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CHRYSOTILE ASBESTOS

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asbestos-cement plant of 1.5–6.3 f/ml during 1956. Later, based on direct measurements, values were 0.3–5.0 f/ml in 1969 and 0.9–1.7 f/ml in 1975. Higashi et al. (1994) reported geometric average concentrations of 0.05–0.45 f/ml measured in area samples and 0.05–0.78 f/ml in personal samples of an asbestos-cement plant.

Few data are available in the open literature on exposures encountered during installation of asbestos-cement products. It would be expected that cutting, sanding, drilling or otherwise abrading asbestos-cement without efficient ventilation controls would give rise to high exposures (Nicholson, 1978).

Weiner et al. (1994) reported concentrations in a South African workshop in which chrysotile asbestos-cement sheets were cut into components for insulation. The sheets were cut manually, sanded and subsequently assembled. Initial sampling showed personal sample mean concentrations of 1.9 f/ml for assembling, 5.7 f/ml for sweeping, 8.6 f/ml for drilling and 27.5 f/ml for sanding. After improvements and clean-up of the work environment, the concentrations were 0.5–1.7 f/ml.

Nicholson (1978) reported concentrations of 0.33–1.47 f/ml in a room during and after sawing and hammering of an asbestos-cement panel.

4.1.4 Friction products

Skidmore & Dufficy (1983), based on simulated past conditions (Table 10), and McDonald et al. (1984) reported data on workplace exposures during friction product manufacturing.

McDonald et al. (1984) reported that in the 1930s estimated average dust levels were 35-180 mpcm (1-5 mpcf) in 67% of analysed locations, while in the 1960s average dust levels were below 7 mpcm (0.2 mpcf) at 38% of locations and below 18 mpcm (0.5 mpcf) at 67% of locations in which measurements were obtained.

Table 10. Average concentrations of chrysotile fibres (f/ml) longer > 5 µm from woven asbestos products during various periods

	Pre-1931	1932-1950	1951-1969	1970-1979
Storage/distribution	>20	2–5	2–5	0.5–1
Preparation	>20	0–20	2–5	1–2
Impregnation/forming	>20	2–5	1–2	0.5–1
Grinding	>20	5–10	2–5	0.5–1
Drilling, boring	>20	2–5	1–2	1–2
Inspection	>20	2–5	1–2	0.5–1
Packing	>20	1–2	0.5–1	<0.5
Office/laboratory	10–20	<0.5	<0.5	<0.5

*Skidmore & Dufficy (1983)

Kimura (1987) reported geometric mean fibre concentrations of 10.2–35.5 f/ml in 1970–1975, and 0.24–5.5 f/ml in 1984–1986 in spinning and grinding of friction products in Japan.

A considerable number of reports have included airborne asbestos concentrations during maintenance and replacement of vehicle brakes. In the early period, poor or no engineering control measures were utilized, resulting in high total dust exposure. This was particularly so during grinding of brakes and compressed air blowing off dust, both operations of very short duration. Significantly lower levels were measured when engineering controls were introduced.

An overview of air concentrations measured during maintenance and replacement of asbestos-containing vehicle brakes is presented in Table 11.

4.1.5 *Exposure of building maintenance personnel*

The subject of asbestos exposure of maintenance personnel in buildings has been raised recently and particularly by US OSHA (1994).

Table 11. Asbestos air concentrations measured during maintenance and replacement of vehicle brakes

Mean concentration (f/ml)	Comment	Reference
3.8[a]	grinding truck brakes	Lorimer et al., 1976
15.9[a]	blowing off	Lorimer et al., 1976
3.8[a]	grinding	Rohl et al., 1976
16.0[a]	blowing off	Rohl et al., 1976
2.5[a]	dry brushing	Rohl et al., 1976
> 1[a]	17 of 19 operations	Menichini & Marconi, 1982
> 2[a]	11 of 19 operations	Menichini & Marconi, 1982
0.09[b]	fibres longer than 5 µm	Jahn et al., 1985
6.2[a]	blowing off, grinding	Jahn et al., 1985
0.03[b]	fibres longer than 5 µm	Elliehausen, 1985
0.06[b]		Ruhe & Lipscomb, 1985
< 0.5	TWA	Cheng & O'Kelly, 1986
0.13	maximum	Cheng & O'Kelly, 1986
4–5[a]	fibres longer than 5 µm, blowing off, grinding	Rodelsperger et al., 1986
5–10[a]	fibres longer than 5 µm, blowing off, grinding, trucks	Rodelsperger et al., 1986
< 0.05[b]		Kauppinen & Korhonen, 1987
0.01–0.2[b]	trucks and buses	Kauppinen & Korhonen, 1987

Table 11 (contd).

> 1[a]	blowing off	Kauppinen & Korhonen, 1987
< 0.004		Sheehy et al., 1987
< 0.004[b]		Godbey et al., 1987
0.09–0.12		Van Wagenen, 1987
0.046[b]		Cooper et al., 1988
0.03[b]	TWA < 0.002 f/ml	Moore, 1988

[a] These results are mean personal samples obtained by PCOM; fibres ≥ 5 µm; these represent episodic releases and not time-weighted averages; operation specific.
[b] Mean personal air samples (8-h time-weighted average)