



Bell Laboratories

subject Air Sampling for Asbestos in
the ESS Labs, Bell System
Center for Technical Education,
Lisle, Illinois
Case 48106-3

date December 21, 1978

from C. P. Lichtenwalner

MEMORANDUM FOR RECORD

SUMMARY

On October 31 and November 1, 1978 air samples were collected in the #1 and #2 ESS Labs at the Bell System Center for Technical Education, Lisle, Illinois. All samples were analyzed by phase contrast microscopy and two samples were submitted for further analysis by electron microscopy. All the samples collected were well below the current OSHA standard of 2 fibers/cm³, indeed the number of fibers counted on the filters were not significantly different from the number of fibers present on blank filters. No asbestos fibers were noted by electron microscopy. Therefore under normal conditions there does not appear to be any asbestos hazard to the occupants of these areas from the release of fibers from the sprayed insulation.

BACKGROUND

The ESS Labs at the BSCTE in Lisle, Illinois are in rooms with exposed structural steel beams supporting the ceiling. These beams have been sprayed with an insulation material to retard structural collapse in the event of a fire.

On June 14, 1978 a bulk insulation sample from the ceiling of the ESS Labs at the Bell System Center for Technical Education (BSCTE) was submitted to Mr. G. M. Wilkening by Mr. N. J. DeCapua of AT&T. Analysis of the material by x-ray diffraction and optical microscopy revealed the presences of chrysotile (a form of asbestos) and many long thin fibers of the characteristic morphology of asbestos. In order to assess whether this insulation could be causing the release of asbestos fibers several air samples were collected on October 31 and November 1, 1978.

MEASUREMENTS

All samples were collected using portable air sampling pumps (Bendix BDX-100) to pull air through 0.8 μ m pore size cellulose membrane filters (Millipore MAWPO37A0). These filters were analyzed by phase

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contrast microscopy at 400 x using the methods recommended by the National Institute of Occupational Safety and Health (NIOSH) of counting all fibers (length-to-width aspect ratio of 3:1 or greater) greater than 5 μ m in length. This method was developed for use in the asbestos mining and processing industries and although it is the method required by the OSHA regulations (29 CFR 1910.1001) it has several shortcomings for ambient air sampling like those collected in the ESS Labs. Therefore, two of the samples were also submitted to McCrone associates for analysis by transmission electron microscopy. There are two principle advantages of the transmission electron microscope over the phase contrast microscope for air filter analysis:

1. The transmission electron microscope can be used to see particles smaller than those seen by optical microscopy, and
2. When a fiber is located with the transmission electron microscope one can examine the crystalline structure of the fiber to determine if it is an asbestos fiber.

The cost of a transmission electron microscope analysis (\$300 per filter) precludes its use for analysis of all the filters used in sampling.

On October 31, 1978 six air samples were collected in the ESS Labs. The locations chosen for sampling were representative of the general room environment and are more likely to be occupied than other areas in the room. Samples were collected for approximately 8 hours in each of three locations. One sample was collected in the morning and one in the afternoon to prevent possible overloading of the filters and to increase the number of samples for improved statistical reliability.

On November 1, 1978 two additional samples of shorter duration were taken. Two people were walking on the roof for 7 of the 15 minutes these samples were collected. This was done to determine if a disturbance of the ceiling could cause higher asbestos concentrations.

Details of the sampling and the results of the optical microscopic analysis can be found in Table I. The transmission electron microscopic analysis can be found in the attached report.

DISCUSSION

As can be seen from Table I, the air concentrations are well below the 2 fibers/cm³ standard currently set by OSHA. In addition, all samples are below the 8-hour time weighted average level of 0.1 fibers/cm³ level which is suggested for initiation of a medical monitoring program (U.S. Government, Department of Labor, Occupational

Safety & Health Administration, OSHA Program Directive #300-16, October 11, 1978). It should be noted that the number of fibers seen on the air filter samples collected were not significantly different than the number of fibers counted on the blank filters. In addition, no asbestos fibers were seen by transmission electron microscopy. Thus under the conditions which were present during the time of sampling, which should be representative of normal conditions, there does not appear to be any asbestos hazard to the occupants of these labs from the release of fibers from the sprayed insulation. However, since this insulation does contain asbestos, any operation which would disturb the insulation should be handled as specified in the code of federal regulations 29 CFR 1910.1001.


C. P. Lichtenwalner

MH-7885-CPL-eq

Attachments
Table I
Report

Copy to
R. L. Beach - AT&T
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R. W. Stone, MD

Mary Suhs - BSCTE - Lisle Ill

G. M. Wilkening
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TABLE I

ANALYSIS OF AIR SAMPLES COLLECTED AT BSCTE, LISLE, ILL. 10-31-78 & 11-1-78

SAMPLE	DURATION (min)	VOLUME (Liters)	LOCATION	FIBERS COUNTED*	FIBERS/cm ³
103178A001	283	810	#1 ESS Central Control Desk	4	<.01**
103178A002	286	560	#2 ESS Maint. Control Center	3	<.01
103178A003	290	490	#1 ESS D. A. Tate's Desk	5	<.01
103178A004	190	320	#1 ESS D. A. Tate's Desk	6	.01
103178A006	201	560	#1 ESS Central Control Desk	4	<.01
103178A007+	200	320	#2 ESS Maint. Control Center	10	.02
110178A001	15	42	#1 ESS Maint. Control Center	5	.09
110178A002+	14	26	#2 ESS Maint. Control Center	9	.3
Blank	---	---	Blank	4	---
103178A005	---	---	Blank	10	---

* 100 Microscope fields (.011 mm²/field) were counted. The filter area was 855 mm².

** < = Less than

+ These two filters have been further analyzed by transmission electron microscopy. See attached report.