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CONTROL TECHNIQUES FOR ASBESTOS AIR POLLUTANTS



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U. S. ENVIRONMENTAL PROTECTION AGENCY

CONTROL TECHNIQUES

FOR ASBESTOS AIR POLLUTANTS

ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Water Programs
Office of Air Quality Planning and Standards
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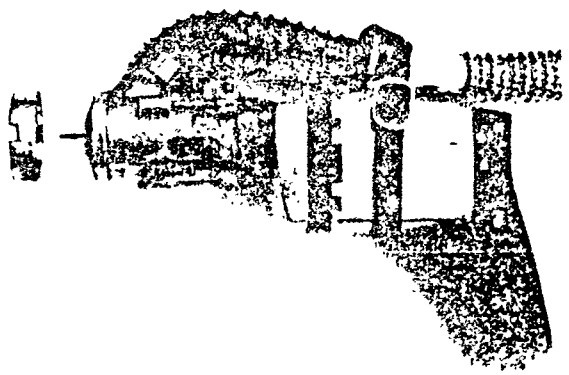


Figure 3-29. Dust capture device fitted to portable drill.[33] *(Courtesy of Johns-Manville.)*

readily supplied by an industrial vacuum cleaning system. The prompt cleanup of trimmed wastes, broken material fragments, and spillage from containers minimizes further disintegration, airborne entrainment, and creation of secondary emission sources such as dispersion from workers' clothing. Tightly sealing waste containers should be conveniently accessible; vacuum cleaning devices are recommended for the removal of small particles and dust. In the absence of vacuum cleaners, the watering of wastes prior to sweeping and shoveling can be an effective control measure. The disposal of asbestos-containing wastes is discussed in Section 3.5.

In an effort to control emissions from the opening and dumping of bags of asbestos insulating cement or loose, dry insulating materials and also from the subsequent mixing of those materials with water to form a slurry, it has been proposed that mixing take place within the shipping bag.[34] Water is injected into a polyethylene bag through a narrow sleeve, and the contents are kneaded into a wet mixture prior to removal from the container.

3.4.3 Friction Products

The automotive and heavy equipment industries are the major users of asbestos friction products.[19] In 1968, new passenger and commercial motor vehicles manufactured in the United States accounted for 9,913,000 sets of brake linings, which contained an average of 3 pounds of asbestos per set.[35] The yearly number of sets of replacement brake linings can be gauged by considering that 1 trillion vehicle-miles were traveled in 1968 in the United States[1] and that an average lifetime for brake linings is 27,500 miles. Further, it is estimated that between one and two sets of asbestos-containing clutch facings are consumed during the lifetime of the average vehicle equipped with a manual clutch.

The principal types of asbestos-containing friction products are molded, woven, or extruded. Chrysotile asbestos (30 to 60 percent of product) is mixed (or asbestos cloth is impregnated) with asphalt, drying oil, synthetic resin, or rubber. Chrysotile is preferred over crocidolite because of better heat resistance and less severe wear against metal surfaces.[19]

Friction materials containing asbestos are also used in the pads of disk brakes, for clutch facings in automatic transmissions, and for brake blocks for heavy-duty trucks, earth-moving equipment, elevators, and other industrial applications. The percentage of domestically produced motor vehicles equipped with disk brakes has increased from 2.9 percent in 1966 to 11.2 percent in 1968.[35] Additional increases in the fraction of vehicles equipped with disk brakes will affect the types of operations carried out during replacement of motor vehicle brake linings.

3.4.3.1 Emissions

During the replacement of drum-type brake linings on motor vehicles, the grinding and trimming operations required for individual fitting are potential emission sources of asbestos fibers. Based on an assumed loss of 0.05 percent of brake lining asbestos content to the atmosphere during grinding and fitting, asbestos emissions from the fitting of brake linings were estimated to total 190 tons in 1968.[23] The analogous grinding operations that are performed in friction product manufacturing plants are

known to yield asbestos fibers of similar physical form to those that have been associated with adverse health effects.[36] Since disk brake pads are not contour ground as drum brake linings are, the current trend to disk brakes should reduce asbestos emissions.

As brake linings and clutch facings rub against their mating bearing surfaces in the course of usage, particles of the lining material are abraded. These particles can be partially trapped in the housings of manual clutches and in brake drums; the remainder can be emitted directly into the atmosphere. The latter emissions are treated as a problem in mobile source air pollution control and are outside the scope of this study.

Because extremely high temperatures can result from the sliding of brake linings and clutch facings against the corresponding mating surfaces, the question arises as to whether the asbestos that would otherwise be contained in the particles released from the friction materials has been thermally degraded. One set of tests of automobile, bus, and truck drum brakes and clutches has shown that, except under conditions of very severe usage, the majority of the freed asbestos has been thermally degraded.[36] For example, most of these samples of released material from automotive brakes contained less than 1 percent asbestos as compared with 50 percent in the original lining formulation.[36] This residual amount, however, is not inconsequential relative to air pollution control. Further tests are needed to evaluate emissions from disk-type brakes.

In the course of servicing and overhauling motor vehicle brakes and manual clutches, the accumulated asbestos-containing dust is frequently dislodged from drums and housings by directing a compressed air jet against the deposits.[37] Depending upon the servicing location, this results in airborne asbestos emissions either to the work space or directly to the atmosphere.

3.4.3.2 Control Techniques

Asbestos emissions accompanying the grinding and trimming of replacement brake linings at the site of installation and fitting are presently uncontrolled at most sites. The incorporation of low-volume, high-velocity dust-capture hoods (see Section 3.3.2) into grinding equipment is feasible and can provide an effective method for controlling these emissions.[18]

The removal of asbestos-laden dust from brake drums and from housings of manual clutches by the compressed-air-jet method produces uncontrolled emissions. The dislodging and collection of this waste material at the source by operating a brush connected to an industrial vacuum cleaner as a low-volume, high-velocity dust capturing and collecting device has been evaluated.[37] This control technique reduced personal exposure to fibers larger than 1 micrometer in diameter by approximately 75 percent.

3.5 DISPOSAL OF ASBESTOS WASTE MATERIALS

Potential waste materials containing asbestos are produced during the mining and milling of asbestos ores and in the manufacture and use of asbestos-containing products. The form of asbestos in these wastes ranges from asbestos bound in relatively large rock masses or in such manufactured products as asbestos-cement pipe and reinforced plastics to small-diameter, readily dispersed asbestos fibers that are removed by gas-cleaning devices or are produced in the milling of asbestos ores.

In mining operations, large quantities of asbestos ore are sometimes rejected at the mine site because either the concentration or the form of dispersal of the asbestos renders recovery uneconomical. The lower limit for profitable recovery of chrysotile asbestos from massive deposits of serpentine rock is a concentration of approximately 3 percent.[1]