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Occupational Exposure to Fibrous Asbestos Dust on Roof Layers

OCCUPATIONAL EXPOSURE TO FIBROUS DUST (ASBESTOS)  
OF ROOF-LAYERS WHEN HANDLING ASBESTOS ROOFING FELT

PRELIMINARY REPORT

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## OCCUPATIONAL EXPOSURE TO FIBROUS DUST (ASBESTOS) OF ROOF-LAYERS WHEN HANDLING ASBESTOS ROOFING FELT

### I- ABSTRACT

Workplace concentration of roof-layers using asbestos roofing felts were measured on August 2nd and 3rd, 1983 when building-up the roof of a new extension at one of the plant of the company Cascades Inc. at Kingsey-Falls, Québec, Canada. Nine personal breathing zone samples and two area samples were collected and analyzed for asbestos by means of optical phase contrast microscopy (OPCM) according to NIOSH P & CAM 239 (1).

Our results indicate that concentrations of asbestos fibre longer than five micrometers ( $\mu\text{m}$ ) are below the analytical limits of detection of the phase contrast microscopy. Further observations of the last and more representative membrane filter samples are presently carried on with the analytical transmission electron microscopy (TEM).

### II- SAMPLING AND ANALYSIS

II-1 The two first sets of three personal breathing zone samples were collected to check independently the handling of the two following asbestos felts during construction work:

- (i) Centurian Asbestos Base Felt.
- (ii) No. 15 Asbestos Finishing Felt.

The ambient air concentration of asbestos fibres in the surrounding was measured upwind of the construction site with two area samples.

The third and last set of three personal breathing zone samples were collected when handling both previous asbestos felts to have longer sampling time as needed to increase the analytical limit of detection of the membrane filter method.

II-2 A first portion of each sample was counted with optical phase contrast microscopy (OPCM) for fibres longer than  $5 \mu\text{m}$  by the Institut de recherche et de développement sur l'environnement. The second (remaining) parts of the four last collected samples have been sent to the School of Occupational Health

of McGill University (Montreal) for transmission electron microscopy (TEM) analysis. Sections of this second parts will be prepared for direct electron microscope observations according to the method of Middleton and Jackson (2). The transmission electron microscope analysis will be performed at a magnification of 20,000 X for total fibres, total asbestos fibres and asbestos fibres longer than 5 µm per litre of air. Each asbestos dust encountered will be characterized with Energy dispersive analysis of X-rays.

### III- RESULTS

No asbestos fibres could be detected on any of the personal breathing zone air samples as reported in the TABLE-I.

Consequently, the asbestos fibres appeared to be well locked in to prevent any measurable airborne asbestos exposure under the conditions of this survey when handling the Kingsey-Falls Centurian Asbestos Base Felt and the Kingsey-Falls No. 15 Asbestos Finishing Felt.

### IV- CONCLUSION

IV-1 The concentrations of asbestos fibre being below the analytical limits of detection of the phase contrast microscopy method, no health hazard to asbestos is existing for roof-layers when handling Kingsey-Falls asbestos roofing felts during construction work.

IV-2 Further observations with the analytical transmission electron microscopy will be pursued on few representative samples to detect short asbestos fibres and for fibre identification in cases of mixed airborne fibre to which workers may be exposed as recommended by the NIOSH-OSHA Asbestos Work Group (3) who also recognized that the membrane filter optical phase contrast microscopy was the only technique available for routine monitoring of occupational exposures.

TABLE-I

| SAMPLE<br>NUMBER      | SAMPLE<br>TYPE | ASBESTOS FELT<br>USED                | FILTER<br>TYPE          | FLOW-<br>RATE | SAMPLING<br>PERIOD | METEOR.<br>OBSERV.         |
|-----------------------|----------------|--------------------------------------|-------------------------|---------------|--------------------|----------------------------|
| Cascades/03-08-84/1/7 | Area           | Centurian and<br>finishing<br>No. 15 | Millipore®<br>37 mm (Q) | 2             | 10:15-14:45        | Sunny, Temp<br>Wind: N.W., |
| Cascades/03-08-84/2/7 | Personal       | Centurian                            | Millipore®<br>37 mm (Q) | 2             | 10:40-11:40        | Sunny, Temp<br>Wind: N.W., |
| Cascades/03-08-84/3/7 | Personal       | Centurian                            | Millipore®<br>37 mm (Q) | 2             | 10:40-11:40        | Sunny, Temp<br>Wind: N.W., |
| Cascades/03-08-84/4/7 | Personal       | Centurian                            | Millipore®<br>37 mm (Q) | 2             | 10:40-11:40        | Sunny, Temp<br>Wind: N.W., |
| Cascades/03-08-84/5/7 | Personal       | Finishing<br>No. 15                  | Millipore®<br>37 mm (Q) | 2             | 13:07-14:27        | Sunny, Temp<br>Wind: N.W., |
| Cascades/03-08-84/6/7 | Personal       | Finishing<br>No. 15                  | Millipore®<br>37 mm (Q) | 2             | 13:07-14:27        | Sunny, Temp<br>Wind: N.W., |
| Cascades/03-08-84/7/7 | Personal       | Finishing<br>No. 15                  | Millipore®<br>37 mm (Q) | 2             | 13:07-14:27        | Sunny, Temp<br>Wind: N.W., |
| Cascades/04-08-84/1/4 | Area           | Centurian and<br>finishing<br>No. 15 | Millipore®<br>37 mm (Q) | 2             | 10:07-15:07        | Sunny, Temp<br>Wind: N.W., |
| Cascades/04-08-84/2/4 | Personal       | Centurian and<br>finishing<br>No. 15 | Millipore®<br>37 mm (Q) | 2             | 10:27-14:27        | Sunny, Temp<br>Wind: N.W., |
| Cascades/04-08-84/3/4 | Personal       | Centurian and<br>finishing<br>No. 15 | Millipore®<br>37 mm (Q) | 2             | 10:27-14:27        | Sunny, Temp<br>Wind: N.W., |
| Cascades/04-08-84/4/4 | Personal       | Centurian and<br>finishing<br>No. 15 | Millipore®<br>37 mm (Q) | 2             | 10:27-14:27        | Sunny, Temp<br>Wind: N.W., |

(1) N.D.: Non detectable - below detection limit. The analytical limit of detec  
and 0.01 for 4 to 5 hours-samples.

#### REFERENCES

- (1) NIOSH P & CAM 239 (1977).  
Asbestos Fibres in Air. National Institute for Occupational Safety and Health Analytical Method, issued 03/30/77.
- (2) Middleton, A.P. and Jackson, E.A. (1982).  
A procedure for the estimation of asbestos collected on membrane filters using transmission electron microscopy (TEM). The Annals of Occupational Hygiene 1982; 25(4) pp. 381-391.
- (3) NIOSH-OSHA Asbestos Work Group (1980).  
Workplace exposure to asbestos: Review and recommendations. Submitted on April 1980 to the Assistant Secretary for Occupational Safety and Health and the Director, National Institute for Occupational Safety and Health.