$$\sigma_{ft} = 5 + 2n$$

$$\sigma_{st} = 8 + 3n$$

for the UF_n molecule.

Nothing is known concerning the inelastic scattering by fluorine. For reasons mentioned above it is safer for our purposes to allow for large inelastic scattering and it will be generous to assume that half the total cross section of 2 for "fast" neutrons is due to inelastic scattering. Accordingly,

$$\sigma_5^i = 2 + 1n$$

$$\sigma_8^i = 3.3 + 1n$$

Oxides (UO_n). The Minnesota group's measurements of the total cross section of oxygen show wide fluctuations with neutron energy. Fair averages to take for the "slow" and "fast" groups seem to be about 3.6 and 2.4, respectively. Thus,

$$\sigma_{ft} = 5 + 2.4n$$

$$\sigma_{st} = 8 + 3.6n$$

for the UO_n molecule. n is understood to be 8/3 for U_3O_8.

There is a measurement (Report C-334) of the inelastic scattering of "fast" neutrons by oxygen giving a cross section of 0.65. Accordingly we may use

$$\sigma_5^i = 2 + .65n$$

$$\sigma_8^i = 3.3 + .65n$$

Neutron reflectors with which we may be concerned are Fe, Ni, Cu and Al. We give a table of total neutron cross sections for these elements. The values listed are estimates based on the data (Report C-334) and on assumptions of 100-500 kv for the "slow" neutron energies, 1-2 mv for the "fast" neutrons. For the "fast" neutrons, an attempt is made to choose values representative of back-scattering rather than the total, since for "fast" neutrons the back-scattering may be appreciably smaller than forward scattering and is the process responsible for the reflections. On the whole, the estimates are made in a way to obtain small critical masses which means using large cross sections.

	Fe	Ni	Cu	Al
"slow"	3.7	6.6	3.6	3.7
"fast"	2	2.5	2.2	1.9

The corresponding mean free path (in cm) follow:

	Fe	Ni	Cu	Al
"slow"	3.2	1.65	3.3	4.5
"fast"	5.9	4.4	5.4	8.7