

From the desk of—

A. E. ALPINE
SENIOR EXECUTIVE VICE PRESIDENT-
GENERAL MANAGER
CEMENT ASBESTOS PRODUCTS CO.

January 11, 1977

TO: Bruce Klomfas

Circulate to Gerald Fox.

A. E. Alpine



ASBESTOS INFORMATION ASSOCIATION

1835 K Street, N.W., Washington, D.C. 20006 • (202) 223-4885

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6 January 1977

Memorandum For: MEMBERS

Subject: Statement in Response to Inquiries with
Regard to NIOSH Report to OSHA on Health
Effects of Occupational Exposure to
Asbestos.

The attached statement, prepared following initial analysis and comment by the members of the Executive Committee, the Association's medical advisor and others, is forwarded for information and appropriate use. The statement is being used in response to queries addressed to the Association.

Effect of the NIOSH document, forwarded to members by memorandum dated December 21, is not known at this time and will probably not be known until after the change of Administration. Current news stories regarding problems with asbestos in ceiling materials and continuing inquiries into the asbestos-health issue both in the United States and abroad may hasten public hearing on the proposed revision to the OSHA standard for exposure to asbestos dust in the workplace.

A letter to Dr. Corn, Assistant Secretary of Labor (OSHA), with regard to the NIOSH document, is being prepared.


R. H. Mereness
Executive Director

RHM:v
Enclosure

CAPCO JEN 0002332



ASBESTOS INFORMATION ASSOCIATION

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6 January 1977

Statement Regarding NIOSH Document to OSHA Dated December 1976
"Re-examination and Up-date of Information on the Health Effects
of Occupational Exposure to Asbestos"

From preliminary review of the NIOSH document, "Re-examination and Update of Information on the Health Effects of Occupational Exposure to Asbestos," dated December 1976 and transmitted to the Department of Labor December 15, the following comments are made:

. Studies cited in the NIOSH document do not define the levels of airborne asbestos dust to which individuals were exposed. The levels of exposure were most probably much higher than those now being experienced in the workplace. There is no evidence to support the proposition that the present OSHA standard for occupational exposure to asbestos-- viz 2 f/cc of air longer than 5 microns in an eight-hour time-weighted average with a ceiling limitation against any exposure in excess of 10 f/cc is not safe for exposed populations.

. Contrary to the NIOSH statement, state of the art and practical considerations rule out sampling and analytical

cated by the presence of a chrysotile fiber in the digest of GI tissue of a rat given taconite tailings, and the presence of a fiber consistent with either amosite or taconite tailings in the digest of mesenteric tissue of a control rat), it is noteworthy that following the administration of a single large dose (400 mg) of either amosite or taconite, no evidence of transmigration of fibers was observed in 16 of the 18 rats gavaged.

Oleomargarine Feeding

The results of this portion of the investigation indicate that if transmigration of mineral fibers from the GI tract occurs at all, it must be a rare event since only five fibers consistent with those ingested were found in the digests of mesentery of three rats and four such fibers were found in the lung digests of two other rats (Table 1). Other fibers (five in all) found in the digests of mesenteric tissue of three rats probably represented contaminations—such as the chrysotile fiber in the digest of the rat fed amosite.

The importance of the nine fibers (Table 1) found in the tissue digests of five of the 37 rats fed or gavaged with mineral fibers must be evaluated in the perspective of the billions on billions of fibers that had been introduced into the GI tract of these animals. If transmigration of fibers through the GI wall were a fact, one would logically expect more than one to three fibers out of many billions to accomplish this feat, and this phenomenon should be demonstrable in more than five out of 37 rats. The dose of asbestos ingested by the rats is equivalent to a consumption of 1.1 to 2.5 kg asbestos by a 75-kg man in six days, and double this amount in terms of taconite tailings. The importance of the nine fibers found is reduced to a negligible level by the finding in four rats of five fibers that are obvious contaminants, thus pointing to a very high probability that the nine fibers in question are also contaminants. As indicated previously, all fibers were ultramicroscopic in dimensions, and could have been derived from the air of the laboratory, as well as from the unfiltered water

and the technique used (weighing of the tissues) in the preparation of the study samples.

Butter Feeding

The failure to detect penetration of the GI mucosa or transmigration of optically visible fibers in this study is important since asbestos fibers in this size range are known to be pathogenic, and there is a growing body of evidence to indicate that asbestos fibers in the submicronic size range are not pathogenic.* The fact that no cancer of the GI tract or mesothelium developed after long-term exposure of the GI mucosa to large numbers of asbestos fibers is highly significant.

Long-Term ad Libitum Feeding of Asbestos in Butter

The lack of success in the third laboratory using optical as well as electron microscopy in finding evidence of penetration of asbestos fibers after one and three months of ingestion of these mineral fibers respectively, adds weight to the importance of these negative findings in the other two laboratories.

GENERAL COMMENTS

The method of digestion used in this investigation by one laboratory is faulted by the possibility of chance contamination that may be difficult to evaluate and thereby give rise to

false-positive results. The possibility of false-negative results also exists. For instance, fibers may be lost by incomplete digestion of the tissue, by incomplete sedimentation during centrifugation, and by being covered with partially digested material on the electron microscope grid. However, in view of the ratio of the amount of tissue examined by the digestion method as compared with that examined by the electron microscope section method (many thousands to one), the chance of a negative result with the former when the latter is positive would appear to be negligible.

Although transmigration of large objects such as bullets from one portion of the body to another has been documented, this transmigration is concerned with foreign materials that had already achieved penetration into the body interstitium. The penetration of inhaled dust particles through the alveolar membrane and the subsequent lymphatic transport to satellite nodes has been recognized and studied experimentally for more than a century but the mechanism by which this penetration takes place is still unknown. Drinker and Field* did determine that particles may penetrate the alveolar membrane and appear in the lymphatic fluid within minutes after their insufflation into the lung of a dog. This rapid penetration of the alveolar membrane by

Table 1.—Tabulation of Fibers Found in Digests of Tissues*

Tissue Digest	Dust	Fibers Found		Contaminating Fibers (Chrysotile and Others)	
		No.	Week-Rat†	No.	
Mesentery	Amosite	2	2 wk	1	1 wk
	7 rats	2	5 wk		(chrysotile)
	Taconite tailings	1	1 wk	1	2 wk (chrysotile)
	10 rats				GI tract
	Control (no dust)			2	
	4 rats				
Lung or kidney	Amosite	1	2 wk		
	10 rats		(lung)		
	Taconite tailings	3	2/7 wk		
	10 rats		gavage (lung)		
	Control (no dust)			1	(kidney)
	7 rats				
Total	48 rats	9		5	

* Electron microscopic examination.

† Week-rat refers to the animal killed at specified time.

Table 2.—Tabulation of Tumors Found in Rats Fed Asbestos

Types of Tumor	Experiment 2				Experiment 3		
	Chrysotile, 10 mg	Crocidolite, 5 mg	Crocidolite, 10 mg	Control	NW Cape Crocidolite, 10 mg	Transvaal Crocidolite, 10 mg	Control
Mesothelioma	0	0	0	0	0	0	0
Carcinoma	2 (breast)	0	0	3 (breast)	0	0	0
Sarcoma	0	0	0	1 (thigh)	0	0	0
Lymphoma	0	0	1 (axillary nodes)	1	0	0	0
No. of animals	31	33	34	24	35	28	24

particles was confirmed by Hamburger and Robertson" using a different technique.

There are, however, important differences between the alveolar membrane that protects the lung interstitium from intrusion by foreign material and the GI mucosa that, among other functions, also performs a similar guard duty. Whereas the alveolar membrane is largely composed of thin squamous cells, the intestinal mucosa is composed not only of mucin-covered tall columnar epithelium but also by a substantial tunica propria mucosae. The GI mucosa constitutes, therefore, a barrier against the intrusion of foreign materials that is many times more formidable than the alveolar membrane.

Penetration of the alveolar membrane, as an accomplished fact, is best demonstrated by the presence of enlarged, discolored, and often stony-hard satellite lymph nodes. No such involvement of mesenteric lymph nodes has been described in coal miners or silicotic hard-rock miners even though they had ingested during their lifetime many times the amount of dust than finally remained stored in their lungs and satellite nodes. Consideration should be given to the fact that the dust stored in the lungs is estimated to represent only 1% to 2% of the dust that had been inhaled and, after clearance from the lungs, swallowed.

If penetration of finely divided foreign particles through the GI mucosa were a common event or even a relatively uncommon event, over the lifetime of an individual, the submucosa of the GI tract and the mesenteric lymph nodes would be the repositories

for a considerable accumulation of a wide variety of materials other than those cleared from the lungs. One need only consider the wide variety of insoluble materials, mostly cellulosic, that are part of many foods. Some, like pepper, can be very irritating when in contact with unprotected tissue and would cause a severe inflammatory reaction. Furthermore, if penetration of the GI mucosa by particulates did occur, the amount of stored material in the intestinal submucosa and in mesenteric lymph nodes would increase with age. The fact, however, is that storage of such foreign material has not been seen in either the intestinal wall or the mesenteric nodes.

The failure to find fibers by electron microscopic examination in sections of intestinal wall of rats fed asbestos or taconite tailings is consonant with the failure to find evidence of transmigration in the digests of other tissues of these animals.

SUMMARY

The more important conclusions can be briefly summarized as follows:

1. Twenty-one months of intimate contact of rat GI mucosa with very high concentrations of chrysotile asbestos failed to produce cancer or any other kind of lesion. These results are highly important inasmuch as in earlier work different modes of asbestos exposure have resulted in cancer production within 16 to 17 months.

2. Twenty-one months of high-dose-chrysotile feeding of rats resulted in no evidence of penetration of GI mucosa by the mineral fibers and no incontrovertible proof of

transmigration as judged from electron microscopic studies.

3. Administration of a single dose of 400 mg of either amosite or taconite tailings by gavage provided no evidence of transmigration of fibers even though the method of examination used was many thousand times more sensitive than the method of examining tissue sections.

4. The voluntary intake by rats within six days of 2 to 10 gm of amosite or taconite tailings mixed in oleomargarine likewise provided no evidence of transmigration of mineral fibers, although a total of nine fibers was found in all of five rats that could have been considered evidence for transmigration, except for the probability that they were contaminants.

5. Short-term and long-term feeding (up to 1½ years) of chrysotile and crocidolite by a second laboratory resulted in no tumor production in the GI tract or mesothelium during the lifetime of the animals. Light microscopic studies provided no evidence that penetration of tissues by ingested asbestos fibers occurred.

6. A partially completed light microscopic and electron microscopic study in a third laboratory has provided data that support the results and conclusions of the other two laboratories with regard to the failure of ingested asbestos fibers to penetrate tissues.

7. The penetration of the pulmonary alveolar membrane and transmigration of inhaled dust particles are facts readily demonstrable by the presence of enlarged, discolored, mineralized tracheobronchial lymph nodes. In contrast to this, the GI mucosa, constituting a much more formi-

dable barrier, does not permit the penetration of insoluble particulates as is evidenced by the lack of similar involvement of mesenteric lymph nodes in miners who, during their

lifetimes, ingest nearly 100 times the amount of dust stored in their lungs and satellite lymph nodes, plus the considerable amount of insoluble particulates in the daily food intake. Nei-

ther is evidence of penetration or storage of inhaled or ingested foreign material to be found in the intestinal wall of these miners.

References

1. Gross P, et al: Mineral fiber content of human lungs: A comparison of the counts obtained from the lungs of people of Pittsburgh, Pennsylvania, with those from the lungs of people of Charleston, South Carolina. *Am Ind Hyg Assoc J*, to be published.
2. Langer AM: Discussion in Langer AM, et al: Inorganic fibers, including chrysotile, in lungs of autopsy: Preliminary report, in Walton WH (ed): *Inhaled Particles: III*. Unwin Brothers, Limited, The Gresham Press, Old Woking, Surrey, England, 1971, vol 2, p 693.
3. Policard A, quoted by Gordonoff T: Epuration pulmonaire, in *Compte Rendus des Journees Francaises de Pathologie Miniere*, Paris, Charbon-
- nage de France, Oct 27-28, 1960, p 165.
4. Bonser GM, Clayson DB: Feeding of blue asbestos to rats, in the *45th Annual Reports of the British Empire Cancer Campaign*, 1967, p 242.
5. Smith WE: Asbestos, talc and nitrites in relation to gastric cancer. *Am Ind Hyg Assoc J* 34:227-228, 1973.
6. Gross P, et al: Experimental asbestosis: The development of lung cancer in rats with pulmonary deposits of chrysotile asbestos dust. *Arch Environ Health* 15:343-355, 1967.
7. Gross P, Harley RA Jr: Asbestos-induced intrathoracic tissue reactions. *Arch Pathol* 96:245-250, 1973.
8. Pontefract RD, Cunningham HM: Penetration of asbestos through the digestive tract of rats. *Nature* 243:352-353, 1973.
9. Gross P: Is short-fibered asbestos dust a biological hazard? *Arch Environ Health* 29:115-117, 1974.
10. Drinker CK, Field ME: *Lymphatics, Lymph and Tissue Fluid*. Baltimore, Williams & Wilkins Co, 1933.
11. Hamburger M, Robertson OH: unpublished experiments quoted by Robertson OH: Phagocytosis of foreign material in the lung. *Physiol Rev* 21:112, 1941.

MYTHOLOGY

Index of Gods, Etc

The Triple Gods

The triple gods of hypertension

And other osclerosis—

Sir William Osler is

Authority for this recension—

The triple gods, I meant to say,

Were Bachus, Vulcan, Venus.

Sir William's counsel is hygienous

And surely non-sclerotic, though it may

Be justa nute restrictive; I remark

The lethal one of these is work.

Charon

I sing of Charon and his ferry—

The price is right,

Short is the flight,

But the journey is dismal—very.

—Rusticatus

functions at a 0.1 f/cc level --the standard level recommended by NIOSH to OSHA -- by phase contrast microscopy at 400 - 450x magnification.

Asbestos is a generic term used for several fibrous minerals found in many areas of the earth's crust. Chrysotile, a serpentine mineral fiber, is the most common form of asbestos. Because of extraordinary fire and heat resistance, strength and stability and other unusual physical properties along with availability at relatively low cost, asbestos is used in a wide variety of domestic products and industrial applications, in many cases without practicable substitute. In most products wherein asbestos is a vital ingredient, the fibers are bonded or locked in as with asbestos cement, plastics, millboard and hundreds of other products. The risk of exposure to respirable particles of asbestos from normal use of these products is negligible. Spraying of asbestos for insulating purposes, once a fairly common practice, is prohibited by federal regulation.

The absence of proper dust control procedures particularly in the World War II period and before when little was known as to the effect of excessive exposures of asbestos dust on worker's health led to the incidence of asbestos-related disease following now known latency periods. With the knowledge of risks to health from asbestos dust that the medical community began to recognize in the 1930s and 1940s, the asbestos industry -- mining, milling and product manufacture -- has spent millions

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of dollars on medical research and engineering systems for dust control.

The asbestos industry continues its extensive efforts to eliminate worker exposure to asbestos dust through engineering controls and disciplined work practices. Concurrently, the tempo of investigation into the many questions surrounding the highly publicized asbestos-health relationship -- including research and analysis of evidence of asbestosis, lung and GI cancer and the rare disease mesothelioma -- has accelerated in world-wide effort to develop thorough scientific information on which to base sound, unemotional judgment on the issues of asbestos and health.

Conformance with the present OSHA regulatory standard, a challenging job, is being accomplished.

Comments on the proposed revision to the OSHA standard for occupational exposure to asbestos, from 2 f/cc to 0.5f/cc (29CFR Part 1910), submitted by this Association on behalf of the asbestos industry April 9, 1976 are available for review. The asbestos industry, after in-depth study of medical literature, technical feasibility and economic impact by independent consultants has recommended to OSHA adoption of a permanent standard of 2 f/cc of air time-weighted average, with a peak of 10 f/cc, using the membrane filter test method, phase contrast microscopy at 400-450 x magnification.

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In its written comment to OSHA on behalf of the asbestos industry the Asbestos Information Association/ North America stated:

" Since there is no new evidence to indicate that the 2 f/cc TWA standard adopted in 1972 does not adequately protect the health of the working population, it would be grossly inequitable and a denial of due process to lower the standard at this time."

This statement continues to reflect the studied opinion of the asbestos industry.

R. H. Mereness, Executive Director, AIA/NA