a half water-tamped slab. The number of fission neutrons, νF_s, produced per cm^2 per sec be reflected slow neutrons must be greater than the unit flux of neutrons entering the water. In this case the critical thickness as given by Eq. 50 reduces to

$$d = \sigma^{-1}\left\{\sum_{i=1}^{3} [F_i e^{\alpha_i A_i}/(F_s - 1/\nu)] - 2x_0\right\} \tag{51}$$

for $f = k_0 = 0$

In case the water is a sufficiently good tamper to make $\nu F_s > 1$ it is possible, even though f is less than zero in the active material, for the tamped slab to become critical with a finite thickness. As usual we designate a negative f as $-g$. Equation 50 is then altered to read:

$$\coth k_0(\sigma d + 2x_0) = \frac{F_s - (1-g)/\nu + k_0^2 \sum_{i=1}^{3} F_i e^{\alpha_i A_i}/(\alpha_i^2 - k_0^2)}{k_0 \sum_{i=1}^{3} F_i \alpha_i e^{\alpha_i A_i}/(\alpha_i^2 - k_0^2)} \tag{52}$$

where $k_0/\tanh^{-1}$, $k_0 = 1 - g < 1$, and $x_0 = 0.71/(1-g)$

Finally, for this case ($\nu F_s > 1$) a semi-infinite slab is just critical when g reaches the value,

$$g = 1 - \nu F_s + \nu k_0 \sum_{i=1}^{3} F_i e^{\alpha_i A_i}/(\alpha_i + k_0) \qquad \text{limit } d \to \infty \tag{53}$$

IV. APPROXIMATE TREATMENT OF A WATER-TAMPED SPHERE

One may estimate the critical radius of a water-tamped sphere of active material by altering the theory developed in sections II and III slightly. We shall assume that the source of fission neutrons produced by the three groups of slow neutrons reflected from the water is distributed as

$$\phi(x) = I\nu \sum_{i=1}^{3} B_i \alpha_i e^{-\alpha_i x} \tag{54}$$

where x is the distance in units of σ^{-1} along a radius of the sphere from the sphere surface. Here again when x has reached the value "a" (sphere radius) we obtain a negligible value for ϕ. In order to

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