INHALATION EXPERIMENTS

Four large scale inhalation experiments have been conducted in this laboratory with various forms of asbestos dust. In each of these investigations, more than 100 animals were used, and the experiments were carried on for periods ranging from two to more than five years. The four kinds of asbestos dust employed are designated as King's floats, short fiber, 100 per cent ball-milled, and long fiber asbestos dust.

King's Floats Asbestos Dust

The first inhalation experiment conducted at the Saranac Laboratory with asbestos dust was begun in 1928. Animals inhaled the dust for

TABLE 2.—*Chemical Analysis of Asbestos Dusting Materials*

Type of Asbestos	SiO_2	Fe_2O_3	Al_2O_3	Cr_2O_3	MnO	CaO	MgO	Na_2O	K_2O	CO_2	Ignition Loss	Total
King's floats.....	[illegible]	0.84		*	*	0.67	[illegible]	*	*	*	12.74	97.13
Short fiber.....	37.12	9.09	1.40	0.14	0.09	0.83	[illegible]	0.14	0.29	0.99	14.09	100.11
Long fiber.....	[illegible]	5.22	0.76	*	0.06	0.21	40.18	0.08	0.06	0.57	14.00	99.76

* Not determined.

TABLE 3.—*Petrographic Analysis of Asbestos Dusting Materials*

King's floats *: The approximate composition, based on particles (except chrysotile) smaller than 10 microns and reported as percentages obtained from particle counts, was chrysotile 11, serpentine 40, magnetite 12, carbonates 18, talc 12, other minerals 4. For chrysotile, fibers up to 200 microns long were included.

Short fiber †: The material, before being ball milled, contained a preponderance of fibrous chrysotile and platy (nonfibrous) serpentine. The approximate composition, by percentage, was chrysotile [illegible], serpentine [illegible], magnetite [illegible], quartz [illegible], brucite [illegible], other minerals, including chlorite, actinolite and tremolite, 11.

Long fiber †: The material consisted principally of the fibrous asbestos mineral chrysotile. Shreds of nonseparated fibers 5 to 15 microns in diameter and up to 50 microns in length were present. The approximate composition, by percentage, was chrysotile 75, serpentine 15, magnetite 5, brucite 2, other minerals, among which were calcite and chloritic and micaceous minerals, 3. Only a trace of quartz was observed.

* The analysis of the King's floats asbestos, made by Dr. C. S. Hurlbut Jr., of Harvard University, has been reported elsewhere (Hurlbut, C. S., Jr., and Williams, C. R.: The Mineralogy of Asbestos Dust, J. Indust. Hyg. & Toxicol. [illegible]).

† For the short fiber asbestos and the long fiber asbestos the petrographic analysis was supplemented with x-ray diffraction examination.

periods up to 33 months. Some guinea pigs with six and nine months' exposure lived for an additional three years after cessation of their exposure. A preliminary report[14] presented observations after 29 months of exposure. At that time observations covered a period of only 2½ years and the conclusions as to the ultimate effects of inhaled asbestos dust were provisional. Those conclusions are substantiated by results of the completed study, which is reported as follows.

Composition and Atmospheric Concentration of the Dust.—The dusting material, a commercial variety of asbestos known as King's floats, was composed of short fibers, ranging in length from 1 mm. to 1 micron or less, and of particles which also varied in size. It was obtained from the Thetford, Quebec, plant of the Asbestos Corporation of America, and analyses (tables 2 and 3) reveal that the amount of fibrous chrysotile was only 14 per cent, a rather low value.