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Reviewer:  
D. L. Aaron  
2/4/94

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PROJECT AGREEMENT NO. 2

to

APPENDIX B

to

SUBCONTRACT 212

between

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

and

MONSANTO RESEARCH CORPORATION

Pursuant to APPENDIX B to Subcontract 212 between The Regents of the University of California, (hereinafter called the "University") and Monsanto Research Corporation, (hereinafter called the "Subcontractor"), the University and Subcontractor have on this 1st day of October, 1962, entered into this Project Agreement No. 2 which is subject to all applicable provisions of such Subcontract and to the more detailed supplementary provisions as set forth below. In accordance with ARTICLE VII - CHANGES, The Business Manager of the University of California Lawrence Radiation Laboratory may direct, in writing, changes in the scope of work set forth in this Project Agreement.

I - GENERAL SCOPE OF WORK

As approved by the University's Technical Coordinator, Subcontractor shall, on a best efforts basis, apply approximately 2,750 man hours of technical effort toward the development of a complete adhesive system for the joining of shaped parts of uranium metal and of thorium metal. In this effort, the Subcontractor will investigate organic chelating primers, development of a compatible adhesive, methods of sealing the adhesive joined edge, and development of a practical process for applying and curing the adhesive.

II - TECHNICAL SCOPE OF WORK

A. Adhesive Property Requirements

Subcontractor will endeavor to develop an adhesive system

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having the following properties:

1. Initial tensile shear strength of 2,000 pounds per square inch or higher.
2. The tensile shear strength should not fall below 1,000 pounds per square inch during a period four years after application.
3. A pot life of one to four hours.
4. Capable of being applied by production line techniques.
5. Capable of being cured at temperatures as close to room temperature as possible.

B. Development of Adhesive System

In the development of the adhesive system, Subcontractor will devote research effort to the following areas. To facilitate this effort, the University will furnish Subcontractor a bibliography of uranium bonding from Atomic Energy Commission classified files:

1. Development of Organic Chelating Primers
  - a. Based on a search of available literature, select the most promising chelating groups for use with uranium and thorium.
  - b. Experimentally determine the effectiveness of these organic agents in preventing corrosion on slightly oxidized and freshly cleaned uranium and thorium specimens.
  - c. Prepare and evaluate compounds containing the most successful chelating groups and polymerizing groups which will react chemically with the proposed adhesive to improve the bond between the organic primer and the adhesive.
2. Development of Adhesive
  - a. Evaluate the compatibility of the chelating treatment with the best commercial metal adhesives, such as the epoxy types.

- b. Develop and evaluate at least one rigid and one -  
rubbery, low-polarity, reactive, vinyl-type ad-  
hesive having low moisture and oxygen transmit-  
ting properties.
- c. Determine the effect of drying and deoxygenizing  
the adhesive by successive evacuation and purging  
with a small molecule, such as hydrogen or helium.
- d. Investigate the effects of incorporating oxygen-  
scavenging and antioxidant material into the ad-  
hesive formulation.

### 3. Adhesive Bond Edge Sealing

Evaluate the effectiveness of sealing the outside edge  
of the metal to metal bond with polymer films possessing  
low oxygen and water transmitting qualities.

#### C. Develop a Practical Process for Applying and Curing the Adhesive

The adhesive should be capable of being applied by produc-  
tive type techniques and should be capable of being cured  
at room temperature or slightly higher temperatures.

#### D. Testing of Adhesive Systems

- 1. Bond in simple lap joints and age depleted uranium and  
thorium test strips.
- 2. Test the bonds between the test strips for tensile  
shear strength at 65°F, 72°F, and 165°F.

### III - MATERIALS

The Subcontractor will procure depleted uranium of an unclassi-  
fied assay for use under this Project Agreement.

### IV - SCHEDULE AND DELIVERY

Work under this agreement shall commence October 1, 1962, and  
continue for a period of approximately 12 months. All work shall be  
completed and all reports shall be submitted no later than September 30, 1963.

V - TERM, ESTIMATES, FIXED FEE, COSTS AND EXPENSES

In accordance with ARTICLE II - TERM, ARTICLE III - ESTIMATES AND FIXED FEE, and APPENDIX A - COSTS AND EXPENSES OF SUBCONTRACT 212, the Subcontractor shall be reimbursed in an amount not to exceed Thirty Eight Thousand Seven Hundred Sixty and no/100 (\$38,760.00) Dollars, which shall include the Subcontractor's fixed fee of Two Thousand Five Hundred Thirty Three and no/100 (\$2,533.00) Dollars for services rendered by Subcontractor from October 1, 1962, through September 30, 1963.

VI - ASSIGNMENT OF PERSONNEL

It is understood and agreed that Subcontractor's key technical personnel assigned to work under this Project Agreement will not be re-assigned or replaced without prior University approval, except where such instances are beyond the control of the Subcontractor. Subcontractor shall not assign replacement or substitute key personnel without prior University approval.

VII - COORDINATION AND ADMINISTRATION

- A. The Contract Administrator for the University is Mr. C. L. Blue, his designee or successor. All matters regarding administration of this Subcontract and interpretations thereof shall be conducted through the Contract Administrator.
- B. The Technical Coordinator for the University and within this scope of work is Mr. L. E. Peck, his designee or successor.
- C. The Subcontractor's Technical Coordinator for this scope of work is Mr. I. O. Salyer.

VIII - REPORTS

The Subcontractor will supply the University with technical reports in a form and format acceptable to the University's Technical Coordinator, and financial reports in a form and format acceptable to the Contract Administrator.

A. Progress Reports

The Subcontractor shall prepare and submit by the 15th of each month, progress reports describing work performed

during the previous month.

B. Financial Reports

Subcontractor will submit monthly expenditure analysis reports which shall confirm and/or explain actual cost expenses.

C. Comprehensive Progress Reports

At six month intervals and at the conclusion of work under this Project Agreement, the Subcontractor shall prepare and submit within 30 days reports containing a comprehensive summary of the findings and results of research conducted under this Project Agreement.

D. Distribution of Reports

Formal reports shall be distributed as follows:

Mailing Address: University of California  
Lawrence Radiation Laboratory  
P. O. Box 808  
Livermore, California

Number of Copies:

1	Director's Office, Bldg. 112, Rm. 1041
1	Business Office, Bldg. 161, Rm. 1113
4	Technical Information(only technical reports) Bldg. 112, Room 1067
1	R. Adelman, Bldg. 112, Room 3044
6	L. E. Peck, Bldg. 102, Room 1235
1	B. Rubin, Bldg. 102, Room 1242A

E. Interim Reports

It is understood that from time to time, there will be other information exchanged between the parties. These data may be exchanged directly between the parties concerned. Formal report form and distribution is not required in these instances.

VIII - SECURITY

The University may furnish Subcontractor documents which may be classified up to Secret Restricted Data to facilitate work under

PA #2  
SC 212

September 11, 1962

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this Project Agreement. The work, documents and materials generated under this Project Agreement shall be unclassified.

IX - SHIPMENT OF MATERIALS

Any materials furnished the University under this Project Agreement will be shipped to the following address:

University of California  
Lawrence Radiation Laboratory  
End of East Avenue  
Livermore, California  
Attn: L. E. Peck

Subcontract 212  
Project Agreement No.

ACCEPTED:

MONSANTO RESEARCH CORPORATION

By J. H. K. Nason  
Title President  
Date SEP 18 1962

AUTHORIZED:

UNIVERSITY OF CALIFORNIA  
LAWRENCE RADIATION LABORATORY

By W. B. Reynolds  
Title W. B. Reynolds, Business Manager  
Date OCT 3 1962