

enter of crocidolite mining in Western Australia, reached a peak population of about 1,000 in the 1960's. At present the population is down to about 200 and the West Australian State Government has suggested the closing of the town and evacuation of the residents because of continuing risks of airborne asbestos dust (*Chemical Week*, December 8, 1978, p. 25). The risk of mesothelioma among the residents of the town who were not employed by mines is demonstrated by the case of a 27-year-old woman who had an environmental childhood exposure to crocidolite (Langlois et al., 1978).

SUMMARY

Production

Of the six forms of asbestos, only four have been used to any significant degree in commerce. These are amosite, crocidolite, anthophyllite, and chrysotile. Although asbestos was used by Stone Age man, it was not until the latter part of the 19th century that it came into widespread use in the industrialized world. The modern industry began in Italy and England after 1860, with Quebec being the main supplier of the crude fiber. By 1900 two to three hundred thousand metric tonnes had been mined, mostly in Quebec. By 1980 over 100 million tonnes had been mined worldwide of which about 90 percent was of the chrysotile variety. Approximately 75 percent of all asbestos ever mined has come from just three chrysotile mining localities, Quebec, Canada, and the central and southern Urals of the Soviet Union. The chrysotile producing countries in order of importance are the Soviet Union (46.1 percent of the world's total asbestos production in 1978), Canada (28.9%), Zimbabwe (3.8%), China (3.8%), Italy (2.9%), South Africa (2.1%), Brazil (1.8%), U.S.A. (1.7%), and Australia (1.0%).

Two to three percent of the world's asbestos production has been of the crocidolite variety, most of which came from South Africa. Western Australia was a minor producer of crocidolite between 1944 and 1966. All amosite has been mined in the Transvaal Province of South Africa and accounts for about two to three percent of all asbestos ever produced. The only significant anthophyllite production came from Finland, where 350,000 tonnes was mined between 1918 and 1966. Total production of

anthophyllite asbestos probably accounts for no more than 0.5 percent of the world's total asbestos production to date.

Geology

Deposits of commercial asbestos are found in four types of rocks: (I) alpine-type ultramafic rocks, including ophiolites (chrysotile, anthophyllite, and tremolite); (II) stratiform ultramafic intrusions (chrysotile and tremolite); (III) serpentized limestone (chrysotile); and (IV) banded ironstones (amosite and crocidolite). Type I deposits are by far the most important and probably account for over 85 percent of the asbestos ever mined. The most important Type I deposits are those of Quebec and the Urals.

Type II deposits are found mostly in South Africa, Swaziland, and Zimbabwe. These furnish mostly chrysotile asbestos. Type III deposits are small in size; the most notable of these are located in Globe, Arizona, and in the Carolina area of the Transvaal Province of South Africa. Type IV deposits are found only in the Precambrian banded ironstones of the Transvaal and Cape Provinces of South Africa and of Western Australia. Only the South African deposits are still in production.

There is considerable geologic evidence that commercial asbestos deposits form only where there is a favorable stress environment, such as where folding or faulting occurs.

Asbestos and health

The three principal diseases which are related to asbestos exposure are (1) lung cancer, (2) cancer of the pleural and peritoneal membranes (mesothelioma), and (3) asbestosis, a condition in which the lung tissue becomes fibrous and thus loses its ability to function. Lung cancer can be caused by exposure to chrysotile, anthophyllite, amosite, and crocidolite asbestos; however, increased risk of this disease is probably found only in those who also smoke cigarettes. Asbestosis is also caused by heavy and prolonged exposure to all four forms of asbestos. Mesothelioma is caused principally by exposure to crocidolite asbestos. There is good evidence that anthophyllite and chrysotile asbestos do not cause any significant increase in mesothelioma mortality, even after heavy