DRAFT, MEMO

September 23, 1970

To: Sprayed Mineral Fiber Manufacturers' Association, Inc.

From: Tabershaw-Cooper Associates

Re: Preliminary Report on Analysis of Air Samples Collected in a [redacted] Building with Sprayed Mineral Fiber Fireproofing Lining the Return Air Space.

During the period July 7 to July 9, 1970, air samples were collected at two points within the air distribution system of a large San [redacted] Francisco office building. The purpose was to make a preliminary assesment of the probability that asbestos fibers were being added to the air stream in its passage over sprayed mineral fiber fireproofing. The fireproofing material had been applied to structural steel members of the building during its construction in 1966.

The portion of the air distribution system selected for this test supplies air to the 32nd to 41st floors; the airmoving equipment is located on the 42nd floor, which is entirely given over to mechanical support equipment. Air is supplied to the occupied spaces on these floors through enclosed sheet metal ducts partially lined with fibrous glass. Air is returned through the spaces between the structural and suspended ceilings on each floor. It is conducted thence to a large return shaft leading to the 42nd floor mechanical room. Approximately 75% of the returned air (depending on external temperature) is recirculated, the remainder is discharged to the outside. The returning air is in contact with sprayed mineralfiber fireproofing during most of its passage back to the mechanical room.

Sampling and Analysis

Air samples were taken at two points, both within the 42nd floor mechanical room. The first point ("Supply") was immediately downstream of the filter through which the combined recirculated and outside air pass before delivery to the occupied space of the building. The second point ("Return") was the top opening of the return air shaft through which all returned air passes before its eventual recirculation or discharge. Four air samples were taken at each sampling point as matched pairs of samples; the sampling periods were coincident at both locations. The time periods were: 1500 - 1800 on July 7; 0900 - 1500 and 1500 - 2000 on July 8; and 0900 - 1500 on July 9. All air samples were taken by drawing air through 47 mm diameter Millipore organic membrane filters (0.8. um mean pore size) at a flow rate of 0.8 cubic feet per minute. The filter holders were placed in the moving air streams at points where the linear air velocities matched the filter face velocities within ± 25%.

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Analysis of the dust samples collected on the membrane filters was by the method recommended by the United States Public Health Service for the determination of asbestos fibers. A portion of the membrane filter was placed on a microscope slide, cleared by the addition of a drop of a mounting medium matching the index of refraction of the filter, and covered with a cover slip. The mounted filter was then examined with phase contrast microscopy at a magnification of 430X; 100 random microscopic fields (defined by a Porton eyepiece reticle) were so examined, and all fibers counted and placed in size categories. The location of each fiber was marked, and the slide was transferred to the petrographic microscope, where (also at a magnification of 430X) the fibers were identified. The identification in this case was limited to deciding whether or not the fiber in question was asbestos. The numbers of asbestos fibers seen were converted to concentrations, expressed in fibers per liter of sampled air, by taking into account the area counted, the flow rate, and the sampling time.

A secondary analysis was the determination of the gravimetric concentrations of all particular matter. The filters were weighed (± 0.005 mg) before and after exposure; the change in weight was divided by the number of cubic meters of air which had passed through the filters, and the results expressed as micrograms of particulates per cubic meter of air.

All sample filters have been retained and are available for electron microscope analysis, if this becomes desirable.

Results

In Table I are shown the results of the air sampling program. The results are shown both as asbestos fibers per liter (f/l) and as total particulate mass concentrations (ug/m^3).

Asbestos Fibers and Total Particulate Concentrations

Date	Time	Supply		Return	
		f/l	ug/m^3	f/l	ug/m^3
7-7-70	1500 - 1800	1.2	4	9.4	28
7-8-70	0900 - 1500	1.2	5	5.9	40
7-8-70	1500 - 2000	2.7	6	6.9	20
7-9-70	0900 - 1500	2.1	11	6.9	96

Discussion of Results

Although these data are far from complete, comparison of the asbestos fiber concentrations in the supplied air and the asbestos fiber concentrations in the air which has passed over the sprayed mineral fiber fireproofing shows a clear trend. The increases are larger than we have seen in buildings in which the air does not come in contact with this type of fireproofing. Further, the increases are statistically significant with alpha = 0.025. (There is only a 2.5% probability that these results are due to chance.) There is thus no reason to believe that further air sampling in this building would yield results markedly different than those given here.

Outside air samples were being taken during the same period of time covered in this report, at another sampling site near to this building. The asbestos fiber concentrations found there were similar to those found here in the "Supply" samples and significantly lower than the concentrations in the "Return" samples.

We must emphasize that this report is based on limited sampling on one building system, and that extrapolation to other buildings, or to air distribution systems in which the air velocities may be much different, is not warranted. Nevertheless, our preliminary conclusion is that, in this building, asbestos fibers are being added to the air stream passing over sprayed mineral fiber fireproofing.

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