

REPORT

ON

THE COUNTING OF AIRBORNE ASBESTOS FIBERS

PLAINTIFF'S EXHIBIT

MBL-136

This report presents the results of the project entitled "Counting of Airborne Asbestos Fibers" performed by Clayton Environmental Consultants, Inc. (CEC) for the American Petroleum Institute under the terms of an agreement dated September 17, 1974. The project consisted of a one-day workshop of instruction and practice counting at the Clayton Laboratory, the "round robin" counting by 14 participating member companies of API of the asbestos fibers microscope slides prepared and counted by CEC, and the statistical analysis of the results.

The workshop was held at the Clayton Laboratory on April 15, 1975 with representatives of 11 of the 14 companies participating. The first set of prepared slides for the round robin counting was mailed to Participant No. 1 on April 22, 1975. Only 7 participants were able to count this set due to a crystallization of the counting medium, presumably caused by a combination of delays in mailing and the hot weather of June and July of that year. After due deliberation on ways to circumvent these problems, it was decided to send out a second set of slides during the winter season and request the participants to keep in telephone contact with the Project Director regarding each shipment and receipt of the slides. In addition, it was decided to initiate this series immediately after January 1, 1976 to avoid the risk of loss of the slides in December mailings. Despite these precautions, the second set of slides was lost in the mail after counting had been completed by Participant No. 2. A replicate set of slides, held in reserve at

002213

18-0000798

the Clayton Laboratory, was then shipped to participant no. 3 with the further instructions that all future shipments of this set must be made by First Class Mail, Registered, and Return Receipt Requested. With this type of mailing, we were able to complete the round robin testing.

Presentation and Discussion of Results

The Workshop

On April 15, 1975, the workshop was held at the Southfield, Michigan facility of Clayton Environmental Consultants, Inc. The following representatives of API member companies participated.

<u>Name</u>	<u>Company</u>
E. R. Averill	Mobil Oil Corporation, New York, New York
H. P. Blakeney	Bayton Refinery, Exxon Company, U.S.A., Bayton, Texas
R. G. Confer	Exxon Corporation, Linden, New Jersey
R. M. Curtis	Shell Development Company, Houston, Texas
A. Fried	Texaco, Incorporated, Beacon, New York
E. F. Legryk	Atlantic Richfield Company, Harvey, Illinois
D. F. O'Reilly	Sun Oil Company, Marcus Hook, Pennsylvania
G. A. Saunders	Imperial Oil Ltd., Toronto, Ontario
R. L. Stouffer	Standard Oil Co. (Indiana), Naperville, Illinois
H. M. Taylor	Ethyl Corporation, Baton Rouge, Louisiana
R. W. Veit	Phillips Petroleum Company, Bartlesville, Oklahoma

The participants viewed slides that had been prepared by CEC and each participant counted the fibers on two of these slides. The results of these counts are presented in Table I. Slide No. 9 contained chrysotile fibers and Slide No. 11 contained amphibole fibers. The coefficients of variation for these counts were 0.22 and 0.24, respectively.

To convert fibers per field to an asbestos concentration in terms of fibers per milliliter of air, it was assumed that the slides were prepared from air samples collected at 1.7 liters per minute for 120 minutes. The samples were assumed to have been

602213

18-0000799

collected on 37-mm, type AA filters with 100 millimeters in diameter.

Round Robin Counting

Tables II and III summarize the results of the round robin counting conducted during 1975 and 1976, respectively. During 1975 only seven of the participants were able to complete the counting due to crystallization of the counting medium. The coefficients of variation for the four slides counted during 1975 ranged from 0.24 to 0.84. The fibers on Slides 4 and 7 of this series were chrysotile while those on Slides 16 and 18 were amphibole.

During the 1976 series, all participants except Participant No. 9 completed the counting. As shown in Table III, the coefficients of variation ranged from 0.70 to 1.0. For this series, the fibers on Slides 4 and 16 were amphibole and those on Slides 7 and 18 were chrysotile.

Examination of the data from the two round robin counting series indicated some deterioration in the fiber concentration over time. As a result, the fibers on the four slides used during the 1976 series were recounted at the CEC laboratory after they had been counted by the other participants. The initial count was completed on January 5, 1976 while the second count was done on June 23, 1976, more than five months later. The results of this dual count are displayed in Table IV. As shown, the decrease in fiber concentration ranged from 22 to 82 percent.

As a result of this decrease over time shown in Table IV, an attempt was made to determine a relationship between time and

18-0000800

002220

fiber concentration using the data obtained using the robin counting. However, statistically significant relationships were obtained for only four of the eight data sets. In addition, the form of these significant relationships was different in each of the four cases. Thus, it appears that no conclusive statement can be made regarding this apparent deterioration in fiber concentration over time.

18-0000801

002221

TABLE I
RESULTS OF ASBESTOS FIBER COUNTING DURING WORKSHOP

Participant	Asbestos Concentration (Fibers/ml of Air)	
	Slide No. 9	Slide No. 11
CEC	5.31	4.61
1	3.97	4.81
2	2.84	3.18
3	2.84	4.08
4	5.53	4.49
5	4.29	5.12
6	3.94	5.39
7	3.60	3.94
8	4.63	5.95
9	3.11	4.15
10	3.87	6.57
11	3.66	7.33
Mean	3.97	4.97
Coefficient of Variation	0.22	0.24

18-0000802

002222

TABLE II
RESULTS OF 1975 ROUND ROBIN ASBESTOS FIBER COUNTING

Participant	Day	Asbestos Concentration (Fibers/ml of Air)											
		Slide No. 4			Slide No. 7			Slide No. 16			Slide No. 18		
		Count No. 1	Count No. 2	Mean	Count No. 1	Count No. 2	Mean	Count No. 1	Count No. 2	Mean	Count No. 1	Count No. 2	Mean
CEC	1	—	—	1.4	—	—	6.1	—	—	2.4	—	—	1.8
	9	1.0	1.0	1.0	5.0	3.5	4.2	2.2	2.2	2.2	1.8	1.9	1.8
	14	0.36	0.44	0.40	0.90	0.66	0.78	1.4	1.4	1.6	0.97	0.75	0.86
	3	1.4	1.5	1.4	4.6	4.9	4.8	3.1	2.8	3.0	4.0	3.1	3.6
	4	0.43	0.49	0.46	2.8	3.1	3.0	2.4	2.3	2.4	1.7	1.6	1.6
	5	0.28	0.48	0.38	1.4	1.5	1.4	1.7	1.9	1.8	1.3	1.0	1.2
	6	0.02	0.02	0.02	0.38	0.27	0.32	1.5	1.4	1.4	0.66	0.93	0.80
	84	0.08	0.20	0.14	1.1	0.71	0.90	1.9	2.1	2.0	1.7	1.8	1.8
	106												
Mean		—	—	0.65	—	—	2.7	—	—	2.1	—	—	1.7
Coefficient of Variation		—	—	0.84	—	—	0.80	—	—	0.24	—	—	0.52

TABLE III

RESULTS OF 1976 ROUND ROBIN ASBESTOS FIBER COUNTING

122200

Participant	Day	Asbestos Concentration (Fibers/ml of Air)											
		Slide No. 4			Slide No. 7			Slide No. 16			Slide No. 18		
		Count No. 1	Count No. 2	Mean	Count No. 1	Count No. 2	Mean	Count No. 1	Count No. 2	Mean	Count No. 1	Count No. 2	Mean
CEC	1	—	—	7.8	—	—	8.4	—	—	1.2	—	—	0.50
1	7	6.8	7.3	7.0	7.3	7.4	7.4	1.2	1.1	1.2	0.87	0.46	0.66
2	10	7.7	7.2	7.4	7.5	8.3	7.9	3.5	2.9	3.2	2.6	2.3	2.4
3	45	2.8	2.6	2.7	3.6	3.6	3.6	1.1	0.81	0.96	0.65	0.79	0.72
4	42	1.4	1.2	1.3	0.45	0.48	0.46	1.2	1.2	1.2	<0.1	<0.1	<0.1
5	50	1.5	1.6	1.6	2.4	2.3	2.4	0.2	0.2	0.2	0.1	0.1	0.1
6	64	0.82	0.98	0.90	1.6	1.6	1.6	0.55	1.0	0.78	0.45	0.40	0.42
7	85	2.6	2.0	2.3	5.3	6.2	5.8	0.37	0.79	0.58	0.36	0.46	0.41
8	93	2.1	2.0	2.0	3.3	4.0	3.6	0.93	0.84	0.88	0.55	0.57	0.56
10	99	1.0	0.91	0.96	1.8	1.9	1.8	0.76	0.81	0.78	0.36	0.24	0.30
11	137	1.6	1.7	1.6	3.8	4.2	4.0	0.64	0.71	0.68	0.62	0.68	0.65
12	114	0.63	0.70	0.66	0.68	0.62	0.65	0.51	0.40	0.46	0.09	0.13	0.11
13	121	1.2	1.2	1.2	1.9	1.7	1.8	0.59	0.50	0.54	0.32	0.18	0.25
14	128	1.7	2.2	2.0	2.8	4.2	3.5	2.7	2.2	2.4	0.73	0.87	0.80
Mean	—	—	—	2.8	—	—	3.8	—	—	1.1	—	—	0.56-0.57
Coefficient of Variation	—	—	—	0.91	—	—	0.70	—	—	0.75	—	—	1.0

TABLE IV

**RESULTS OF DUAL COUNTING
OF 1976 SERIES SLIDES
BY
CLAYTON ENVIRONMENTAL CONSULTANTS' LABORATORY**

Slide No.	Asbestos Concentration (Fibers/ml of Air)		Decrease (Percent)
	Before Round Robin Counting	After Round Robin Counting	
4	7.8	1.4	82
7	8.4	1.9	77
16	1.2	0.93	22
18	0.50	0.26	48

18-0000805

002225