it difficul[illegible]nce only the dust capable of penetrating
n counts e[illegible] the pulmonary air spaces is biologically
differences[illegible]ficant in pneumoconiosis-producing dis-
ies. These [illegible] a number of samples were collected by
unting, led[illegible]ns of respirable-mass size-selective sam-
ht method[illegible] devices. A horizontal elutriator having
propriate, [illegible]acteristics similar to those proposed by
are the [illegible] British Medical Research Council[9] for
tuminous co[illegible]rable dust sampling was used ahead of
stos led to [illegible]mbrane filters on which fibers were count-
respirable [illegible] 430× PC. A membrane filter sample
ded some r[illegible]out the elutriator was taken simultaneous-
d-weight [illegible]nd the counts from the pair of samples
[illegible] used to calculate the data in Table VII.
[illegible] finding that 60% of the fibers over 10
arent rock [illegible]rons were able to penetrate the elutriator
esium silic[illegible]als that many of the longer fibers are thin
unt 25% [illegible]gh to have falling speeds in the respira-
ely high s[illegible]range. Other simultaneous sample pairs,
n spectrom[illegible]a Hexhlet and a gross dust filter side
or 1% abso[illegible]ide, were analyzed for asbestos by mag-
asbestos [illegible]m, giving the results shown in Table
ter at 430× [illegible] The 95% confidence intervals of the
for magnes[illegible] percent passing are typical of the range
t/weight [illegible]ost of this data. Use of the gross weight
tained. Se[illegible]ust found on these same samples, together
are readily [illegible]the asbestos by magnesium analyses, re-
estos is d[illegible]d in Table IX. The percent asbestos in
used in so[illegible]product, total dust, and respirable dust
ure pipes i[illegible]not vary greatly for the same product.
estos. Fur[illegible]wever, the percent of asbestos to be ex-
n, especial[illegible]d in either the total or the respirable
ciated with[illegible] will vary from 5% to 65% from product
directly. [illegible]oduct.

not exhibi[illegible]
gth distrib[illegible]mary
mode of d[illegible]
calculated[illegible]e impinger measures all types of dust,
decreasing[illegible]s the TLV for asbestos decreases, the
e, friction[illegible]asbestos dust present becomes a major
nt/weight[illegible] of error in the estimation of exposure
ative TLV o[illegible]estos. Other count methods, however,
ter to the e[illegible]vailable to count asbestos fibers, with
tions of asb[illegible]g degrees of convenience. Weight meth-
minations)[illegible]hat cannot differentiate asbestos from
were 2 m[illegible]dust suffer from the same disadvantage
on, and 0.5[illegible]impinger in that the asbestos fiber con-
e for the w[illegible]ation could differ by a factor of 10 for
would be eq[illegible]ame total or respirable dust concentra-
n fiber thre[illegible]depending on the product area. The
its. [illegible]od for chrysotile weight by magnesium

TABLE VII
Respirability of Textile Fibers by Count

Type Fiber Count	% Passing Elutriator
Total	84
>5 μ	80
>10 μ	60

TABLE VIII
Asbestos Dust Passing an Elutriator

Product	Mean Weight % Passing	95% Confidence Interval
Textile	31	24–38
Friction	29	21–37
Pipe	44	39–49
Insulation	22	19–25

TABLE IX
Asbestos in Product and Dust

	% Asbestos Content		
Product	Product	Total Dust	Respirable Dust
Textile	75–85	68	64
Friction	30–60	22	36
Pipe[a]	10–30	12	18
Shingle	10–30	25	28
Insulation[b]	5–15	4	6

[a] Not including crocidolite.
[b] Not including amosite.

analysis is not specific or general enough to form the basis for a threshold for asbestos.

Conclusions

Certain general statements are possible, based on the data presented:

1. There is, at present, no practical absolute method for the routine measurement of exposure to airborne asbestos fibers. The technical difficulties of the electron microscope for dust counting make its routine use unfeasible; when it is used, the results are heavily biased in favor of very small fibers.

2. Each of the methods considered measures something different and, therefore, they do not correlate well. Ratios between results by different methods should be used for qualitative prediction only.

3. Each method is strongly influenced by one attribute of the dust cloud. The biologically optimum method cannot be selected un-