

SUPPLEMENTAL AGREEMENT  
BETWEEN  
NORTHWESTERN UNIVERSITY

AND  
THE U. S. NUCLEAR REGULATORY COMMISSION

THIS SUPPLEMENTAL AGREEMENT, effective the 1st day of March , 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 NORTHWESTERN UNIVERSITY

(hereinafter referred to as the "Contractor"),

WITNESSETH THAT:

WHEREAS, the parties desire to modify Contract No. NRC-04-77-052 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, provides for the research to be performed by the Contractor during the contract period specified therein.
2. In Article II - The Period of Performance, the date "December 15, 1980" is substituted for the date "February 29, 1980".
3. In Article III - Consideration, the sum "\$441,944.00" is substituted for the sum "\$371,944.00".

IN WITNESS WHEREOF, the parties have executed this document.

UNITED STATES OF AMERICA

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

NORTHWESTERN UNIVERSITY

BY: *David Mintzer*  
DAVID MINTZER  
VICE PRESIDENT FOR RESEARCH  
(title) and DEAN OF SCIENCE

I, James M. Perry, certify that I am the  
(attester)

Assistant Secretary of the Contractor named under this  
(title)

document; that DAVID MINTZER who signed this  
(signatory)

document on behalf of said Contractor was then VICE PRESIDENT FOR RESEARCH  
and DEAN OF SCIENCE

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.

*James M. Perry*  
Assistant Secretary

(SEAL)

CONTRACTOR: NORTHWESTERN UNIVERSITY

APPENDIX A

For the Contract period March 1, 1980 through December 15, 1980

Article A-I RESEARCH TO BE PERFORMED BY CONTRACTOR

(a) The unclassified Scope of Work under this contract entitled, "STEAM-WATER INTERFACIAL TRANSPORT" is as follows:

1. Complete the perforated plate investigation by studying: (1) the effect of water nozzle direction and diameter on the end of complete bypass (EOCB), varying water temperature (12-50C) and elevation above plate (scaled to reactor); and (2) propagation effects on EOCB due to jet penetration of a single hole.
2. Complete the Vertical Countercurrent Flow work by installing additional instrumentation and assessing the current data base for local condensation rates. Additional instruments should include heated pitot tubes, pressure taps, differential pressure cells and impedance probes.
3. Complete the Horizontal Concurrent Flow work by investigating the onset of bridging and condensation shocks.

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

- S. G. Bankoff: 100% of his time for 1 summer month
- R. S. Tankin: 100% of his time for 2 summer months
- M. C. Yuen: 100% of his time for 1 summer month

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   | \$ 29,822.00 |
| (2) Equipment to be purchased or fabricated by the Contractor                                    | \$ - 0 -     |
|  |              |
| (3) Travel   |              |
| (i) Domestic   | \$ 1,000.00  |
| (ii) Foreign   | \$ - 0 -     |
|  |              |
| (4) Other direct costs including employee benefits.  |              |
|  |              |
| (5) Indirect costs based on a predetermined rate of 77 percent applicable to salaries and wages. |              |

- (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 \$ 70,000.00 ; 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 \$ 70,000.00 .

The estimated NRC Support Cost is funded as follows:

- |   |                     |
|---|---------------------|
| (a) Estimated unexpended balance from prior period(s)   | \$ <u>- 0.00</u>    |
| (b) New funds for the current period  | \$ <u>70,000.00</u> |
| (c) The new funds being added in A-III(b) constitute the basis for advance payments provided under Article B-X. |                     |