UNCLASSIFIED

THIS DOCUMENT CONSISTS OF 6 PAGES
THIS IS COPY 14 OF 14a

DATE 8/4/49 INITIALS J.F.E.

MLM-360

Classification changed to Unclassified by authority of Paul B. Dowd by Paul B. Dowd 9-23-70
Reviewed by Paul Dowd 8-9-79

Contract Number AT-33-1-GEN-53

MOUND LABORATORY

Operated By

MONSANTO CHEMICAL COMPANY

MIAMISBURG, OHIO

RECEIVED
APR 16 1996
OSTI

M. M. Haring
Laboratory Director

This document is
PUBLICLY RELEASABLE
C M Davenport/OSTI
Authorizing Official
Date: 6/26/69

NEUT ON COUNTING RESEARCH PROGRESS REPORT

[redacted]

This document contains information affecting [redacted] transmission of the distribution of its contents in [redacted] under 1946 Title Federal Laws. [redacted] restricted data as defined [redacted]

[redacted]

[redacted] Manner To An [redacted] Prohibited.

Date: May 1-31, 1949

Prepared by: J. F. Eichelberger

Distributed: AUG [illegible]

UNCLASSIFIED

UNCLASSIFIED

DISTRIBUTION

1. - F. M. Haring
2. - L. J. Burbage
3. - Los Alamos
4. - Los Alamos
5. - Area Manager
6. - Area Manager
7. - Area Manager
8. - R. A. Standforth
9. - J. F. Eichelberger
10. - R. L. Chaplin, Jr.
11. - Central Files
12. - Central Files
13. - Central Files
14. - Central Files

UNCLASSIFIED

UNCLASSIFIED

TABLE OF CONTENTS

	Page
PERSONNEL	4
ABSTRACT	4
DETAILED REPORT	4
AIb2EI - Operating Characteristics of the Hanson Neutron Counter	4
EIalBIe - Lead-Attenuator, Revolving-Source, Gamma Chamber	5

TITLE DISTRIBUTION

Code	A-202	S-204-P	S-205-P	S-206-P
AIb2EI				3
EIalBIe				0

UNCLASSIFIED

UNCLASSIFIED

NEUTRON COUNTING RESEARCH

Subgroup of General Physical Research, Group 5

R. L. Chaplin, Jr., T. T. Davenport, and T. H. Ryles

ABSTRACT

AIb2EI - Operating Characteristics of the Hanson Neutron Counter

1. The distribution of thermal neutrons entering the B-wall tube has been determined by the use of cadmium shielding about the tube. The distribution is greatest at the face adjacent to the source.

2. It is believed possible that the cadmium may act as a sink toward the flux near the source.

3. The counting efficiency along the axis has been determined for B-wall tube, D-290. Depletion of the boron in the wall may lead to inequalities not present in gas filled tubes.

4. Plateaus and stability were determined for four new, prototype, B-wall tubes from General Electric and were compared with five old B-wall tubes.

5. Rotating the B-wall tube did not affect the counting rate of sections of the tube. This may be a result of poor experimental technique.

BIalBIe - Lead-Attenuator, Revolving-Source Gamma Chamber

No progress.

DETAILED REPORT

AIb2EI - Operating Characteristics of the Hanson Neutron Counter

A study has begun on the configuration of the neutrons responsible for the recorded counts within our cylindrical paraffin moderator. Such a determination would aid in redesigning to reduce the dependency of the moderator on the source spectra. If a large concentration of neutrons occurs at a small area along the boron-tube axis, it seems probable that this portion of the tube will become saturated with the positive ions that are created and the efficiency of the tube will decrease for large sources. Since it is a complex

UNCLASSIFIED

problem to study the neutron distribution for a medium containing various materials of odd geometrical shapes, the experimental approach of knowing the change in distribution as the parameters are varied should prove more satisfactory.

By using cadmium shielding and by making the proper corrections, it is possible to obtain the counting rate of a definite section along the boron-tube's axis. The results of cadmium shielding showed that the distribution is greatest at the paraffin face at which the source is placed. The flux magnitude of these thermal incident neutrons has not been determined accurately enough as the proper corrections are being determined. There has been a revision of the method of measurement of this flux as it is believed possible for the cadmium near the source to present a sink, and therefore a decrease of the flux away from the source. Such effects are still under investigation, and the extent of these corrections for our particular type sources and for the experimental arrangement adopted will be considered in the final method employed for this measurement.

One of the corrections necessary will involve the efficiency of a boron tube along the axis. The following response curve, Figure 1, was determined for this purpose. It gives the counting rate for a three-quarter section of the tube immediately below the responsible section. It can be observed how the counting rate for the end sections of the tube is greatly reduced because of the limited length of the anode and because of interference of the Kovar seal. This effect is reported to be remedied somewhat in tubes recently built, however we have not tested any new tube's efficiency along its axis. The great variation of counting rate for the central section of the tube is attributed to the variable amount of boron remaining on the cylinder wall. Since this tube has been used considerably in the past, the reaction, B^{10} (n,α) Li^7, has occurred most frequently at the end of the tube closest to the source. This effect should be one of the factors that determine the life of a B-wall tube whenever it is required that the moderator enclosing the tube should supply a flat energy response. The use of gas BF_3 tube however, should eliminate such difficulties.

A study was made of the plateaus and stability of five old B-wall tubes and also of four new prototypes to be produced by the General Electric Company.

A study was made to determine the effect of rotating the B-wall tube on the counting rate of a small section of the tube, all but the sensitive section being covered with cadmium. The source was centered on the side of the cylindrical paraffin moderator. No results were obtained because of poor mechanical arrangement.

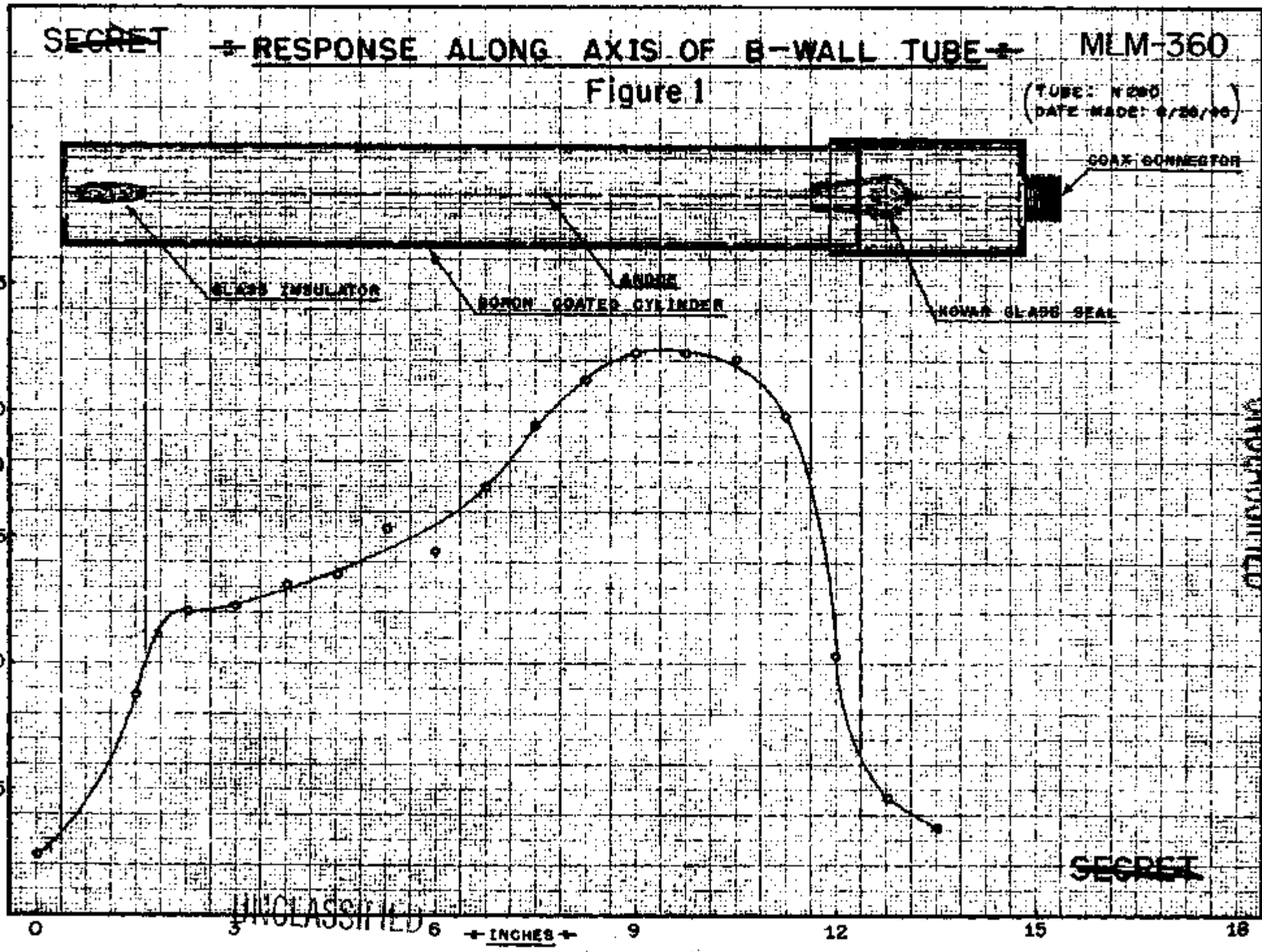
BTalBIe - Lead-Attenuator, Revolving-Source, Gamma Chamber

No progress.

JFE/pjr

UNCLASSIFIED

UNCLASSIFIED



UNCLASSIFIED