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FILE AEC-chem

U. S. ATOMIC ENERGY COMMISSION — MEMO

(Date used by ORNL C. Files, July 21, 1953

CF#53-7-151

TO: S. R. Sapirie, Manager, Oak Ridge Operations Office

FROM: R. W. Cook, Director, Division of Production, Washington

Inv 55

Subj: PARTIALLY ENRICHED U-235 FOR USE AS FUEL IN OFF-SITE RESEARCH REACTORS

Symbol: R:P&M:WJK

CLASSIFICATION CANCELLED
DATE 12/16/58
For The Atomic Energy Commission
H. F. Carroll
Chief, Declassification Branch

The Division of Research is considering several proposals from universities and agencies of the government for research reactors. Some of these proposals involve amounts of highly enriched fissionable material in excess of that which can be loaned under the existing law. The Pennsylvania State College, the University of Michigan, and the Watertown Arsenal have plans for reactors (similar to the BSF at Oak Ridge) each requiring about 3.7 Kgs of U-235. In order legally to loan the fissionable material for these reactors, it may be necessary to supply diluted or partially enriched fissionable material instead of the highly enriched material. Although T. H. Johnson has discussed this problem recently in a telephone conversation with A. M. Weinberg, the Research Division would also like written comments representing the opinions of appropriate personnel on the following points.

RESTRICTED DATA

This document has been reviewed and is determined to be APPROVED FOR PUBLIC RELEASE.
Name/Title: Leesa Laymance TIO
Date: 8-16-16

1. The economic and technical feasibility of obtaining partially enriched material from the production stream or by diluting end-product material.

2. The problem of processing and fabricating such partially enriched material and the re-processing of used fuel. (We are also asking Arco to supply us with information on this point.).

3. The amount of U-235 required for a given reactivity or power level vs the degree of enrichment.

4. The effect of partial enrichment on core design in the BSF.

5. Its effects on water-boiler reactor design and possible difficulties with solution chemistry.

6. A rough estimate of the cost of any special facilities (involving the above points or any others which may occur to you), which would be necessary if ORNL were to supply partially enriched fuel for research reactors.

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R:P&M	R:P&M	R:P&M	Dir Research	Dir Production
WJKnox:gjs	GAKolstad	ASBishop	THJohnson	RWCook

7-16-53

If it becomes necessary to set up special facilities for the production of partially enriched fuel, it may be desirable to standardize on one or two isotopic concentrations. In this connection, we would like to know what degrees of enrichment would be desirable considering both the problem of supplying the fuel and the legal restrictions on the amounts and concentrations which can be loaned. In order to comply with the law, it can be assumed that the amount of contained U-235 must be less than that given in Kg by [illegible] (one divided by the isotopic concentration of U-235 raised to the 0.7 power) The proposals received so far contemplate steady power levels of up to 100 Kw and intermittent operation up to 1 magawatt. Although a power level of 1 magawatt may not be allowed in some reactors because of safety requirements, it nevertheless seems desirable to consider operation up to the power levels in determining the amounts and concentrations of fissionable material to be used.

Another possibility, of course, is that the Atomic Energy Act may be changed with respect to the amount of fissionable material which can be loaned. The General Counsel is considering this possibility now. However, if it appears that the desired power levels and neutron fluxes can be achieved by the use of partially enriched material without excessive cost to the Commission, it may not be necessary to change the law. This is the reason for requesting cost estimates for the special facilities which may be needed to supply partially enriched fuels.

Some of the proposals which have been received, particularly those of Pennsylvania State College and the University of Michigan, are in advanced stages of design. These two reactors would be financed entirely by the institutions themselves, and the Commission is requested only to supply and reprocess the fuel elements. The proposals have not yet been cleared by the Reactor Safeguard Committee, but the main obstacle to the negotiations appears to be the legality of transferring the fissionable material. The Research Division would like your comments and opinions on these questions as soon as possible.

Copy 6-A. A. M. Weinberg (rec'd. by AMW from AEC, W'ton.)

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