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Contract Number AT-33-1-GEN-53

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W. M. Harding,
Laboratory Director

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NEUTRON SOURCE PROGRESS REPORT

**SPECIAL REREVIEW
FINAL DETERMINATION**

Classification:

Category:

Signature:

Date: 2/17/80

Date: 2/17/80

Date: December 1-31, 1948

Prepared by: John L. Richmond

Distributed:

MASTER

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NEUTRON SOURCE GROUP

L. L. Bentz, J. H. Birden, M. R. Hertz, J. L. Richmond, W. J. Schrantz,
and R. W. Watrous

<u>General Problem</u>	<u>Specific Problem</u>	<u>Man-Months</u>	<u>Job Classification</u>
All Problems (Group Leader)		1	202
I. Study of Production Methods	A. Postum-Beryllium Neutron Sources	2	205-C
	B. Postum-Fluoborate Neutron Sources	1	205-C
	C. Postum-Liquid Neutron Sources	1	205-C
II. Engineering Study of Dryboxing and Shielding	Design of Remote Controls	1	206-C
III. Neutron Counting		0	

ABSTRACT

I-A. Postum-Beryllium Neutron Sources

An immersion alpha counting tube has been assembled which has a plateau at 1850-2050 volts. It has been tested with a solution containing 0.1 case per milliliter and found to retain a low background.

I-B. Postum-Fluoborate Neutron Sources

A sodium fluoborate-sodium fluoberyllate neutron source of 67 cases was prepared and shipped to Los Alamos.

DETAILED REPORT

I-A. Immersion Alpha Counter

Metal parts for ten tubes have been made and a fourth tube has been assembled. Initial counts indicate a 200 volt plateau starting at 1850 volts with a dry alpha sample and a 100 volt plateau starting at 1950 volts with a

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liquid alpha sample. The background of the tube was easily maintained at less than 25 c./min. after a 6 N hydrochloric acid solution containing about 0.1 c./ml. had been counted. Various tests show that the tube is operating in the Geiger region and not in the proportional region as desired.

I-B. Postum-Fluoborate Neutron Sources

An order for a seventy case mock fission neutron source was filled. The source was prepared in an apparatus similar to the apparatus used in preparing neutron source PB-123, Figure 1, Neutron Source Progress Report, MLM-220, October 1-31, 1948. A slight modification of the apparatus consisted of a small platinum tube, inserted through the formica cover over the top of the apparatus, to transfer the postum-hydrofluoric acid to the platinum source can without removing the ground glass joint. The platinum tube outside the apparatus was connected to a platinum funnel by Tygon tubing. The postum on the platinum gauzes was dissolved in 48 per cent hydrofluoric acid. Additions and evaporations were made until all the postum has been transferred. During the evaporation, the system was operated around 305 mm. pressure with the temperature of the evaporating vessel and dry nitrogen entering the system being held around 80°C. When all the activity had been added, the source container was calorimetered. The calorimeter value was 78.99 c. December 10, 1948. The source can was replaced in the apparatus and the sides were washed down with 48 per cent hydrofluoric acid to concentrate all the postum on the bottom. Several additions and evaporations were made in this manner to further concentrate the postum. Then 0.85 grams $\text{NaBF}_4\text{-Na}_2\text{BeF}_4$ were added to the source can. Several additions of 48 per cent hydrofluoric acid and evaporations were made to help make a more homogeneous mixture. The source was dried under reduced pressure over the week-end. The source was tamped and cut off with a metal tubing cutter. The platinum can was then transferred to the nickel coating apparatus for sealing. Then it was transferred to the beryllium spheres and coated with about 0.010 inch of nickel.

Data on Neutron Source PB-110 - 66.972 c. December 14, 1948

<u>Date</u>	<u>Compared with Std. 49</u>	<u>Compared with AL-1</u>	<u>Efficiency</u>
12/14	1.263×10^7 n./sec.	1.639×10^7 n./sec.	57%
12/15*	1.322×10^7 n./sec.	1.647×10^7 n./sec.	58%

* Source was permitted to heat up in vacuum overnight for better distribution.

The source was shipped to Los Alamos December 16, 1948.

II and III

Nothing to report.

JLR/eat

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