

SUPPLEMENTAL AGREEMENT
BETWEEN
WASHINGTON UNIVERSITY
AND
THE U. S. NUCLEAR REGULATORY COMMISSION

THIS SUPPLEMENTAL AGREEMENT, effective the 16th day of January , 1979, 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 WASHINGTON UNIVERSITY (hereinafter referred to as the "Contractor"),

WITNESSETH THAT:

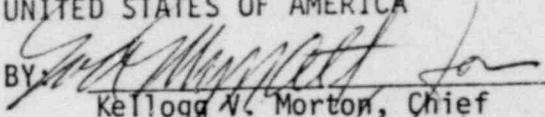
WHEREAS, the parties desire to modify Contract No. NRC-04-78-227 as hereinafter provided, and this supplemental agreement is authorized by law, including the Energy Reorganization Act of 1974, as amended, and the Atomic Energy Act of 1954, as amended.

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 III - Consideration, the sum "\$339,776.00" is substituted for the sum "\$231,776.00".

IN WITNESS WHEREOF, the parties have executed this document.

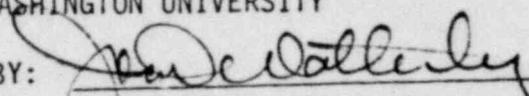
UNITED STATES OF AMERICA

BY: 

Kellogg W. Morton, Chief
Research Contracts Branch
(title)

Nuclear Regulatory Commission

WASHINGTON UNIVERSITY

BY: 

Joan D. Wattenberg
Contract and Grant Administrator
(title)

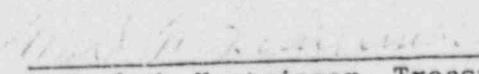
I, Merl M. Huntsinger, certify that I am the
(attester)

Treasurer of the Contractor named
(title)

under this document; that Joan D. Wattenberg
(signatory)

who signed this document on behalf of said Contractor was then
Contract and Grant Administrator 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.


Merl M. Huntsinger, Treasurer

(SEAL)

CONTRACTOR: WASHINGTON UNIVERSITY

APPENDIX A

For the Contract period January 16, 1978 through June 30, 1980

Article A-I RESEARCH TO BE PERFORMED BY CONTRACTOR

- (a) The scope of work under this contract is unclassified and shall be in accordance with Contractor's proposal entitled, "Applications of Tearing Instability Analysis," which is incorporated herein by reference, and includes the following tasks:

TASK 1

DEVELOP OPTIMUM PROCEDURES FOR HOT CELL TESTING AND THE DATA ANALYSIS OF IRRADIATED FRACTURE TOUGHNESS SPECIMENS TO OBTAIN J-R CURVES AND T-MATERIAL VALUES FOR THE PURPOSE OF ASSESSING FRACTURE TOUGHNESS USING A SINGLE SPECIMEN. COMPARE THE RESULTS OF THESE PROCEDURES WITH SIMILAR DATA, BOTH FROM MULTIPLE SPECIMEN TESTS USING HEAT TINTING AND FROM UNLOADING COMPLIANCE TESTS. IN ALL TESTS, EXPLORE THE EFFECTS OF FACE GROOVING RELATIVE TO CRACK FRONT CURVATURE EFFECTS.

TASK 2

DEVELOP THE ANALYSIS METHODOLOGY REQUIRED TO APPLY THE DATA FROM THE HSST TESTS ON IRRADIATED LOW DUCTILE SHELF WELD MATERIAL AND ON CURRENT AND FUTURE SURVEILLANCE TESTS TO SAFETY ANALYSES OF FULL-SIZED STRUCTURAL COMPONENTS. INITIATE THE DEVELOPMENT OF REFINED ANALYSIS METHODOLOGY FOR FUTURE SURVEILLANCE PROGRAMS. COMPLETE THE EVALUATION OF THE TEARING INSTABILITY METHODOLOGY FOR APPLICATION TO SAFETY ANALYSES.

TASK 3

DETERMINE THE PROPER DEFINITION OF DJ, FIRST FOR SMALL AMOUNTS OF CRACK GROWTH, THEN FOR LARGE AMOUNTS OF CRACK GROWTH, AND FINALLY, FOR VESSEL CONDITIONS, MEANING PREDOMINANTLY ELASTIC SUPPORT FOR BOTH SMALL AND LARGE CRACK GROWTH. PERFORM ANALYSES AND DETAILED CRITICAL EXPERIMENTS REQUIRED TO SUPPORT THE DEVELOPED DEFINITION.

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

Professor Paul C. Paris - 20% of his time for 2 years

ARTICLE A-II WAYS AND MEANS OF PERFORMANCE

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

(1) Salary and Wages \$ 88,872.00

(2) Equipment to be purchased or fabricated by the Contractor, including testing costs \$ 77,465.00

Basic 110 Kip MTS Testing System

(3) Travel (i) Domestic \$ 15,000.00

(ii) Foreign \$ -0-

(4) Other direct costs

(5) Indirect costs based on a predetermined rate of 79 percent applicable to salaries and wages for the period 1/16/78 through 6/30/78 and 77 percent for the period 7/1/78 through 1/15/80.

- (b) Items, if any, significant to the performance of this contract, but excluded from computation of Support Cost and from consideration in proportioning costs: Hydraulic Power Systems, electrical connections and cooling water connections for the MTS Testing System (\$25,000) and laboratory space.

- (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 \$339,776.00 ; 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 \$ 339,776.00 .

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>108,000.00</u> |
| (c) The new funds being added in A-III(b) constitute the basis for advance payments provided under Article B-X. | |