the pressure ratio between the vessels. Large pressure ratios (highly underexpanded supersonic jets) shall be produced by starting with subatmospheric pressures in the dump tank.

c. Task 3 - Oxidation of Near-Limit Mixtures

High-temperature jets of hydrogen and steam shall be injected into nearly inert atmosphere of hydrogen-steam-air. The

C.3 (Continued)

effect of jet temperature and velocity on combustion initiation shall be investigated. In addition, the role of particulates in the ignition process shall be studied. The atmosphere composition shall be selected to be near the flammability limits as determined by previous investigators.

Note: Tests with high temperature jets injected into cold atmospheres are excluded from this task.

d. Task 4 - Transient Jet Initiation of Detonation

High-temperature (800-3000 K) H_2 - H_2O jets containing particulates (metal oxides) shall be used to initiate cooler (300-400 K) hydrogen-air-steam mixtures. Potential for flame acceleration and DDT shall be evaluated. Mechanisms of gas-particulate jet-initiated DDT shall be investigated.

e. Task 5 - Analysis and Modeling

A simple two-compartment model of the experimental apparatus shall be developed and used to design the experiments and interpret the data. This model shall use simplified heat and mass transfer correlations together with energy and mass balances to estimate the transient temperatures and pressures within each vessel. A simple complete-combustion diffusion flame model shall be used to examine the effects of burning. For the near-limit oxidation studies, a detailed network of elementary chemical reactions and a simple stirred-tank model of the vessel shall be used to design and interpret those experiments. Other chemical reaction kinetics and thermodynamic equilibrium software tools developed for modeling flames, ignition, detonation reaction zones, and stirred reactors shall be applied as required.

C.4 MEETINGS AND TRAVEL

It is anticipated that the contractor shall be required to make one trip to Troy, New York for the combustion facility transfer and 2 trips to Washington, DC to coordinate programmatic and technical activities with NRC staff. It is also anticipated that the contractor shall make 2 trips to visit other laboratories or institutions in Russia to exchange technical information when appropriate.

[End of Clause]

C.5 NRCAR 2052.215-83 TRAVEL APPROVALS (JAN 1993)

(a) All domestic travel requires the prior approval of the project officer.

C.5 (Continued)

- (b) All foreing travel must be approved in advance by the NRC on NRC Form 445 and must be in compliance with FAR 52.247-63 Preference for U.S. Flag Air Carriers. Foreign travel approval must be communicated in writing through the contracting officer.

[End of Clause]

SECTION D - PACKAGING AND MARKING

D.1 PACKAGING AND MARKING (MAR 1987)

The Contractor shall package material for shipment to the site in such a manner that will ensure acceptance by common carrier and safe delivery at destination. Containers and closures shall comply with the Interstate Commerce Commission Regulations, Uniform Freight Classification Rules, or regulations of other carriers as applicable to the mode of transportation. On the front of the package, the Contractor shall clearly identify the contract number under which the product is being provided.

[End of Clause]

SECTION E - INSPECTION AND ACCEPTANCE

E.1 52.252-2 CLAUSES INCORPORATED BY REFERENCE (JUN 1988)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available.

1. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1) CLAUSES

NUMBER	TITLE	DATE
52.246-8	INSPECTION OF RESEARCH AND DEVELOPMENT - COST-REIMBURSEMENT Alternate I (APR 1984)	APR 1984

[End of Clause]

E.2 PLACE OF INSPECTION AND ACCEPTANCE (MAR 1987)

Inspection and acceptance of the deliverable items to be furnished hereunder shall be made by the Project Officer at the destination.

[End of Clause]

SECTION F - DELIVERIES OR PERFORMANCE

F.1 52.252-2 CLAUSES INCORPORATED BY REFERENCE (JUN 1988)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available.

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1) CLAUSES

NUMBER	TITLE	DATE
52.252-13	STOP-WORK ORDER Alternate I (APR 1984)	AUG 1989

[End of Clause]

F.2 NRCAR 2052.212-70 PREPARATION OF TECHNICAL REPORTS (JAN 1993)

All technical reports required by Section C and all Technical Progress Reports required by Section F are to be prepared in accordance with the attached Management Directive 3.8, "Unclassified Contractor and Grantee Publications in the NUREG Series." Management Directive 3.8 is not applicable to any Contractor Spending Plan (CSP) and any Financial Status Report that may be included in this contract. (See Section J for List of Attachments).

[End of Clause]

F.3 NRCAR 2052.212-71 TECHNICAL PROGRESS REPORT

The contractor shall provide a monthly Technical Progress Report to the project officer and the contracting officer. The report is due within 15 calendar days after the end of the report period and must identify the title of the project, the contract number, Financial Identification Number (FIN), project manager and/or principal investigator, the contract period of performance, and the period covered by the report. Each report must include the following for each discrete task/task order:

- (a) A listing of the efforts completed during the period, and milestones reached or, if missed, an explanation provided;
- (b) Any problems or delays encountered or anticipated and recommendations for resolution. If the recommended resolution involves a contract modification, e.g., change in work

F.3 (Continued)

requirements, level of effort (cost) or schedule delay, the contractor shall submit a separate letter to the contracting officer identifying the required change and estimated cost impact.

- (c) A summary of progress to date; and
- (d) Plans for the next reporting period.

[End of Clause]

F.4 NRCAR 2052.212-73 FINANCIAL STATUS REPORT
 ALTERNATE 1 (JUN 1988)

The Contractor shall provide a monthly Financial Status Report to the Project Officer and the Contracting Officer. The report is due within 15 calendar days after the end of the report period and shall identify the title of the project, the contract number, job code, project manager and/or principal investigator, the contract period of performance, and the period covered by the report. Each report shall include the following for each discrete task:

- (a) Provide total estimated cost (value) of the project as reflected in the contract, the amount of funds available in the contract to date, and the balance of funds required to complete the work as follows:
 - (1) Total Estimated Contract Amount.
 - (2) Total Funds Obligated to Date.
 - (3) Total Costs Incurred this Reporting Period.
 - (4) Total Costs Incurred to Date.
 - (5) Balance of Obligations Remaining.
 - (6) Balance of Funds Required to Complete Contract.
- (b) Detail of all direct and indirect costs incurred during the reporting period for each task.

[End of Clause]

F.5 PLACE OF DELIVERY--REPORTS (JUN 1988)

The items to be furnished hereunder shall be delivered, with all charges paid by the Contractor, to:

- (a) Project Officer (3 copies)

F.5 (Continued)

_____*____

(b) Contracting Officer (1 copy)

[End of Clause]

F.6 DURATION OF CONTRACT PERIOD (MAR 1987)

This contract shall commence on ____*____ and will expire on ____*____

[End of Clause]

F.7 ADDITIONAL REPORTS

The contractor shall provide a technical report for each of the three (3) test series. A draft copy of each individual report shall be sent to the NRC two (2) months after the completion of a test series. A final version of this report shall be issued one (1) month from receipt of the NRC comments.

SECTION G - CONTRACT ADMINISTRATION DATA

G.1 NRCAR 2052.215-71 PROJECT OFFICER AUTHORITY
(JAN 1993)

- (a) The contracting officer's authorized representative hereinafter referred to as the project officer for this contract is:

Name: ____*____

Address: ____*____

Telephone Number: ____*____

- (b) Performance of the work under this contract is subject to the technical direction of the NRC project officer. The term technical direction is defined to include the following:
- (1) Technical direction to the contractor which shifts work emphasis between areas of work or tasks, fills in details, or otherwise serves to accomplish the contractual statement of work.
 - (2) Provide advice and guidance to the contractor in the preparation of drawings, specifications, or technical portions of the work description.
 - (3) Review and, where required by the contract, approval of technical drawings, specifications, and technical information to be delivered by the contractor to the Government under the contract.
- (c) Technical direction must be within the general statement of work stated in the contract. The project officer does not have the authority to and may not issue any technical direction which:
- (1) Constitutes an assignment of work outside the general scope of the contract.
 - (2) Constitutes a change as defined in the "Changes" clause of this contract.
 - (3) In any way causes an increase or decrease in the total

G.1 (Continued)

estimated contract cost, the fixed fee, if any, or the time required for contract performance.

- (4) Changes any of the expressed terms, conditions, or specifications of the contract.
 - (5) Terminates the contract, settles any claim or dispute arising under the contract, or issues any unilateral directive whatever.
- (d) All technical directions must be issued in writing by the project officer or must be confirmed by the project officer in writing within ten (10) working days after verbal issuance. A copy of the written direction must be furnished to the contractor.
- (e) The contractor shall proceed promptly with the performance of technical directions duly issued by the project officer in the manner prescribed by this clause and within the project officer's authority under the provisions of this clause.
- (f) If, in the opinion of the contractor, any instruction or direction issued by the project officer is within one of the categories as defined in paragraph (c) of this section, the contractor may not proceed but shall notify the contracting officer in writing within five (5) working days after the receipt of any instruction or direction and shall request the contracting officer to modify the contract accordingly. Upon receiving the notification from the contractor, the contracting officer shall issue an appropriate contract modification or advise the contractor in writing that, in the contracting officer's opinion, the technical direction is within the scope of this article and does not constitute a change under the "Changes" clause.
- (g) Any unauthorized commitment or direction issued by the project officer may result in an unnecessary delay in the contractor's performance and may even result in the contractor expending funds for unallowable costs under the contract.
- (h) A failure of the parties to agree upon the nature of the instruction or direction or upon the contract action to be taken with respect thereto is subject to FAR 52.233-1 - Disputes.
- (i) In addition to providing technical direction as defined in paragraph (b) of the section, the project officer shall:
- (1) Monitor the contractor's technical progress, including surveillance and assessment of performance, and recommend to the contracting officer changes in requirements.

G.1 (Continued)

- (2) Assist the contractor in the resolution of technical problems encountered during performance.
- (3) Review all costs requested for reimbursement by the contractor and submit to the contracting officer recommendations for approval, disapproval, or suspension of payment for supplies and services required under this contract.

(End of Clause)

*To be incorporated into any resultant contract

G.2 NRCAR 2052.215-61 TRAVEL REIMBURSEMENT (JAN 1993)

- (a) Total expenditure for domestic travel may not exceed * without the prior approval of the contracting officer.
- (b) The contractor is encouraged to use Government contract airlines, AMTRAK rail services, and discount hotel/motel properties in order to reduce the cost of travel under this contract. The contracting officer shall, upon request, provide each traveler with a letter of identification which is required in order to participate in this program. The Federal Travel Directory (FTD) identifies carriers, contract fares, schedules, payment conditions, and hotel/motel properties which offer their services and rates to Government contractor personnel traveling on official business under this contract. The FTD, which is issued monthly, may be purchased from the U.S. Government Printing Office, Washington, DC 20402.
- (c) The contractor will be reimbursed for reasonable travel costs incurred directly and specifically in the performance of this contract. The cost limitations for travel costs are determined in accordance with the specific travel regulations cited in FAR 31.205-46, as are in effect on the date of the trip. Travel costs for research and related activities performed at State and nonprofit institutions, in accordance with Section 12 of Pub. L. 100-679, shall be charged in accordance with the contractor's institutional policy to the degree that the limitations of Office of Management and Budget (OMB) guidance are not exceeded. Applicable guidance documents include OMB Circular A-87, Cost Principles for State and Local Governments; OMB Circular A-122, Cost Principles for Nonprofit Organizations; and OMB Circular A-21, Cost Principles for Educational Institutions.
- (d) When the Government changes the Federal Travel Regulations, or other applicable regulations, it is the responsibility of the contractor to notify the contracting officer in accordance

G.2 (Continued)

with the Limitations of Cost clause of this contract if the contractor will be unable to make all of the approved trips and remain within the cost and fee limitations of this contract due to the changes.

(End of Clause)

G.3 NRCAR 2052.216-72 INDIRECT COST RATES
- ALTERNATE 1 (JAN 1993)

The contractor is reimbursed for allowable indirect costs in accordance with the following predetermined rates:

*

(End of Clause)

*To be incorporated into any resultant contract

G.4 REMITTANCE ADDRESS (MAR 1987)

If item 15C. of the Standard Form 33 has been checked, enter the remittance address below:

Name: _____

Address: _____

[End of Clause]

SECTION H - SPECIAL CONTRACT REQUIREMENTS

H.1 NRCAR 2052.209-73 CONTRACTOR ORGANIZATIONAL
CONFLICTS OF INTEREST (JAN 1993)

- (a) Purpose. The primary purpose of this clause is to aid in ensuring that the contractor:
- (1) Is not placed in a conflicting role because of current or planned interests (financial, contractual, organizational, or otherwise) which relate to the work under this contract; and
 - (2) Does not obtain an unfair competitive advantage over other parties by virtue of its performance of this contract.
- (b) Scope. The restrictions described apply to performance or participation by the contractor, as defined in 48 CFR 2009.570-2 in the activities covered by this clause.
- (c) Work for others.
- (1) Notwithstanding any other provision of this contract, during the term of this contract the contractor agrees to forego entering into consulting or other contractual arrangements with any firm or organization, the result of which may give rise to a conflict of interest with respect to the work being performed under this contract. The contractor shall ensure that all employees under this contract abide by the provision of this clause. If the contractor has reason to believe with respect to itself or any employee that any proposed consultant or other contractual arrangement with any firm or organization may involve a potential conflict of interest, the contractor shall obtain the written approval of the contracting officer before the execution of such contractual arrangement.
 - (2) The contractor may not represent, assist, or otherwise support an NRC licensee or applicant undergoing an NRC audit, inspection, or review where the activities that are the subject of the audit, inspection or review are the same as or substantially similar to the services within the scope of this contract (or task order as appropriate), except where the NRC licensee or applicant requires the contractor's support to explain or defend the contractor's prior work for the utility or other entity which NRC questions.

H.1 (Continued)

- (3) When the contractor performs work for the NRC under this contract at any NRC licensee or applicant site, the contractor shall neither solicit nor perform work in the same or similar technical area for that licensee or applicant organization for a period commencing with the award of the task order or beginning of work on the site (if not a task order contract) and ending one year after completion of all work under the associated task order, or last time at the site (if not a task order contract).
 - (4) When the contractor performs work for the NRC under this contract at any NRC licensee or applicant site,
 - (i) The contractor may not solicit work at that site for that licensee or applicant during the period of performance of the task order or the contract, as appropriate.
 - (ii) The contractor may not perform work at that site for that licensee or applicant during the period of performance of the task order or the contract, as appropriate, and for one year thereafter.
 - (iii) Notwithstanding the foregoing, the contracting officer may authorize the contractor to solicit or perform this type of work (except work in the same or similar technical area) if the contracting officer determines that the situation will not pose a potential for technical bias or unfair competitive advantage.
- (d) Disclosure after award.
- (1) The contractor warrants that to the best of its knowledge and belief, and except as otherwise set forth in this contract, it does not have any organizational conflicts of interest as defined in 48 CFR 209.570-2.
 - (2) The contractor agrees that, if after award, it discovers organizational conflicts of interest with respect to this contract, it shall make an immediate and full disclosure in writing to the contracting officer. This statement must include a description of the action which the contractor has taken or proposes to take to avoid or mitigate such conflicts. The NRC may, however, terminate the contract if termination is in the best interest of the government.
 - (3) It is recognized that the scope of work of a task-order-type contract necessarily encompasses a broad

H.1 (Continued)

spectrum of activities. Consequently, if this is a task-order-type contract, the contractor agrees that it will disclose all proposed new work involving NRC licensees or applicants which comes within the scope of work of the underlying contract. Further, if this contract involves work at a licensee or applicant site, the contractor agrees to exercise diligence to discover and disclose any new work at that licensee or applicant site. This disclosure must be made before the submission of a bid or proposal to the utility or other regulated entity and must be received by the NRC at least 15 days before the proposed award date in any event, unless a written justification demonstrating urgency and due diligence to discover and disclose is provided by the contractor and approved by the contracting officer. The disclosure must include the statement of work, the dollar value of the proposed contract, and any other documents that are needed to fully describe the proposed work for the regulated utility or other regulated entity. NRC may deny approval of the disclosed work only when the NRC has issued a task order which includes the technical area and, if site-specific, the site, or has plans to issue a task order which includes the technical area and, if site-specific, the site, or when the work violates paragraphs (c)(2), (c)(3) or (c)(4) of this section.

(e) Access to and use of information.

- (1) If in the performance of this contract, the contractor obtains access to information, such as NRC plans, policies, reports, studies, financial plans, internal data protected by the Privacy Act of 1974 (5 U.S.C. Section 552a (1988)), or the Freedom of Information Act (5 U.S.C. Section 552 (1986)), the contractor agrees not to:
 - (i) Use this information for any private purpose until the information has been released to the public;
 - (ii) Compete for work for the Commission based on the information for a period of six months after either the completion of this contract or the release of the information to the public, whichever is first;
 - (iii) Submit an unsolicited proposal to the Government based on the information until one year after the release of the information to the public; or
 - (iv) Release the information without prior written approval by the contracting officer unless the information has previously been released to the

H.1 (Continued)

public by the NRC.

- (2) In addition, the contractor agrees that, to the extent it receives or is given access to proprietary data, data protected by the Privacy Act of 1974 (5 U.S.C. Section 552a (1988)), or the Freedom of Information Act (5 U.S.C. Section 552 (1986)), or other confidential or privileged technical, business, or financial information under this contract, the contractor shall treat the information in accordance with restrictions placed on use of the information.
- (3) Subject to patent and security provisions of this contract, the contractor shall have the right to use technical data it produces under this contract for private purposes provided that all requirements of this contract have been met.
- (f) Subcontracts. Except as provided in 48 CFR 2009.570-2, the contractor shall include this clause, including this paragraph, in subcontracts of any tier. The terms contract, contractor, and contracting officer, must be appropriately modified to preserve the Government's rights.
- (g) Remedies. For breach of any of the above restrictions, or for intentional nondisclosure or misrepresentation of any relevant interest required to be disclosed concerning this contract or for such erroneous representations that necessarily imply bad faith, the Government may terminate the contract for default, disqualify the contractor from subsequent contractual efforts, and pursue other remedies permitted by law or this contract.
- (h) Waiver. A request for waiver under this clause must be directed in writing to the contracting officer in accordance with the procedures outlined in 48 CFR 2009.570-9.
- (i) Follow-on effort. The contractor shall be ineligible to participate in NRC contracts, subcontracts, or proposals therefor (solicited or unsolicited), which stem directly from the contractor's performance of work under this contract. Furthermore, unless so directed in writing by the contracting officer, the contractor may not perform any technical consulting or management support services work or evaluation activities under this contract on any of its products or services or the products or services of another firm if the contractor has been substantially involved in the development or marketing of the products or services.
- (1) If the contractor, under this contract, prepares a complete or essentially complete statement of work or

H.1 (Continued)

specifications, the contractor is not eligible to perform or participate in the initial contractual effort which is based on the statement of work or specifications. The contractor may not incorporate its products or services in the statement of work or specifications unless so directed in writing by the contracting officer, in which case the restrictions in this paragraph do not apply.

- (2) Nothing in this paragraph precludes the contractor from offering or selling its standard commercial items to the Government.

[End of Clause]

H.2 NRCAR 2052.210-71 DRAWINGS, DESIGNS, SPECIFICATIONS, AND OTHER DATA (JAN 1993)

All drawings, sketches, designs, design data, specifications, notebooks, technical and scientific data, and all photographs, negatives, reports, findings, recommendations, other data and memoranda of every description relating thereto, as well as all copies of the foregoing relating to the work or any part thereto, are subject to inspection by the Commission at all reasonable times. Inspection of the proper facilities must be afforded the Commission by the contractor and its subcontractors. These data are the property of the Government and may be used by the Government for any purpose whatsoever without any claim on the part of the contractor and its subcontractors and vendors for additional compensation and must, subject to the right of the contractor to retain a copy of the material for its own use, be delivered to the Government, or otherwise disposed of by the contractor as the contracting officer may direct during the progress of the work or upon completion or termination of this contract. The contractor's right of retention and use is subject to the security, patent, and use of information provisions, if any, of this contract.

[End of Clause]

H.3 NRCAR 2052.215-70 KEY PERSONNEL (JAN 1993)

- (a) The following individuals are considered to be essential to the successful performance of the work hereunder:

*

H.3 (Continued)

The contractor agrees that personnel may not be removed from the contract work or replaced without compliance with paragraphs (b) and (c) of this section.

- (b) If one or more of the key personnel, for whatever reason, becomes, or is expected to become, unavailable for work under this contract for a continuous period exceeding 30 work days, or is expected to devote substantially less effort to the work than indicated in the proposal or initially anticipated, the contractor shall immediately notify the contracting officer and shall, subject to the concurrence of the contracting officer, promptly replace the personnel with personnel of at least substantially equal ability and qualifications.
- (c) Each request for approval of substitutions must be in writing and contain a detailed explanation of the circumstances necessitating the proposed substitutions. The request must also contain a complete resume for the proposed substitute and other information requested or needed by the contracting officer to evaluate the proposed substitution. The contracting officer or his/her authorized representative shall evaluate the request and promptly notify the contractor of his or her approval or disapproval in writing.
- (d) If the contracting officer determines that suitable and timely replacement of key personnel who have been reassigned, terminated, or have otherwise become unavailable for the contract work is not reasonably forthcoming, or that the resultant reduction of productive effort would be so substantial as to impair the successful completion of the contract or the service order, the contract may be terminated by the contracting officer for default or for the convenience of the Government, as appropriate. If the contracting officer finds the contractor at fault for the condition, the contract price or fixed fee may be equitably adjusted downward to compensate the Government for any resultant delay, loss, or damage.

[End of Clause]

*To be incorporated into any resultant contract

H.4 NRCAR 2052.235-71 PUBLICATION OF RESEARCH
RESULTS - UNIVERSITIES (JAN 1993)

- (a) The principal investigator(s)/contractor shall comply with the provisions of NRC Handbook 3.8 (formerly MC 3202) and NRC Manual Chapter 3206 regarding publication in refereed scientific and engineering journals or dissemination to the public of any information, oral or written, concerning the work performed under this contract. Failure to comply with

H.4 (Continued)

this clause shall be grounds for termination of this contract.

- (b) The principal investigator(s)/contractor may publish the results of this work in refereed scientific and engineering journals or in open literature and present papers at public or association meetings at interim stages of work, in addition to submitting to NRC the final reports and other deliverables required under this contract. However, such publication and papers shall focus on advances in science and technology and minimize conclusions and/or recommendations which may have regulatory implications.
- (c) The principal investigator(s) shall coordinate all such publications with, and transmit a copy of the proposed article or paper to, the NRC Contracting Officer or Project Officer, prior to publication. The NRC agrees to review and provide comments within thirty (30) days after receipt of a proposed publication. However, in those cases where the information to be published is (1) subject to Commission approval, (2) has not been ruled upon, or (3) disapproved by the Commission, the NRC reserves the right to disapprove or delay the publication. Further, if the NRC disagrees with the proposed publication for any reason, it reserves the right to require that any publication not identify the NRC's sponsorship of the work and that any associated publication costs shall be borne by the contractor.

[End of Clause]

H.5 NRCAR 2052.235-72 SAFETY, HEALTH, AND FIRE
PROTECTION (JAN 1993)

The contractor shall take all reasonable precautions in the performance of the work under this contract to protect the health and safety of its employees and of members of the public, including NRC employees and contractor personnel, and to minimize danger from all hazards to life and property and shall comply with all applicable health, safety, and fire protection regulations and requirements (including reporting requirements) of the Commission and the Department of Labor. In the event that the contractor fails to comply with these regulations or requirements, the contracting officer may, without prejudice to any other legal or contractual rights of the Commission, issue an order stopping all or any part of the work; thereafter, a start order for resumption of work may be issued at the discretion of the contracting officer. The contractor shall make no claim for an extension of time or for compensation or damages by reason of, or in connection with, this type of work stoppage.

[End of Clause]

H. 6 GOVERNMENT FURNISHED EQUIPMENT/PROPERTY (JUNE 1988)

- (a) The NRC will provide the contractor with the following items for use under this contract: refer to Schedule of Government Furnished Property included herein as Attachment 5.
- (b) Only the equipment/property listed above in the quantities shown will be provided by the Government. This property is subject to the provisions of the Government Property clause under this contract. All other equipment/property required in performance of the contract shall be furnished by the Contractor.

[End of Clause]

PART II - CONTRACT CLAUSES

SECTION I - CONTRACT CLAUSES

I.1 52.252-2 CLAUSES INCORPORATED BY REFERENCE (JUN 1988)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available.

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1) CLAUSES

NUMBER	TITLE	DATE
52.202-1	DEFINITIONS	SEP 1991
52.203-1	OFFICIALS NOT TO BENEFIT	APR 1984
52.203-3	GRATUITIES	APR 1984
52.203-5	COVENANT AGAINST CONTINGENT FEES	APR 1984
52.203-7	ANTI-KICKBACK PROCEDURES	OCT 1988
52.203-10	PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY	SEP 1990
52.209-6	PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT	NOV 1992
52.215-1	EXAMINATION OF RECORDS BY COMPTROLLER GENERAL	FEB 1993
52.215-2	AUDIT - NEGOTIATION Alternate II (FEB 1993)	FEB 1993
52.215-22	PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA	JAN 1991
52.215-24	SUBCONTRACTOR COST OR PRICING DATA	DEC 1991
52.215-26	INTEGRITY OF UNIT PRICES Alternate I (APR 1991)	APR 1991
52.215-27	TERMINATION OF DEFINED BENEFIT PENSION PLANS	SEP 1989
52.215-33	ORDER OF PRECEDENCE	JAN 1986
52.215-39	REVERSION OR ADJUSTMENT OF PLANS FOR POSTRETIREMENT BENEFITS OTHER THAN PENSIONS (PRB)	JUL 1991
52.216-11	COST CONTRACT - NO FEE	APR 1984
52.217-1	LIMITATION OF PRICE AND CONTRACTOR OBLIGATIONS	APR 1984
52.217-2	CANCELLATION OF ITEMS Alternate I (APR 1984)	APR 1984

I.1 (Continued)

NUMBER	TITLE	DATE
52.219-8	UTILIZATION OF SMALL BUSINESS CONCERNS AND SMALL DISADVANTAGED BUSINESS CONCERNS	FEB 1990
52.219-13	UTILIZATION OF WOMEN-OWNED SMALL BUSINESSES	AUG 1986
52.220-3	UTILIZATION OF LABOR SURPLUS AREA CONCERNS	APR 1984
52.222-3	CONVICT LABOR	APR 1984
52.222-26	EQUAL OPPORTUNITY	APR 1984
52.222-35	AFFIRMATIVE ACTION FOR SPECIAL DISABLED AND VIETNAM ERA VETERANS	APR 1984
52.222-36	AFFIRMATIVE ACTION FOR HANDICAPPED WORKERS	APR 1984
52.222-37	EMPLOYMENT REPORTS ON SPECIAL DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA	JAN 1988
52.223-6	DRUG-FREE WORKPLACE	JUL 1990
52.225-11	RESTRICTIONS ON CERTAIN FOREIGN PURCHASES	MAY 1992
52.227-1	AUTHORIZATION AND CONSENT Alternate I (APR 1984)	APR 1984
52.227-2	NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT	APR 1984
52.227-12	PATENT RIGHTS - RETENTION BY THE CONTRACTOR (LONG FORM)	JUN 1989
52.227-17	RIGHTS IN DATA - SPECIAL WORKS	JUN 1987
52.228-7	INSURANCE - LIABILITY TO THIRD PERSONS	APR 1984
52.232-17	INTEREST	JAN 1991
52.232-20	LIMITATION OF COST	APR 1984
52.232-23	ASSIGNMENT OF CLAIMS	JAN 1986
52.232-25	PROMPT PAYMENT	SEP 1992
52.232-28	ELECTRONIC FUNDS TRANSFER PAYMENT METHODS	APR 1989
52.233-1	DISPUTES	DEC 1991
52.233-3	PROTEST AFTER AWARD Alternate I (JUN 1985)	JUN 1985
52.242-1	NOTICE OF INTENT TO DISALLOW COSTS	APR 1984
52.242-13	BANKRUPTCY	APR 1991
52.243-2	CHANGES - COST-REIMBURSEMENT Alternate V (APR 1984)	AUG 1987
52.244-2	SUBCONTRACTS (COST-REIMBURSEMENT AND LETTER CONTRACTS)	JUL 1985
52.245-5	GOVERNMENT PROPERTY (COST-REIMBURSEMENT, TIME-AND-MATERIAL, OR LABOR-HOUR CONTRACTS) Alternate I (JUL 1985)	JAN 1986

I.1 (Continued)

NUMBER	TITLE	DATE
52.219-5	TERMINATION FOR CONVENIENCE OF THE GOVERNMENT (EDUCATIONAL AND OTHER NONPROFIT INSTITUTIONS)	APR 1984
52.222-1	COMPUTER GENERATED FORMS	JAN 1991

[End of Clause]

I.2 52.216-7 ALLOWABLE COST AND PAYMENT (JUL 1991)

- (a) Invoicing. The Government shall make payments to the Contractor when requested as work progresses, but (except for small business concerns) not more often than once every 2 weeks, in amounts determined to be allowable by the Contracting Officer in accordance with 31.3 of the Federal Acquisition Regulation (FAR) in effect on the date of this contract and the terms of this contract. The Contractor may submit to an authorized representative of the Contracting Officer, in such form and reasonable detail as the representative may require, an invoice or voucher supported by a statement of the claimed allowable cost for performing this contract.
- (b) Reimbursing costs. (1) For the purpose of reimbursing allowable costs (except as provided in subparagraph (2) below, with respect to pension, deferred profit sharing, and employee stock ownership plan contributions), the term "costs" includes only--
- (i) Those recorded costs that, at the time of the request for reimbursement, the Contractor has paid by cash, check, or other form of actual payment for items or services purchased directly for the contract;
 - (ii) When the Contractor is not delinquent in paying costs of contract performance in the ordinary course of business, costs incurred, by: not necessarily paid, for--
 - (A) Materials issued from the Contractor's inventory and placed in the production process for use on the contract;
 - (B) Direct labor;
 - (C) Direct travel;
 - (D) Other direct in-house costs; and

I.2 (Continued)

- (E) Properly allocable and allowable indirect costs, as shown in the records maintained by the Contractor for purposes of obtaining reimbursement under Government contracts; and
- iii) The amount of progress payments that have been paid to the Contractor's subcontractors under similar cost standards.
- (2) Contractor contributions to any pension or other postretirement benefit, profit-sharing or employee stock ownership plan funds that are paid quarterly or more often may be included in indirect costs for payment purposes; Provided, that the Contractor pays the contribution to the fund within 30 days after the close of the period covered.
- (3) Notwithstanding the audit and adjustment of invoices or vouchers under paragraph (g) below, allowable indirect costs under this contract shall be obtained by applying indirect cost rates established in accordance with paragraph (d) below.
- (4) Any statements in specifications or other documents incorporated in this contract by reference designating performance of services or furnishing of materials at the Contractor's expense or at no cost to the Government shall be disregarded for purposes of cost-reimbursement under this clause.
- (c) Small business concerns. A small business concern may be paid more often than every 2 weeks and may invoice and be paid for recorded costs for items or services purchased directly for the contract, even though the concern has not yet paid for those items or services.
- (d) Final indirect cost rates. (1) Final annual indirect cost rates and the appropriate bases shall be established in accordance with Subpart 42.7 of the Federal Acquisition Regulation (FAR) in effect for the period covered by the indirect cost rate proposal.
- (2) The Contractor shall, within 90 days after the expiration of each of its fiscal years, or by a later date approved by the Contracting Officer, submit to the cognizant Contracting Officer responsible for negotiating its final indirect cost rates and, if required by agency procedures, to the cognizant audit activity proposed final indirect cost rates for that period and supporting cost data specifying the contract and/or subcontract to

I.2 (Continued)

which the rates apply. The proposed rates shall be based on the Contractor's actual cost experience for that period. The appropriate Government representative and Contractor shall establish the final indirect cost rates as promptly as practical after receipt of the Contractor's proposal.

- (3) The Contractor and the appropriate Government representative shall execute a written understanding setting forth the final indirect cost rates. The understanding shall specify (i) the agreed-upon final annual indirect cost rates, (ii) the bases to which the rates apply, (iii) the periods for which the rates apply, (iv) any specific indirect cost items treated as direct costs in the settlement, and (v) the affected contract and/or subcontract, identifying any with advance agreements or special terms and the applicable rates. The understanding shall not change any monetary ceiling, contract obligation, or specific cost allowance or disallowance provided for in this contract. The understanding is incorporated into this contract upon execution.
- (4) Failure by the parties to agree on a final annual indirect cost rate shall be a dispute within the meaning of the Disputes clause.
- (e) Billing rates. Until final annual indirect cost rates are established for any period, the Government shall reimburse the Contractor at billing rates established by the Contracting Officer or by an authorized representative (the cognizant auditor), subject to adjustment when the final rates are established. These billing rates--
 - (1) Shall be the anticipated final rates; and
 - (2) May be prospectively or retroactively revised by mutual agreement, at either party's request, to prevent substantial overpayment or underpayment.
- (f) Quick-closeout procedure. When the Contractor and Contracting Officer agree, the quick-closeout procedures of Subpart 42.7 of the FAR may be used.
- (g) Audit. At any time or times before final payment, the Contracting Officer may have the Contractor's invoices or vouchers and statements of cost audited. Any payment may be (1) reduced by amounts found by the Contracting Officer not to constitute allowable costs or (2) adjusted for prior overpayments or underpayments.

I.2 (Continued)

- (h) Final payment. (1) The Contractor shall submit a completion invoice or voucher, designated as such, promptly upon completion of the work, but no later than one year (or longer, as the Contracting Officer may approve in writing) from the completion date. Upon approval of that invoice or voucher, and upon the Contractor's compliance with all terms of this contract, the Government shall promptly pay any balance of allowable costs and that part of the fee (if any) not previously paid.
- (2) The Contractor shall pay to the Government any refunds, rebates, credits, or other amounts (including interest, if any) accruing to or received by the Contractor or any assignee under this contract, to the extent that those amounts are properly allocable to costs for which the Contractor has been reimbursed by the Government. Reasonable expenses incurred by the Contractor for securing refunds, rebates, credits, or other amounts shall be allowable costs if approved by the Contracting Officer. Before final payment under this contract, the Contractor and each assignee whose assignment is in effect at the time of final payment shall execute and deliver--
- (i) An assignment to the Government, in form and substance satisfactory to the Contracting Officer, of refunds, rebates, credits, or other amounts (including interest, if any) properly allocable to costs for which the Contractor has been reimbursed by the Government under this contract; and
- (ii) A release discharging the Government, its officers, agents, and employees from all liabilities, obligations, and claims arising out of or under this contract, except--
- (A) Specified claims stated in exact amounts, or in estimated amounts when the exact amounts are not known;
- (B) Claims (including reasonable incidental expenses) based upon liabilities of the Contractor to third parties arising out of the performance of this contract; provided, that the claims are not known to the Contractor on the date of the execution of the release, and that the Contractor gives notice of the claims in writing to the Contracting Officer within 6 years following the release date or notice of final payment date, whichever is earlier; and

I.2 (Continued)

- (C) Claims for reimbursement of costs, including reasonable incidental expenses, incurred by the Contractor under the patent clauses of this contract, excluding, however, any expenses arising from the Contractor's indemnification of the Government against patent liability.

[End of Clause]

I.3 52.227-23 RIGHTS TO PROPOSAL DATA (TECHNICAL) (JUN 1987)

Except for data contained on pages _____, it is agreed that as a condition of award of this contract, and notwithstanding the conditions of any notice appearing thereon, the Government shall have unlimited rights (as defined in the Rights in Data--General" clause contained in this contract) in and to the technical data contained in the proposal dated _____, upon which this contract is based.

[End of Clause]

PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACHEMENTS

SECTION J - LIST OF ATTACHEMENTS

J.1 ATTACHEMENTS (MAR 1987)

<u>Attachment Number</u>	<u>Title</u>
1	Billing Instructions
2	NRC Contractor Organizational Conflicts of Interest
3	NRC Handbook 3.8
4	Standard Form 1411 with Instructions
5	Schedule of Government Furnished Property
6	Breakdown of Proposed Estimated Cost and Labor Hours