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FABRICATION OF ASBESTOS CEMENT PRODUCTS

OCCUPATIONAL EXPOSURE TO ASBESTOS

Report prepared for the U.S. Environmental Protection Agency Office of Toxic Substances

April 4, 1979

Fabrication of Asbestos-Cement Products -- Exposure

1. A. Cross, Asbestosis Research Council, ILO/1972

Sawing and drilling -- in an enclosure 31-59 f/cc without dust extraction (hand sawing)
"incombustible boards" 1-3.4 f/cc with extraction

more than 200 f/cc w/o extraction
more than 100 f/cc (power sawing)
1.4-4.5 f/cc f/cc with extraction

"other rept'd counts"
13-45 f/cc hand sawing w/o
63-186 f/cc power sawing w/o

drilling -- 0.7-0.9 f/cc w/extraction
1.0 - 5.4 f/cc w/o extraction

2. H. Forster (Germany), Ibid. pp 49-52

presents formula for limiting total dust (mg/cm) based on asbestos content

says that 8 of 700 "asbestos joiners" ..."with a maximum of 10 years exposure" have been transferred out of dusty work on medical orders.

3. M. Trosper AIA conference proceedings/1976 (J-M)

Discusses progressive reductions of exposure with modifications of high-velocity, low-volume exhaust ventilation. Worst case figures not given in text; and Trosper could not find them once when I called for the photos he presented. Cutting Corspan tubular panel, the first-cut control fiber count was 33 f/cc. They got it down to 19 f/cc with better enclosure and higher vacuum. Then, applying vacuum to openings in the panel as well as to the saw blade, they got down to 0.7 f/cc.

Cutting "Flexboard" (the stuff used in ill-fated Utah construction) with haphazard use of dust collector, they measured operator exposure at 8.7-10 f/cc. With plywood deflector sheet under the A-C panels, stiffened to prevent bowing, they got 2.8 f/cc. Trosper felt that they could do even better, but the only other counts for this continuous operation were 2.6 and 3.3 f/cc with best efforts at control applied.

At end, he gives these figures for cutting flat sheet A-C: "about 250 f/cc" before, down to 0.8 f/cc with the dust control device.

This report points up the different degrees of control available with machine sawing of A-C products of different shapes. Flat sheet seems easiest to control, and here the need is greatest as it is usually done indoors. Corrugated A-C products would present much greater difficulties in a real-life construction situation.

Note: The controlled situations are most important as a matter of prevention, since they are reasonably reproducible. Uncontrolled sawing of any asbestos product is as much a danger as the enclosure permits, irrespective of the rate of dust generation.

4. A/C Pipe Producers Assn. sponsored reports 1977

Operator exposures were measured during fabrication operations using a variety of cutting tools. Fiber counts over periods usually less than 15 minutes were up to 0.5 f/cc for sewer pipe, 0.3 - 2.0 f/cc for pressure pipe (which also takes longer to cut through). Somewhat lower values were obtained for the operator's helper's exposures. The remote-controlled Wheeler pipe cutter yielded the lowest values.

The exception to the above range of readings was the exposure measured during use of the abrasive disc saw, which was only used wet. The investigators believed that the actual contact surface during cutting was not being wetted, and that use of mist-wetting would yield improvement. However, as a practical matter, these values have to be regarded as minimal for use of the abrasive disc saw in cutting A-C pipe:

	pressure pipe (f/cc)	sewer pipe
operator	20,65 (17-109)	35,42 (11-95)
helper	49,60 (31-62)	10,64 (8-81)

mean values of separate trials, range in parentheses

Quartz exposures were generally low, certainly far less alarming than the asbestos exposures.

Though plastic bags and rigid shrouds were used to limit operator exposures during use of some tools, none of the devices used collected any of the dust created by machining this pipe. Some of the photographs show the work area blanketed with heavy patches of dust from the A-C pipes. This is quite worrisome in light of the fact that 15-20% of the asbestos used in the USA (180,000+ tons/year) is used in this product.

Use of the abrasive disc was acknowledged to cause peak exposures and possibly time-averaged exposures in violation of the existing OSHA standard. Though the industry presumably would discourage such practices, there is an urgent need to know the extent of abrasive disc cutting of A-C pipe that is actually going on in the country.

Equally worrisome is the acknowledged need for "rigorous housekeeping" in controlling hazards from dust and scrap cuttings. The state-of-the-art in dust control is totally unsatisfactory to all who regard asbestos to pose carcinogenic risks at levels below those permitted in the workplace. Cutting tools should be equipped with dust-capture devices; the solution here is not just having construction laborers sweep the dust up with brooms at the end of each day.

I have heard that the A-C pipe industry acknowledges these things:

1. A-C pipe should not be used with water supplies of aggressiveness index less than 10.
2. Abrasive disc saw cutting of A-C pipe is discouraged.

What is the industry actually doing to assure that these fine suggestions are put into practice in the United States?

5. Harless et al. Env. Res. 16:360 (1978)

Acute effects noted in workmen after a 5-month construction job using lots of J-M (A-C) Flexboard. Samples taken after the damage was done:

sweeping and moving scaffolding: 3.8-6.2 f/cc
drilling holes in board -- 0.57 f/cc

Obviously, these samples were taken too late to have any value in dose-response terms. Sweeping of a usual asbestos job gives values orders of magnitude higher (see this review, other parts of Cross' paper, and Mt. Sinai report on spackling compounds in Science, 1975), leading me to conclude that the sampling period was not the first time these floors were cleaned after the job.

My correspondence with one of the authors of this report is useful in appreciating the extent of asbestos exposure that still goes on in the U.S. in fabrication of A-C sheet. The workers who did the construction, and who have developed measureable pulmonary airflow obstruction, were unaware that sawing up the panels indoors was dangerous. They had no recollection of seeing warning labeling on the Flexboards, and a later inspection showed that though a warning was on the boards, it was usually illegible. Workers said it was sometimes so dusty that it was difficult to see across the building, during the job.

Since 3% of the asbestos used in the USA goes into A-C sheet products, and these products are commonly cut, indoors, without worker protection or dust capture, this represents a very serious public health concern.

As with A-C pipe, it would be worthwhile to survey manufacturers to see what they are doing to limit both the health hazard and liability associated with the use of their products.

Discussion:

There is substantial public health hazard associated with fabrication of A-C pipe and A-C sheet products. While there exist means to substantially reduce these hazards to workers fabricating these products, these measures are not standard practice and may in fact be rarely practiced. The use of cutting tools equipped with dust collection devices, for field fabrication of A-C products, is most likely quite rare. Therefore, sites where A-C product fabrication is done continue to be a source of public exposure to asbestos air pollution and water run-off. Much more information is needed from the field, and from the manufacturers responsible for the present regrettable state of affairs.

USE OF THESE PRODUCTS SHOULD BE DRASTICALLY CURTAILED

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