

the "Asbestos Round Robin" for certified laboratories sponsored by the NIOSH Proficiency Analytical Testing (PAT) program. (Ex. 330)

The NIOSH PAT program has been in existence for 13 years. Recently, however, NIOSH has transferred the administration of the program to the American Industrial Hygiene Association, which will provide PAT samples to private laboratories. Since the direction and administration of the PAT program is undergoing changes, OSHA has not at this time required employers to utilize laboratories that are participating in the PAT program.

Intersample Variability

The third type of asbestos monitoring variability discussed by the AIA was that of intersample variability, defined as the difference in results obtained by analyzing two samples that are taken side-by-side. The AIA cited two reports that "... address directly the magnitude of [intersample variability] ... for airborne asbestos monitoring" (Ex. 328, p. A-18). In one of these reports (Exs. 91-18, Tab D, 232-B), Dr. Chatfield used the data from the Chase and Rhodes study to compute a CV for intersample variability of 0.47 for a 100 fiber count. The AIA concluded that "... the breadth of the Chase and Rhodes Study warrants considerable weight for this evidence" (Ex. 328, p. A-19).

Yehia Hammad, D.Sc., Associate Professor at the School of Medicine, Tulane University, commented on this estimate of intersample variability under cross-examination by Tim Hardy of the AIA:

I just could not see a measurement where I would have 47 percent variability between two points ... If we have 47 percent variability between two points, then all the numbers that we are talking about today should fall out the window. That means that engineers cannot go and measure anything side-by-side because the variability is 47 percent. (Tr. 6/20, p. 89)

Under questioning by Mr. Schneider of the BCTD, Dr. Hammad elaborated on the cause of intersample variability:

The variability that is present depends on the properties of the dust cloud ... [I]f you are walking in a dust cloud ... then there is a difference between dust concentrations at different points. And the point that I was making is that I do not see any reason, and I haven't seen during the past 15 years that I have been working in this field, that dust concentrations between two points four or five inches apart will be 47 percent. Things just don't happen that way. (Tr. 6/20, p. 121)

OSHA believes that the testimony of Dr. Hammad casts considerable doubt on the estimated CV for intersample

variability derived from the Chase and Rhodes study. Furthermore, as discussed above, interpretation of the Chase and Rhodes study with regard to intrinsic error in the NIOSH P&CAM 239 method is complicated by a lack of adequate quality control procedures in many of the participating laboratories.

The AIA relied more heavily on a study conducted by Serocki et al. (Ex. 84-478), in which 15 paired asbestos samples placed in "close proximity" to each other were collected in two worksites where asbestos is present. The sample pairs were collected at 2 lpm for sampling durations of from 25 to 96 minutes. The AIA determined the CV for each sample pair and found that the average CV for intersample variability in this study was 0.62 (Ex. 328, p. A-20). The AIA asserted that electrostatic capture of asbestos fibers on the filter cassette was at least partially responsible for the intersample variability observed in the Serocki et al. report. The AIA concluded from the Chase and Rhodes and Serocki et al. studies that the CV for intersample variability for the P&CAM method lies between 0.4 and 0.5 (Ex. 328, p. A-22).

OSHA does not agree with the AIA's analysis of the Serocki et al. data, for a

number of reasons. First, Serocki and his colleagues did not claim that electrostatic charge was responsible for the differences in results between paired samples collected at low (2 lpm) flow rates; in fact, these authors concluded that differences in results between paired low flow rate samples were not statistically significant. Serocki et al. did observe significant differences between members of paired samples where one sample was collected at a high flow rate (7.5 lpm), and the other was collected at a low flow rate (2 lpm), and these authors attributed these differences, in part, to excess electrostatic charge.

OSHA believes that some of the variability in the Serocki report's low flow rate paired samples can be attributed to the short sampling times used and the resultant low fiber counts. Table 31 shows OSHA's calculation of the number of fibers counted for each of the 15 paired samples used by the AIA in their analysis of the Serocki data, along with the CV obtained by the AIA for each sample pair. This table shows that, for the vast majority of samples analyzed by Serocki et al. (Ex. 84-478), total fiber counts were below the minimum of 80 fibers recommended by the NIOSH 7400 method (Ex. 84-444).

TABLE 31.—NUMBER OF FIBERS COUNTED PER 100 FIELDS AND COEFFICIENTS OF VARIATION REPORTED BY AIA FOR EACH OF 15 PAIRED ASBESTOS SAMPLES REPORTED BY SEROCKI ET AL. (Ex. 84-478)

Sample No.	Concentration (f/cc)	No. of fibers counted (100 fields)	Concentration (f/cc)	No. of fibers counted (100 fields)	Coefficient of variation reported by AIA/NA ¹
1.	0.40	17	1.1	46	0.66
2.	.35	30	.51	44	.28
3.	.17	19	.47	51	.66
4.	1.0	29	* ND (DL = .34)	10	1.33
5.	.76	36	.51	24	.28
6.	.32	23	.42	30	.19
7.	* ND (DL = .16)	10	.90	54	1.37
8.	* ND (DL = .09)	10	.28	30	1.32
9.	* ND (DL = .07)	10	.21	29	1.35
10.	* ND (DL = .14)	10	.58	39	1.34
11.	3.37	236	2.96	208	.09
12.	.24	17	.36	26	.28
13.	7.28	594	7.79	638	.05
14.	7.90	444	9.01	506	.09
15.	.15	17	.14	18	.05

¹ Ex. 328, Appendix A, p. A-20.

* ND=Not Detected; OSHA determined minimum detection level (DL) assuming a fiber count of 10 fibers per 100 fields and a microscopic field area of 0.005 mm².

Evidence to support OSHA's contention about the importance of fiber counts to the reliability of the results is found in an analysis of the CV's for four pairs of 8-hour TWA exposure levels reported by Serocki that were calculated from paired short-term samples taken consecutively over a working day (Ex. 84-478, pp. 11-12). (The AIA did not analyze CV's for these sample results.) When OSHA calculated CV's for each

of these four 8-hour TWA pairs, CV's of 0.115, 0.86, 0.018, and 0.057 were obtained, respectively; these CV's reflect the adequate sampling times and fiber counts associated with these four samples.

OSHA therefore concludes that counting an adequate number of fibers when analyzing airborne asbestos samples is of the utmost importance. Accordingly, OSHA does not agree that