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Walter J. Williams, Director of Production May 6, 1949
Washington
J. C. Franklin, Manager, Oak Ridge

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EVALUATION OF PROPOSED CRITICALITY EXPERIMENTS AT K-25

In your memorandum of March 17, 1949, entitled, "Criticality Experiments for Hanford" you requested that the K-25 criticality group prepare jointly with Hanford an experimental program at K-25 for obtaining data that would be helpful in determining the plutonium criticality limits. You indicated that the proposed experiments should be reviewed by a group of experts and their findings transmitted to Washington for approval.

On April 18, 1949, the K-25 criticality group after consultation with the Hanford group prepared a feasibility report, No. K-320. This report was forwarded to your office on April 22, 1949.

On May 2, 1949, R. F. Christy, Consultant to Hanford Operations, and [illegible]. F. East and J. [illegible]. West of General Electric reviewed with C. K. Beck, A. D. Callihan and J. W. Morfitt of K-25 and E. Grueling, Consultant to Carbide, the feasibility report. ORO was represented by H. M. Roth and St. G. T. Arnold.

The group inspected the facilities in Building K-1005 where the proposed experiments would be performed and observed the proximity of the K-25 Power House.

After the conference and inspection of Building K-1005, Drs. Christy and East prepared the following statement summarizing the conclusions they had reached and recommending that the experiments be performed at K-25. These conclusions were concurred in by the K-25 criticality group and by E. Grueling, Consultant to Carbide.

1. "The experiments with bismuth present and with various tampers will yield results of immediate usefulness to Hanford. This will be true regardless of whether or not a quantitative method can be worked out for computing exact plutonium critical mass from data obtained with uranium.

DECLASSIFICATION AUTHORIZED
MALCOLM THEISEN, ANALYSAS
Name (ADD) - Organization
9.16.94
Date

DECLASSIFICATION RECOMMENDED
ROY ANDERSON, ANALYSAS
Name (ADC) - Organization
9-13-94
Date

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2. "The main obstacle in the way of developing a method for computing such plutonium masses is the lack of knowledge of the effective cross-section and average number of neutrons emitted per neutron capture in plutonium. The experiments with uranium will throw no light on this question. However, considerable information on this question will be obtained from the first experiments done with actual plutonium at Hanford. When this point is reached, the uranium experiments with bismuth, etc., will become even more valuable.

3. For those reasons it is recommended that the experiments with uranium solutions be performed [illegible] Series I is preferable to Series II, since it develops the information on bismuth, etc., at an earlier date."

There was a unanimity of opinion that the experiments at K-25 would shorten by several months the time required at Hanford to obtain the plutonium criticality data even though the uranium results [illegible] not be translated immediately into the plutonium system. With the uranium results available far fewer plutonium experiments will have to be performed at Hanford. Trends would be established which will lessen the number and narrow the range of plutonium experiments which must be made.

It is understood that the Christy-Gast statement will be submitted to Hanford Operations office and that Hanford will submit it to Washington along with the request that the experiments at K-25 be authorized.

It was agreed that close liaison would be maintained between the General Electric and the Carbide criticality groups and that the responsibility of interpreting the data would rest on General Electric.

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EVALUATION OF PROPOSED CRITICALITY EXPERIMENTS AT X-25

As stated in Carbide's feasibility report the estimated cost of performing these experiments is $[illegible] and the time required to obtain the results is approximately three months. An additional two months is required for purification of the uranium and clean up of equipment. It is proposed that this work shall be accomplished within the framework of existing appropriations for X-25; no additional funds are requested.

J. C. Franklin

CC: S. R. Sapirie
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Arnold:rg

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