SCIENCE

2 MARCH 1990
VOLUME 247
NUMBER 4946

The Asbestos Removal Fiasco

Removal of asbestos from buildings could cost as much as $50 to $150 billion. The content of asbestos fibers in the air of buildings containing asbestos is harmlessly small and essentially the same as in outdoor air.* Asbestos in buildings, unless damaged, does not shed fibers. The removal process releases asbestos fibers which could result in more cancer in the workmen than would have resulted in the usual occupants had the asbestos been left in place.

A puzzling defect in federal legislation and regulations is an arbitrary lumping together of disparate minerals and calling the lot of them asbestos. As a result, chrysotile, a serpentine mineral, is tarred with association with the dangerous amphibole crocidolite. The two minerals differ in composition, color, shape, solubility, and persistence in human tissue. Chrysotile is a white mineral with composition $Mg_6Si_4O_{10}(OH)_8$. It tends to be soluble and to disappear in tissue. Fibers tend to be curly and excluded from the periphery of the lung. Crocidolite is blue, has the formula $Na_2(Fe^{3+})_2(Fe^{2+})_3Si_8O_{22}(OH)_2$, and is relatively insoluble. It persists in tissue. Its fibers are long, thin, and straight and penetrate narrow lung passages. About 95 percent of the asbestos in place in the United States is chrysotile.

Another puzzling defect in federal performance is failure to give sufficient weight to epidemiological experience relating to chrysotile mines in Quebec. These mines have been operating since before 1900 and have produced about 40 million tons of chrysotile. In keeping with the lax practice of earlier days, mining operations were accompanied by large amounts of chrysotile dust. Wives of miners were heavily exposed; they dwelt in homes near the mines. Four epidemiological studies of the Quebec chrysotile mining localities show that lifelong exposure of women to dust from nearby mines caused no statistically significant excess disease.

The Environmental Protection Agency has fostered the view that a single fiber can cause cancer. This hypothesis is unproven. We live on a planet on which there is an abundance of serpentine- and amphibole-containing rocks. Natural processes have been releasing fibers throughout Earth history. We breathe in about 1 million fibers a year.

Another puzzle is a lack of expeditious effort by the EPA to obtain rigorous measures of indoor and outdoor levels of fibers. It is only recently that appropriate measurements have been made using transmission electron microscopy. Use of this equipment permits identification and quantitation of asbestos fibers. One would think that in a $50- to $150-billion program the first priority would be an accurate assessment of the problem. This lack of concern about determining the facts of exposure is also reflected in EPA policies with respect to schools.

Public and private schools are required to inspect for asbestos and to inform parents if asbestos-containing materials are present. Schools must submit a plan detailing how they will deal with damaged asbestos. They can be fined $5000 per day for failing to meet deadlines. The EPA has recommended bulk sampling and visual inspection to determine a course of action rather than measurement of airborne levels of fibers.

The removal process releases fibers into the air, sometimes creating greater concentrations of them than before the abatement work began. Remedial workers are being exposed to high occupational levels. EPA itself estimates that one half of all asbestos removal projects are done improperly.

Panic has not been confined to schools. Building owners broadly have been ripping out asbestos. If anything, the rush to remove asbestos is accelerating. EPA requires that asbestos be taken out of buildings before they are demolished or renovated. In addition, some owners have noted that the presence of asbestos has made it difficult to lease, sell, or insure asbestos-containing buildings. *The Environmental Contractor* has published an estimate that this year $7 billion will be spent on asbestos abatement—an increase of more than 30 percent during 1989. The estimate for 1993 is $11.5 billion.

The credibility of EPA has already been damaged. Unless policies are modified, the sums wasted in abatement and litigation will proliferate. Regulations should be modified to take into account the greatly differing hazards of the various asbestiform minerals. Standards for indoor air should be based on actual measurements of types and amounts of fibers.

—PHILIP H. ABELSON

*B. T. Mossman *et al.*, *Science* **247**, 294 (1990).