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SUBJECT: Permissible Fuel Concentration in the Dump Tank
of the Homogeneous Research Reactor

TO: Distribution

FROM: D. R. Gilfillan and C. W. Nestor, Jr.

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For The Atomic Energy Commission

H. F. Canale
Chief, Declassification Branch**LEGAL NOTICE**

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PERMISSIBLE FUEL CONCENTRATION IN THE DUMP TANKS
OF THE HOMOGENEOUS RESEARCH REACTOR

Critical fuel concentration at 20°C are given for long, cylindrical dump tanks having inside diameters of 20, 22, 24, 26, 28 and 30 inches. Data were obtained from CF 54-5-170,* which considers very long circular cylinders coated with a layer of cadmium and having infinite H₂O reflectors. The purpose of the cadmium is to absorb thermal neutrons, either those which leak out of the core or those produced in the reflector. This leads to an increase in critical concentration by about a factor of 2; calculations indicate that 1/4" of cadmium will be adequate.

Data extracted from CF 54-5-170 give the minimum critical concentration for a given diameter attainable with any H₂O-D₂O mixture; it is conceivable that H₂O might leak into the dump tanks.

Diameter, inches	gm 25/liter	liters/ft	length of pipe for 40,000 liters
20	12.0	61.78	650
22	9.77	74.74	535
24	8.15	88.97	450
26	6.70	104.4	380
28	5.62	121.1	330
30	4.89	139.1	290

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* Criticality of U²³⁵ - H₂O - D₂O Systems in Cylindrical Geometry - S. Visner and L. C. Noderer

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