LETTERS TO THE EDITOR

MINIMUM ^{235}U CRITICAL MASS IN D_2O

Dear Sir:

The suggestion was made by Muehlhause[1] that a heavy-water-moderated, reflected reactor might have a critical mass almost as low as that found for a light-water-moderated, beryllium-reflected system. A low critical mass coupled with a lower fuel concentration could permit the development of a better high-flux liquid-fuel reactor than is possible with H_2O and Be.

As a result of these suggestions, a simple comparison between D_2O and H_2O moderators was made to supplement a previous criticality study.[2] The parametric results are shown in Fig. 1. While the minimum critical mass in D_2O is shown to be a factor of 2 larger than in H_2O reflected by Be, the minimum ^{235}U concentration has been decreased by an order of magnitude. There might be then, as Muehlhause suggested, a real advantage in using D_2O in a carefully optimized high-flux reactor.

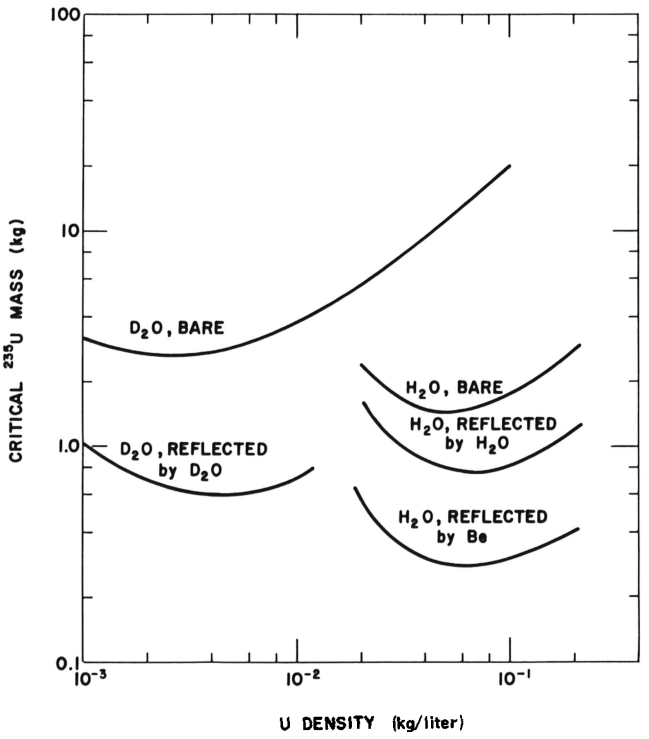

Fig. 1. Critical mass of H_2O and D_2O moderated spheres.

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July 29, 1968

ACKNOWLEDGMENTS

Work performed under the auspices of the USAEC.

REFERENCES

1. Personal Communication by CARL O. MUEHLHAUSE, National Bureau of Standards, Jan. 5, 1968.

2. CARROLL B. MILLS, "Reactor Minimum Critical Dimensions," LA-3221-MS, Los Alamos Scientific Laboratory (April 1965).

SECRET COMMUNICATION USING RECOILED FISSION FRAGMENTS

Dear Sir:

We have studied the possibility of using recoiled fission fragments for secret communication and temporary storage of secret information. This application is based on the following principle. Radioactive fission products recoil from a spontaneously fissioning source onto a catcher foil. By interchanging a collimator, which has a hole, with another, which has a slot, between the source and the catcher foil, a dot-dash pattern is formed on the latter. This pattern, which may be secretly coded, can be revealed by radioautography. Since the amount of the recoiled materials is very small, presently known methods of image detection, other than nuclear techniques, will not reveal this pattern or even detect the presence of the message. The recoil fission fragments carry a considerable amount of energy and, hence, are firmly embedded on the surfaces of the catcher foil. Depending upon the amount collected,