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TITLE

COPRODUCT DEMONSTRATION LOAD

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3/6/96

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Approved By:

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June 13, 1966

This document

Classified by: *W. A. Blanton*

U. S. Atomic Energy Commission
Richland Operations Office
Richland, Washington 99350

Attention: O. W. Rathbun, Chief
Metallurgical Operations Branch
Production Reactor Division

cc: OC Schroeder
WA Blanton
RW Reid
LE Rice
JT Stringer
DUN Doc. Control
WMM/LE

Gentlemen:

COPRODUCT DEMONSTRATION LOAD

Douglas United Nuclear is planning an irradiation program to demonstrate the capability to produce weapons-grade plutonium and tritium in a 210-fuel lithium target loading. A block of 210-fuel and lithium target elements will be irradiated in a K reactor, and our target date for beginning the irradiation is in November, 1966. The target elements for this irradiation are to be fabricated from both lithium-aluminum alloy and from lithium aluminate. We have alloy of the proper composition in inventory, however it is not of the right size. For this irradiation the cores are to be solid pieces 1.510 inch in diameter and 8.600 inches long. The rod we have on site is hollow and has an outside diameter of 1.410 inches. The cost of remelting and extruding the rod at Hanford would be approximately two to three times the price we have paid in the past for rod received from the Savannah River Project.

Please make all of the necessary arrangements to have a minimum of 210 pounds of lithium aluminate and 175 feet of lithium-aluminum rod conforming with the attached specifications delivered at Richland by September 1, 1966.

Very truly yours,

DOUGLAS UNITED NUCLEAR, INC.

Ann Matter
Manager, Production Fuels

WMM:rh

Enclosure

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SPECIFICATIONS FOR LITHIUM ALUMINATE

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1. Total Lithium Content - 9.7 to 10.2 wt percent
(21 to 22 wt percent Li_2O) on a
sample basis after subtracting the LOI.
2. Li-6 Content - 17.60 to 18.40 atomic percent on a lithium basis.
3. Loss-on-ignition - 2 percent maximum at 800C
4. Particle Size

<u>U.S. Sieve Rating</u>	<u>Wt Percent</u>
- 60 mesh	100 minimum
- 100 mesh	80 minimum
5. Phase - The process conditions shall be such as to ensure that
at least 75 percent of the material is in the gamma
(high temperature) phase.
6. Impurities - The following impurity limits shall not be exceeded.

<u>Element</u>	<u>ppm</u>
Antimony	30
Boron	10
Cadmium	10
Carbon	5000
Chromium	200
Cobalt	10
Copper	200
Fluorine	25
Iron	500
Silicon	250
Sulphur	500
Zinc	275
Zirconium	200
Manganese	50
7. The vendor shall supply complete analyses, except for the lithium 6 content,
on each batch of lithium aluminate.

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SPECIFICATION FOR LITHIUM - ALUMINUM ROD

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1. Total Lithium Content - 3.1 ± 0.35 wt percent.
2. Lithium - 6 Content - 44.3 atomic percent on a lithium basis.
3. Rod Dimensions

- a. Rod sections 73.1 ± 0.5 inches in length.
Shorter sections will be acceptable in the following lengths:

- (1) 64.3 ± 0.5 inches
- (2) 55.6 ± 0.5 inches
- (3) 47.0 ± 0.5 inches
- (4) 38.2 ± 0.5 inches
- (5) 29.5 ± 0.5 inches
- (6) 20.8 ± 0.5 inches

- b. The diameter shall be $1.550" \pm 0.005"$
- c. Following extrusion the rods shall be roller straightened to a maximum warp of 7 mils per foot.
- d. The surface of the finished rods shall be free from marks, gouges, or pits deeper than 10 mils, and inclusions, nonfills, or spalls greater than $1/16" \times 1/4"$ in surface area by 10 mils in depth.
The ends of the rods shall be free of extrusion pipes.

4. Analysis and Identification

- a. The fabricator shall supply complete analyses of ingot samples taken from each casting heat.
- b. The heat number shall be stamped on the end of each rod for lotting and control purposes.

5. Purity

The impurities in the alloy shall not exceed the following limits:

<u>Element</u>	<u>Maximum Concentration</u>
Boron	2 ppm
Cadmium	2 ppm
Chromium	200 ppm
Cobalt	10 ppm
Copper	200 ppm
Iron	500 ppm
Manganese	50 ppm

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