

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

THIS AGREEMENT, effective the 1st day of October , 1979, by and between the UNITED STATES OF AMERICA (hereinafter referred to as the "Government"), as represented by the NUCLEAR REGULATORY COMMISSION (hereinafter referred to as the "Commission"), and MASSACHUSETTS INSTITUTE OF TECHNOLOGY existing under the laws of the Massachusetts with its principal office in Cambridge, Massachusetts (hereinafter referred to as the "Contractor"),

WITNESSETH THAT:

WHEREAS, the Commission desires to have the Contractor perform certain research work, as hereinafter provided; and

WHEREAS, this 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, the parties hereto agree as follows:

ARTICLE I - THE RESEARCH TO BE PERFORMED

- (a) The Contractor shall, to the best of its ability, furnish personnel, facilities, equipment, materials, supplies, and services, except such as are furnished by the Government, necessary for the performance of the research provided for in Appendix A hereto, and shall perform the research and report thereon pursuant to the provisions of this contract. It is understood that Appendix A, a guide to the performance of this contract, may be deviated from by the Contractor subject to the specific requirements of this contract.
- (b) This work shall be conducted under the direction of Professor Peter Griffith or such other member of the Contractor's staff as may be mutually satisfactory to the parties.

ARTICLE II - THE PERIOD OF PERFORMANCE

The period of performance under this contract shall commence on October 1, 1979, and expire on September 30, 1980. Performance may be extended for additional periods by the mutual written agreement of the parties.

ARTICLE III - CONSIDERATION

- (a) In full consideration of the Contractor's performance hereunder, the Commission shall furnish the equipment, supplies, materials, and services, if any, listed in Article A-II(b) and pay the Contractor the sum of \$97,894.00, hereinafter called the "Support Ceiling" which sum shall be subject to adjustment as hereinafter provided.
- (b) Payments to the Contractor shall equal the "Cumulative Support Cost" of the performance of this contract, as the term "Cumulative Support Cost" is defined in Article B-XXVIII, provided, however, and notwithstanding any other provisions of this contract, that the Government's monetary liability under this contract shall not exceed the Support Ceiling specified in (a) above. The Commission shall not pay more than the Support Ceiling or an amount equal to the Cumulative Support Cost, whichever is less. The Contractor shall be obligated to perform under this contract throughout the agreed-upon period of performance, and to bear all costs which the Commission has not agreed to pay, provided, however, that the Contractor shall have the right to cease to perform the research provided for in this contract, upon written notice to the Commission to that effect, at any time when or after the Cumulative Support Cost equals or exceeds the Support Ceiling.
- (c) The Support Ceiling specified in (a) above may be increased unilaterally by the Commission by written notice to the Contractor and may be increased or decreased by written agreement of the parties (whether or not by formal modification to this contract). In the event the stated period of contract performance is extended, the Support Ceiling will be revised to reflect any increased Commission support for the extended period or periods.
- (d) Upon termination, or expiration of the total period of performance, the Contractor shall promptly refund to the Commission (or make such disposition as the Commission may in writing direct) any sums paid by the Commission to the Contractor under this contract, in excess of the Cumulative Support Cost incurred in performance under this contract.

ARTICLE IV - GOVERNMENT PROPERTY

The following items of property procured or fabricated by the Contractor are hereby listed as "Government property":

NONE

ARTICLE V - APPENDICES

Appendix A, Appendix B - General Provisions and Appendix C - Statement of Costs, are hereby attached to and made a part of this contract.

ARTICLE VI - NONDISCRIMINATION

The Contractor agrees to comply with the Commission's Regulation (Part 4 of Title 10, Chapter 1, Code of Federal Regulations), as amended, effectuating the provisions of Title VI of the Civil Rights Act of 1964, and Title IV of the Energy Reorganization Act of 1974, as amended.

ARTICLE VII - CONFLICT OF INTEREST

The Contractor agrees to adopt policies and procedures, designed to avoid conflict-of-interest situations, which are in substantial conformance with the Joint Statement of the Council of American Association of University Professors and the American Council on Education of December 1964, entitled "On Preventing Conflicts of Interest in Government-Sponsored Research at Universities", which policies and procedures will be in connection with this contract.

ARTICLE VIII - ALTERATIONS

- a. Article B-XXII, Priorities, Allocations, and Allotments, of Appendix B is deleted in its entirety.
- b. In accordance with FPR Temporary Regulation No. 39, Article B-XXVII, Listings of Employment Openings, of Appendix B is deleted in its entirety and inserted in lieu thereof is the attached Article B-XXVII, Disabled Veterans and Veterans of the Vietnam Era.
- c. Article B-XXXII, Employment of the Handicapped, of Appendix B is deleted in its entirety and inserted in lieu thereof is the attached Article B-XXXII, Employment of the Handicapped.
- d. The attached Article B-XXXIII, Preference for U. S. Flag Air Carriers, is added to Appendix B.
- e. The attached Article B-XXXIV, Clean Air and Water, is added to Appendix B.

IN WITNESS WHEREOF, the parties have executed this document.

UNITED STATES OF AMERICA

BY: Kellogg V. Morton
Kellogg V. Morton, Chief
Research Contracts Branch
(title)

Nuclear Regulatory Commission

BY: George A. Dwyer
George A. Dwyer
Director Office of Sponsored Programs
(title)

Massachusetts Institute of Technology

APPROVED
[Signature]

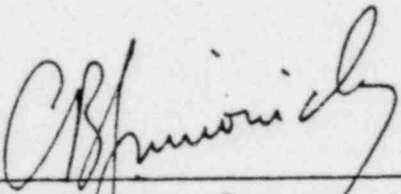
I, C. B. Simonidas, certify that I am the
(attester)
Secretary of the Executive
Committee of the Corporation of the Contractor named
(title)

under this document; that George H. Dummer
(signatory)

who signed this document on behalf of said Contractor was then
DIRECTOR, OFFICE OF SPONSORED PROGRAMS of said Contractor; that
(title)

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.



C. B. Simonidas Secretary of the Executive
Committee of the Corporation

(SEAL)

(seal)

CONTRACTOR: MASSACHUSETTS INSTITUTE OF TECHNOLOGY

APPENDIX A

For the Contract period October 1, 1979, through September 30, 1980:

Article A-I, RESEARCH TO BE PERFORMED BY THE CONTRACTOR:

- (a) The unclassified scope of work under this contract entitled, "Steam Generator Modeling During Reflood Stage of a LOCA" is as follows:

Steam Generator Modeling During the Reflood Stage of a Loss of Coolant Accident (Der Yu Hsia)
Air-Water experiments showing the effects of inlet plenum geometry and tube length on phase distribution will be completed. An analysis will be developed and recommendations made for calculating steam generator performance during a large LOCA. A report will be delivered in the summer.

Modes of Circulation in an Inverted U Tube Array During Condensation - (C Calia) -

A four tube glass condenser will be built, run and analyzed to provide information on when blockage occurs in the condenser and what the effect on the pressure drop and heat transfer will be. Recommendations for calculating a steam generator during a small break LOCA (when it serves as a heat sink) will be made. A report will be completed in the summer

Upper Plenum Dump During Reflood-Y. Sudo.

A screen core apparatus will be built and tested in order to determine how the liquid makes it from the upper to the lower plenum during refill and reflood in a large break LOCA. Tests with a variety of temperature and pressure boundary conditions will be run. Recommendations will be made and a report delivered by 1 October 1980

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

30% of his time during the nine (9) month academic year, plus one (1) month full time during the two (2) month summer period.

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 | \$ 50,514.00 |
| (2) Equipment to be purchased or fabricated by the Contractor | \$ 7,200.00 |

Under \$1,000.

Flow meter for steam	\$400.
Heaters	\$400.
Plastic Sheet	\$200.
Gage Glasses for natural circulation apparatus	\$400.

Over \$1,000.

Flow meters for high and low flow	\$1,200.
Copper and stainless steel pipe and fittings	\$2,000.
Thermocouple wire, dexion, plywood, wood, photographic film	\$2,600.

- | | |
|--------------|--------|
| (3) Travel | |
| (i) Domestic | \$ -0- |
| (ii) Foreign | \$ -0- |

(4) Other direct costs including employee benefits

(5) Indirect costs based on a predetermined rate of 68.3 percent applicable to Salaries and Wages minus one-half Research Assistant(s) wages plus employee benefits (Research Assistant(s) 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 \$ 97,894.00 ; 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 \$ 97,894.00 .

The estimated NRC Support Cost is funded as follows:

- | | |
|---|---------------------|
| (a) Estimated unexpended balance from prior period(s) | \$ <u>-0-</u> |
| (b) New funds for the current period | \$ <u>97,894.00</u> |
| (c) The new funds being added in A-III(b) constitute the basis for advance payments provided under Article B-X. | |