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PLAINTIFF'S EXHIBIT
JM-2039

Environmental Control Department
Denver GHQ
May 8, 1972

E. J. Bulava - REC
L. A. Schriver - Lompoc
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cc: File: E. M. Fenner
D. A. Aldinger
C

S. HOLMES' LETTER 21ST APRIL, 1972 TO M. M. SMETONIC

Enclosed is a copy of subject letter and enclosure.

I thought you would all be interested in seeing someone else's work regarding the accuracy of the membrane filter method. You will note the British results are very much in line with our own.

G. L. Swallow

GLS/ems

Attachs.

AA-105

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TURNER BROTHERS ASBESTOS CO. LTD.

ROCHDALE
ENGLAND

[illegible] 21st April, [illegible]

Mr. F. M. [illegible],
Asbestos Information Association/
North America,
22 East 40th Street,
New York,
New York 10016,
U.S.A.

Dear Matt,

It was nice to talk with you on the telephone last week.

I have not been able to find out whether Mr. [illegible] is due to pay another visit to the States, but on think not, and I have heard nothing regarding a further approach to me.

In regard to your request for information on sampling [illegible], [illegible] a copy of a report [illegible] for me by my Junior Assistant, who is probably the most experienced dust counter in the U.K. hope you find it helpful.

I am off to [illegible] on [illegible].

With kind regards,

Yours sincerely,

[illegible]

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[illegible]

[illegible]

[illegible]

The Errors Associated with the [illegible]

Asbestos Test using the [illegible]

1. Errors Associated with the Counting of Asbestos Fibres

Fibre counts may be affected by:

a) Sample preparation.

b) Microscopic conditions.

c) Different interpretations of asbestos fibres and their configurations.

d) Retention of 5 μm length.

e) Bias in the selection of fields to be counted.

f) Visual acuity of observer.

g) Statistical errors associated with counting.

Only (g) can be calculated. Such as [illegible] has indicated that [illegible] samples, prepared by the method [illegible] in the revised (September 1971) Technical Note 1, produce dust deposited according to the Poisson law. Statistical analysis has shown that, if 200 fibres are counted, the statistical error (95% confidence limits) is ± 13.8%. Badly prepared samples (a) however, significantly increase this error.

In 1969 an initial comparison of [illegible] filter counts, [illegible] set amongst the 3 major [illegible] in the [illegible], indicated differences of up to [illegible], [illegible] being quite common. These differences are very significant, as they are [illegible] by the percentage of the highest count, i.e. the [illegible] differences for counts of [illegible] and [illegible] [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

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2. Sample Collection and Evaluation Errors

The volume (V) of the air sample is usually determined by a "Rotameter" type flowmeter. These instruments are quoted as having an accuracy of [illegible] of the full scale, but it is considered that the practical limitation in observing the level of the float adds significantly to this error, e.g. [illegible] can often only be estimated to within [illegible] (= [illegible]). No error is assumed for the measurement of sample periods.

There is also a small error associated with the measurement of the microscope "Multiplicator Number" used for the calculation of results. The diameter of the dust deposit ([illegible]), after mounting the sample, can be measured (using the stage vernier) to the nearest [illegible] mm, i.e. [illegible] mm (= [illegible]). Similarly the error in measuring the diameter of the microscope field of view ([illegible] mm) with a suitable stage micrometer is [illegible] mm (= [illegible]).

There should be no error in recording the number of fields counted (n) and therefore the above errors may be summed in the formula used for the evaluation of the asbestos fibre concentrations:

$$\text{Dust Concentration } (f/ml) = \frac{[illegible]}{[illegible]} \times \frac{[illegible]}{[illegible]} \times \frac{[illegible]}{[illegible]}$$

$$\text{Errors associated with above formula} = \frac{[illegible]}{[illegible]} \times \frac{[illegible]}{[illegible]} \times \frac{[illegible]}{[illegible]}$$

$$= [illegible]$$

where [illegible] is the theoretical error associated with the fibre count [illegible]

Assuming even samples, [illegible] fibres

[illegible] Total Error = [illegible]

and [illegible] fibres

[illegible] Total Error = [illegible]

This level of error is considered acceptable, as it is relatively small compared with the [illegible] variations of dust levels [illegible] at most [illegible]. For example results for [illegible] dust levels may fluctuate [illegible] of the [illegible] dust level. The actual total [illegible] are found to be a little higher than the theoretical errors calculated above (see [illegible]).

3. Error Due to Contamination of Samples

A further source of error, that was [illegible] to the measurement of asbestos dust levels [illegible], in contamination of the membrane filter samples. [illegible] filters [illegible] by the standard procedure [illegible] and the "background" [illegible] fibres per [illegible] fields of [illegible]. [illegible] and a sample volume of [illegible], there would be a [illegible] of [illegible] associated with the calculated level of [illegible] with [illegible] [illegible], using the [illegible] and counting [illegible] fields.

[illegible]

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This error can obviously be reduced by taking precautions when preparing the membrane samples and increasing the sample volume. If the contamination can be eliminated and relatively high volumes collected ([illegible]), uncertain dust levels down to 0.001 g/m³ may be measured using the membrane filter method.

J. Harness

J. Harness
Health Physics Department,
T.R.I. Co. Ltd.

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