number of neutrons emerging per collision from an average nucleus in the active layer.

II. DETERMINATION OF THE FISSION RATE PRODUCED BY REFLECTED NEUTRONS

In order to calculate approximately the distribution in the slab of fissions per unit fast neutron current into the water, $f_s(x)$, we defined a penetration length, l, of fast neutrons into the water such that $I \exp[-x/l]\, d(x/l)$ represents an isotropic source of neutrons of age $\tau_0 = l^2$ in the water. We assumed arbitrarily that neutrons entering the water had to suffer between 3 and 4 hydrogen collisions before they were sufficiently disoriented to be considered as an isotropic source. With such a source of neutrons in the water one may obtain the subsequent neutron flux distribution in the age group between τ_0 and τ by solving the following diffusion-like equations:

In water $\quad \lambda(n\nu)_1''/3 - \lambda(n\nu)_1/3\tau' + I \exp[-x/l]/l = 0 \qquad$ (1a)
$x \geq 0$

In active layer $\quad \Lambda_1(N\nu)_1''/3 - \sigma_a^{(1)}(N\nu)_1 = 0 \qquad$ (1b)
$x \leq 0$

Here λ is the transport mean free path in water, Λ_1 is the first-group average transport mean free path in the active layer (assumed to extend to $x = -\infty$), and $\sigma_a^{(1)}$ is the first-group average total absorption cross section per cm^3 in the active material. The latter two quantities were averaged over the first group energy range corresponding to neutrons of age τ_0 to τ_1.

The quantity $\lambda/3\tau'$ is the absorption cross section per cm^3, σ_{ab}, effective in removing neutrons from the age group between $\tau' = 0$ and $\tau' = \tau = -\tau_0$ in water. It was estimated as $\sigma_{ab} = \sigma_s(H)/N$ where $\sigma_s(H)$ is the hydrogen scattering cross section per cm^3 and N is the average number of collisions required to moderate a neutron from age τ_0 to τ or from an energy E_0 to E. Assuming unit average logarithmic energy loss per collision in water, one obtains according to age theory:

$$N = ln(E_0/E) = 3(\tau - \tau_0)\, \sigma_s(H)/\lambda \qquad (2)$$