
asbestos:

An Information Resource

Prevention
Branch

Division
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and
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in the United States are located at the mines, the remaining two are separated by short, rural, distances (32 and 55 miles).

Shipment of milled asbestos fiber, usually in bags, can result in emissions when bags are broken, but such emissions are minimized by pressure packing and unitization as described in Chapter II of this monograph. If bags are reused, either in the asbestos industry or elsewhere, they may become a source of contamination.²³ When milled asbestos is pelletized and transported in sealed railroad cars (see Chapter II) the potential for emission is no doubt reduced considerably.

Emissions of fibers could occur during the shipment of manufactured products, but they would be negligible, since most manufactured products contain asbestos tightly bound in a matrix. A more important emission source, perhaps, would be the transporting of asbestos-containing solid wastes in open vehicles through urban areas. Also, the transportation of other asbestos-bearing ores, such as talc and taconite, and their products may result in environmental emissions.

Exposure from Asbestos Manufactured Products

Most asbestos is incorporated into finished products where the fibers are bound in a matrix (e.g., asbestos-cement pipe and sheet, flooring and roofing products, and friction products), and this reduces the possibilities for air contamination. Yet, by the application of sufficient energy, fibers may be dislodged from even tightly bound materials; automobile brake linings are an example.

Clearly, there are opportunities for human nonoccupational atmospheric exposure during installation, use, and repair of asbestos products. However, since there are so many products that use asbestos or materials that may be contaminated with asbestos, it would be next to impossible to estimate human exposure for each product type. In the paragraphs that follow, some data and information are presented for automotive friction materials and spray asbestos.

Automotive Friction Materials

Friction materials used in automotive brake linings, disk pads, and clutch facings contain an average concentration of 50% chrysotile asbestos by weight.²⁴ It has been estimated that about 118 million pounds of asbestos are used annually to produce brakes in the U.S. and, assuming a 15% grinding and milling loss, approximately 103 million pounds of asbestos are actually incorporated into brakes; similarly, it has been estimated that 4.5 million pounds are incorporated annually into automotive clutch facings.²⁵ However, since brakes and clutches are usually repaired before they are completely worn out, and since some working automobiles are scrapped, not all this automotive asbestos

will be released to the atmosphere. Hence, the estimate of how much actually is worn away annually is 74 million pounds, but only a small amount of which is released as fibrous material.²⁵

Tests performed on brake linings have indicated that under conditions of normal usage, considerable alteration of the asbestos occurs. One study has reported that most of the dust collected from brake drums is nonfibrous and is similar in appearance to thermally degraded asbestos, and it was suggested that the temperature at the points of contact of brake linings and drum actually reaches levels at which thermal degradation of asbestos can occur.²⁴

Three research studies of asbestos emissions from brake linings give estimated percentages of free fiber at 1% or less, 0.3%, and less than 0.02%, respectively.^{25,26,27} In the first of these studies, it was estimated that annually in the United States there are 239,340 pounds of asbestos fiber emissions from cars, buses, and trucks and that, of this amount, 204,952 pounds drop out on the roadway; 7,655 pounds become airborne, and 26,733 pounds are retained within the brake and clutch housings.*²⁵ These atmospheric emissions are of greatest concern in urban areas near traffic routes with high volumes of braking vehicles.

Electron and light microscopy were used in a recent study to analyze the number and size of asbestos fibers collected from air at four Los Angeles freeway loop sites and from upwind ambient air controls within 200 feet of the freeway.¹³ Concentrations of chrysotile asbestos at the four freeway sites were low, generally in the range of 0 to 12,000 electron-microscope-visible fibers per cubic meter, and they did not differ significantly from concentrations of chrysotile in the matched upwind ambient air samples (0 to 9,000 fibers per cubic meter). Concentrations of amphibole asbestos did not differ between freeway or controls (1200 fibers per cubic meter). There was no correlation of asbestos fiber concentrations in the freeway samples with number or speed of motor vehicles passing by during the sampling periods, nor was there a correlation with wind direction or velocity.

Measurements were also made of chrysotile and amphibole asbestos at the San Francisco Bay Bridge toll plaza, and the concentrations there

*There is apparently an error in data used in this study from "Brake Emissions: Emission Measurement from Brake and Clutch Linings from Selected Mobile Sources," March 1973 EPA (NTIS #68-04-0020). Total emissions should have been 239,340 pounds and, therefore, the other emission figures have been scaled up accordingly in this monograph.

were found to be 1,400 electron-microscope-visible fibers of both types per cubic meter. This compared with an average San Francisco Bay Area atmospheric chrysotile concentration of 500 fibers per cubic meter.¹³

Spray Asbestos

From 1958 through 1973, spray materials containing 10% to 30% asbestos by weight were used extensively to fireproof girders, spandrels, and decking of high-rise office buildings, and use of spray asbestos for decorative and acoustical purposes dates from the mid-1930s.^{15,28} Erosion of such spray materials alone may cause asbestos fibers to enter building air, but the materials might also be damaged and dislodged--as, for example, by workmen repairing fixtures inside the space between a ceiling and the floor above. In large office buildings, air is often returned to the ventilation system through these spaces.

A recent study of public buildings in which asbestos sprays had been used showed that there were elevated levels of asbestos within the buildings, as compared with the air outside. Also, the difference between inside and outside air was greater in the case of fibrous-sprayed buildings than in the case of buildings sprayed with cementitious asbestos.²⁸

Flaking of sprayed asbestos from ceilings has been reported inside schools, libraries, dormitories, and warehouses.^{19,29,30,31} Air concentrations may range from 0.02 optical-microscope-visible fibers per milliliter under quiet conditions to 4.0 per milliliter during dry dusting.³¹

Prior to implementation of federal regulations on asbestos-containing fireproofing materials,* data were obtained at various building sites in lower Manhattan where such materials were being sprayed.³² Generally, average atmospheric concentrations within one-quarter mile of a construction site were at least twice the background level. Current spray materials that contain 1% asbestos or less may be

* Spray-on materials used to insulate or fireproof structures, pipes, and conduits must contain less than 1% asbestos on a dry-weight basis, and, for the spray application of material containing more than 1% asbestos used to insulate or fireproof machinery or equipment, no visible emissions are permitted.²² Spray-on paints, decorative materials, and weatherproofing are not regulated.

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