

SUPPLEMENTAL AGREEMENT
BETWEEN
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
AND
THE U. S. NUCLEAR REGULATORY COMMISSION

THIS SUPPLEMENTAL AGREEMENT, effective the 1st day of September, 1980, by and between the UNITED STATES OF AMERICA (hereinafter referred to as the "Government"), as represented by the UNITED STATES NUCLEAR REGULATORY COMMISSION (hereinafter referred to as the "Commission"), and Massachusetts Institute of Technology (hereinafter referred to as the "Contractor"),

WITNESSETH THAT:

WHEREAS, the parties desire to modify Contract No. NRC-04-80-194 as hereinafter provided, and this supplemental agreement is authorized by law, including the Energy Reorganization Act of 1974, as amended, and the Atomic Energy Act of 1954, as amended.

NOW, THEREFORE, said contract is hereby modified as follows:

1. Appendix A, attached to this supplemental agreement and made a part hereof, supercedes in its entirety the Appendix A attached to the basic contract and provides for the research to be performed by the Contractor during the contract period specified therein.
2. In Article III - Consideration, the sum "\$112,378.00" is substituted for the sum "\$104,170.00".

IN WITNESS WHEREOF, the parties have executed this document.

UNITED STATES OF AMERICA

BY: 

Kellogg V. Morton, Chief
Research Contracts Branch
Division of Contracts
U. S. Nuclear Regulatory Commission

Massachusetts Institute of Technology

BY: 

George H. Dummer, Director
Office of Sponsored Programs

(title)

I, C. B. Simonides, certify that I am the
(attester)

Secretary of the Executive
Committee of the Corporation of the Contractor named under this
(title)

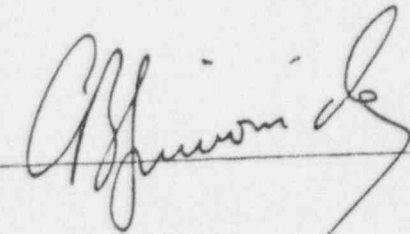
document; that George H. Dummer who signed this
(signatory)

document on behalf of said Contractor was then Director
Office of Sponsored Programs

of said Contractor; that this document was duly signed for and on behalf of
said Contractor by authority of its governing body and is within the scope
of its legal powers.

IN WITNESS WHEREOF, I have hereunto affixed my hand and the seal of said
Contractor.

(SEAL)



APPROVED 2/1/74

CONTRACTOR: THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

APPENDIX A

For the Contract period September 1, 1980 through February 28, 1982

Article A-I RESEARCH TO BE PERFORMED BY CONTRACTOR

(a) The unclassified scope of work under this contract entitled, "Containment Safety Under Internal Explosions is as follows:

1. Construct numerical models for the explosion phenomenon and the generated shock wave, and use these models for the prediction of wall pressure as a function of explosion parameters (such as type, magnitude and location).
2. Develop an understanding of the dynamic characteristics, first, of linear elastic containment structures.
3. Assess the effect of containment deformability on the wall pressure induced by the shock waves.
4. Develop a capability for nonlinear dynamic analysis of containment shells, subjected to pressure loadings.
5. Identify and model the uncertainties in the load and in the containment properties.
6. Using the capabilities developed in parts 1 and 4 predict the response and assess the integrity of the containment under postulated internal explosions. Develop an in-depth understanding of the behavior and performance of deterministic sensitivity analyses to the dominant uncertainties.
7. Construct simple, but accurate mechanical models to replace the sophisticated models in part 6, and use these models in a probabilistic analysis of containment behavior under strong internal explosions.
8. Coordinate the work being performed for this contract with the NRC-sponsored effort at Sandia Laboratories, entitled "Containment Safety Margins," FIN A1249. The coordination will include: preparation and presentation at Sandia Laboratories (Albuquerque, NM) of briefings on results generated at MIT, review and comment on Containment Safety Margins reports generated by Sandia Laboratories.
9. Prepare a final report.

- (b) The Principal Investigators expect to devote the following approximate amount(s) of time to the contract work:

M. N. Fardis - 13% and 20% of his time for 1.2 and 1.8 months in academic years 1980-1981 and 1981-1982 respectively. And 50% of his time for 2 summer months.

C. A. Cornell - 3% and 5% of his time for 0.3 and 0.5 months in 1980-1981 and 1981-1982 Academic years respectively, plus 25% of his time for 2 summer months.

ARTICLE A-II WAYS AND MEANS OF PERFORMANCE

- (a) Items for which support will be provided as indicated in A-III, below

(1) Salaries and Wages	\$ 52,200.00
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(2) Equipment to be purchased or fabricated by the Contractor	\$ - 0 -
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(3) Travel	\$ 4,800.00
(i) Domestic	\$

(ii) Foreign	\$ - 0 -
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(4) Other direct costs including fringe benefits

(5) Indirect costs based on a predetermined rate of 68.3 percent applicable to salaries and wages. However, for work performed in accordance with APPENDIX A, Article A-1, paragraph (a) subparagraph 8 indirect costs shall be based on a predetermined rate of 72 percent applicable to salaries and wages, less 55 percent of research assistant wages, plus employee benefits. (Research assistants do not earn employee benefits.)

- (b) Items, if any, significant to the performance of this contract, but excluded from computation of Support Cost and from consideration in proportioning costs:

None

- (c) Time or effort of Principal Investigator(s) including indirect costs and fringe benefits contributed by Contractor but excluded from computation of Support Cost and from consideration in proportioning costs:

None

Article A-III

The total estimated cost of items under A-II(a) above for the contract period stated in this Appendix A is \$125,578.00 ; the Commission will pay 100 percent of the actual costs of these items incurred during the contract period stated in this Appendix A, subject to the provisions of Article III and Article B-XXVIII. The estimated NRC Support Cost for the contract period stated in this Appendix A is \$125,578.00 .

The estimated NRC Support Cost is funded as follows:

- | | |
|---|--------------|
| (a) Estimated unexpended balance from prior period(s) | \$ - 0 - |
| (b) New funds for the current period | \$ 8,208.00 |
| (c) Funds to be provided in FY81 subject to their availability | \$ 13,200.00 |
| (d) The new funds being added in A-III(b) constitute the basis for advance payments provided under Article B-X. | |