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2.1 E-N DEMONSTRATION LOAD

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FINAL DETERMINATION
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DECLASSIFICATION CONFIRMED
BY [redacted] DATE
BY [redacted] DATE 10/3/95
RT Powell 10/11/95 LK Rice 10-11-95

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2.1 E-N DEMONSTRATION LOAD

by:

L. H. Rice
Fuels Engineering Subsection
Research & Engineering Section - DUN

May 24, 1967

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TO J. T. Stringer, Manager
Manufacturing Engineering Subsection
Production Fuels Section

FROM L. H. Rice, Supervisor
Product Engineering Unit
Fuels Engineering Subsection - R&E

SUBJECT 2.1 E-N DEMONSTRATION LOAD

In preparation for the full core 2.1 E-N load tentatively scheduled for charging in a K Reactor in July 1968, a technical document is being prepared which will serve as a basis for presentations at AEC Headquarters around the middle of next month. This document is to include a comparison of the material and fabrication costs of Li-Al and $LiAlO_2$ target elements and a discussion of the procurement problems that may be encountered, both of which are to be prepared by people in your organization. The most probable loading pattern is with the targets and drivers in separate tubes, in which case we will use solid targets, and your estimates should be directed principally toward this case. However, there is the possibility that we will use striped loads which will require an I&E Li-Al or $LiAlO_2$ target. The design of an I&E $LiAlO_2$ target is not sufficiently firm to provide a basis for estimating; however, we should have an estimate of the cost penalty of using I&E rather than solid Li-Al targets. The relative cost comparisons should be valid for a continuing program as well as for this specific demonstration.

One item that should not be overlooked is the net cost of fabricating the uranium drivers (excluding costs for criticality control which are being developed by a group headed by Austin Hardin). There will be costs incurred in components, sleeves, tooling, etc., and at the same time there will be a substantial savings due to a reduction in the number of standard fuels produced.

The load will require charging of around 15,600 lithium-bearing targets and 62,600 2.1 enriched drivers, and the targets and drivers will displace 132,000 standard elements that would normally be charged in a K Reactor during the period of the demonstration load. The driver element will be very close to the KX (2.1) design already established (drawing number H-3-7350 Rev. 15), and the tentative design and specifications for the Li-Al and $LiAlO_2$ targets are attached. The target designs are not firm, but any changes should not be of a nature that will substantially effect the fabrication costs or procurement problems. Please identify any items in the

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specifications that, if revised, would have a significant effect on costs. We are currently working on these designs and should have better ones in two weeks. Your contributions would be appreciated by June 5.

Please call on us for assistance whenever we can help.

LHR:scc

Attachment

TENTATIVE SPECIFICATIONS - LITHIUM-BEARING TARGETS

1. Cladding - C-64 Alloy

2. Core Material

	Li-Al		$LiAlO_2$	
	Min.	Max.	Min.	Max.
w/o Li	2.75	3.45	9.7	10.2
a/o Li-6 (Li Basis)	44.3	Nom.	17.0	19.0
Density			1.94	2.16
Hydrogen - Vol.%		6		
Water - ppm				50
Boron - ppm		2		2
Cadmium - ppm		2		2
Chromium - ppm		200		200
Cobalt - ppm		10		10
Copper - ppm		200		200
Fluorine - ppm				25
Iron - ppm		500		500
Manganese		50		50

3. Target Dimensions

	Solid Li-Al(1)	I&E Li-Al(1)	Solid $LiAlO_2$
	Dwg. H-3-27060		
Element Length		8.822 ± .070	8.885 ± .075
Cap Thickness		0.160 min.	0.200 ± .010
Base Thickness		0.175 ± .020	0.175 ± .020
Element O.D.		1.593 ± .008	1.600 ± .003
Element I.D.		0.437 ± .005	---
Core O.D.		1.503 ± .002	1.390 ± .002
Core I.D.		0.527 ± .002	0.800 ± .015
Core Length		8.397 ± .010	8.398 ± .025
Axial Gap		None	0.112 ± .025
Can Wall Thickness		0.045 ± .005	0.100 ± .007
Minimum Support Height		0.038	0.038
Maximum Projected Diameter		1.700	1.700

(1) Li-Al targets require sizing