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Chapter 6 The GEOLOGIC OCCURRENCES and HEALTH HAZARDS of AMPHIBOLE and SERPENTINE ASBESTOS

Malcolm Ross

INTRODUCTION

The problem

The widespread use of amphibole and serpentine asbestos¹ by industrial society has contributed greatly to human safety and convenience by service in brake and clutch facings, electrical and heat insulation, fire-proofing materials, cement water pipe, tiles, filters, packings, construction materials, and many other products. Yet, while these very tangible benefits were accruing to our society, some asbestos workers were dying of asbestosis, lung cancer, and mesothelioma.

The hazards of certain forms of asbestos under certain conditions have been so great that several countries have taken extraordinary actions to greatly reduce or even ban their use. Recent experiments with animals demonstrate that the commercial asbestos minerals as well as other fibrous materials can cause tumors to form when the fibrous particles are implanted within the pleura.² These experiments have convinced some health specialists that asbestos-related diseases can be caused by many types of elongate particles; the mineral type, according to these health specialists, is not the important factor in the etiology of

¹At present, the most widely used definition of asbestos by various groups concerned with environmental health problems is from the notice of proposed rule-making for "Occupational Exposure to Asbestos" published in the *Federal Register* (Oct. 9, 1975, p. 47652, 47660) by the U.S. Occupational Safety and Health Administration (OSHA). In this notice, the naturally occurring amphibole minerals amosite, crocidolite, anthophyllite, tremolite, and actinolite and the serpentine mineral chrysotile are classified as asbestos if the individual crystallites or crystal fragments have the following dimensions: length greater than 5 micrometers, maximum diameter less than 5 micrometers, and a length to diameter ratio of 3 or greater. Any product containing any of these minerals in this size range is also defined as asbestos.

²The lungs are invested by a double membrane, the two layers of which form the closed pleural sac. For discussion of these animal experiments see Stanton and Layard (1978) and Port (1978).