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JOHNS-MANVILLE CORPORATION

TWENTY-TWO EAST FORTIETH STREET

NEW YORK, N. Y. 10018

EXECUTIVE OFFICES

April 14, 1969

"ASBESTOS-CEMENT WATER PIPE AND HUMAN HEALTH"

The attached paper "Asbestos-Cement Water Pipe and Human Health" has been prepared to answer medical questions which have been raised in recent months. These questions relate to a product we have brought into common use in Domestic Water Systems over a period of nearly 40 years. Therefore, we feel an obligation to our customers to answer these questions.

We have initiated studies and sought the advice and guidance of the most qualified medical consultants in this country to obtain factual evidence on this matter. All of this evidence is against the allegation that the use of TRANSITE Water Pipe has any influence on the development of any disease.

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April, 1969

ASBESTOS-CEMENT WATER PIPE AND HUMAN HEALTH

Asbestos-cement (A/C) pipe for water supply and disposal systems was developed in Europe in 1913 and introduced into the United States in 1929. Asbestos fiber, added to Portland cement and silica, provides the structural strength required for durable, lightweight, rustproof, economical piping.

These advantages have led to the use of great quantities of asbestos-cement pipe over the past half century, for water supply and sewer systems, irrigation projects, drainage systems, industrial processes, heating and cooling installations, and as conduits for electrical and telephone wires.

For water supply systems, A/C pipe meets the specifications of the American Water Works Association and of the U. S. Government. Under Federal Specification SS-P-351A, A/C water pipe is sold to the U.S. Public Health Service. The World Health Organization uses large quantities of A/C pipe in its programs to improve the quantity and quality of water systems throughout the world.

Because of recognized occupational health hazards connected with the excessive and prolonged inhalation of asbestos dust, the question has been raised as to whether there might be a possible health hazard associated with drinking water that has passed through asbestos-cement pipe.

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In late 1967, the U.S. Public Health Service was asked to look into this question. The PHS discussed the allegations with two prominent medical authorities in the field of asbestos and health "to confirm our view that there is a low probability of any health hazard associated with the use of asbestos-cement pipe."

The two experts were Dr. George Wright and Dr. Irving J. Selikoff, who are referred to by the PHS as "recognized authorities in the field.

Dr. Wright is Chairman of the Institute for Occupational and Environmental Health, and head of the Medical Research Department, St. Luke's Hospital, Cleveland, Ohio. Dr. Selikoff is professor and chairman, Division of Environmental Medicine, Mt. Sinai School of Medicine, New York City.

Briefly, the opinions of these two prominent authorities are as follows:

DR. WRIGHT: "To my knowledge, there have been no reports in medical literature of a relationship between gastrointestinal (GI) cancer and the drinking of water supplied through an asbestos-cement pipe water system. Most assuredly, the ingestion of one or a hundred or a thousand asbestos fibers, on one or more instances, cannot be related to gastrointestinal cancer, since in asbestos workers exposed far more heavily five days a week, over a period of many years, there is no scientifically acceptable evidence of a higher than average frequency of GI cancer."

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I. R. SELIKOFF: There is "no evidence at all at this time that the presumably very low level exposure by ingestion which might occur by intake of water supplied through asbestos-cement pipe has resulted in a recognized health hazard.

EVIDENCE SUPPORTS COMMENTS BY DOCTORS

The comments of Dr. Wright and Dr. Selikoff are supported by five types of evidence:

1. Workers in certain asbestos-related trades have been exposed to heavy concentrations of asbestos dust on the job and have, as a result, swallowed considerable quantities of this material. Despite this exposure, no unusually high rate of gastrointestinal cancer has been reliably demonstrated among these workers.
2. The exposure of laboratory test animals to heavy concentrations of asbestos dust has resulted in no observed cases of gastrointestinal cancer.
3. An experiment in which laboratory animals were fed asbestos shows that the fiber is passed through the intestinal tract without being absorbed.
4. Recent research indicates that only insignificant amounts of asbestos are released into drinking water which flows through asbestos-cement pipe.
5. In the face of ever-increasing use of asbestos-cement pipe and of asbestos fiber, the death rate from gastrointestinal cancer in the United States has shown a steady decline over the last 20 years. This national trend also applies,

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in general, to those cities where A/C pipe has been used in water systems for long periods of time. Similarly, in most of the European countries where A/C pipe has been used extensively -- in many countries for more than half a century -- the death rate from this type of cancer has also declined.

These five points will now be discussed in further detail.

1. OCCUPATIONAL EXPOSURE TO ASBESTOS HAS NOT RESULTED IN ABNORMALLY HIGH GI CANCER RATE

Scientists are now investigating a possible relationship between heavy occupational exposure to inhaled asbestos dust and lung cancer; however, there is no evidence whatever to support the contention that the swallowing of asbestos fibers produces any disease.

Dr. Wright points out that insulation workers are "heavily exposed" to the ingestion of asbestos because a certain percentage of inhaled asbestos dust is coughed up and then swallowed. "I would reason from this, therefore, that in the insulation workers the gastrointestinal exposure to fiber would be high and therefore if there was a strong relationship of fiber ingestion to gastrointestinal cancer, it should not be difficult to demonstrate it." Dr. Wright declares, "there is no evidence to support the contention that even the highest intensity of exposures that we know of in industry leads to clear-cut increased frequency

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of gastrointestinal cancer."

SUMMARY: Studies made on workers exposed to a heavy concentration of asbestos dust do not support the allegation that the minute amounts of asbestos present in water would lead to increased GI cancer risks.

2. ANIMAL EXPERIMENTS WITH ASBESTOS HAVE NOT PRODUCED GI CANCER

Laboratory test animals are used extensively in cancer research to study their reactions to various substances that are suspected of having some relationship to cancer in humans. Tests of this nature, using asbestos, have been conducted on mice for periods as long as two years and on dogs for four or more years. The amount of fiber swallowed by these experimental animals far exceeds even that of insulation workers.

These animal tests have shown no relationship between fiber exposure and gastrointestinal cancer. In fact, there is no record of a tumor of any sort forming in the gastrointestinal tract of the test animals.

In addition, experiments conducted by Dr. Selikoff on hamsters generally support the dog-and-mice feeding findings.

"Yet," Dr. Selikoff commented, "the exposure to ingested asbestos in this experimental work was very much larger indeed than might be anticipated in water obtained from asbestos-cement pipes."

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SUMMARY: Animal experiments confirm the studies made of the health records of asbestos workers, which show no relationship between asbestos exposure, whether by inhalation or swallowing, and GI cancer.

3. More recently, British scientists conducted an experiment in which rats were fed asbestos dust over a long period of time. They reported in 1968: "No tumors were observed, nor were there any lesions in the intestinal wall which might have suggested a previous absorption of asbestos fibers. A microscopical search for fibers in sections of thirty organs was also negative. This experiment failed to demonstrate absorption of asbestos fibers from the intestine." The British Medical Journal (July 13, 1968) commented on this experiment: "It is comforting that ingested asbestos fibers are not absorbed."

SUMMARY: Studies made on rats that were fed asbestos dust over a long period of time showed that the fiber passed through the intestinal tract without being absorbed.

4. MUNICIPAL WATER AND ASBESTOS

Even the so-called "pure" water distributed through municipal systems contains traces of many minerals and chemicals, the amount and type depending upon the source and location of water supplies. It would not be surprising, therefore, to find trace particles of asbestos in water supplied through almost any type of piping system.

A study was recently conducted of the drinking water in nine cities that have used asbestos/cement pipe for periods ranging from eight to 17 years. The highest asbestos content in this water was a mere 6 micrograms -- about one five-millionths of an ounce -- of asbestos fiber per gallon. In terms of human consumption this means that if a man were to drink eight glasses of water per day, he might swallow a total of twenty-seven-ten-thousandths of an ounce (.0027) of asbestos in a lifetime of 70 years.

How does this compare with the exposure of a man working in an asbestos plant? Under the accepted Threshold Limit Value (TLV) for asbestos inhalation in industry, in 45 years a worker would inhale -- depending upon the size of the fiber -- between 700 and 5400 times more asbestos, by weight, than anyone could get from the drinking water in 70 years. What is relevant here is the fact that there is no reliably demonstrated increased frequency of GI cancer among asbestos workers, who cough up and swallow a substantial portion of the fiber they inhale.

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SUMMARY: Although additional research is being carried on, present evidence does not support the contention that asbestos-cement water pipe releases asbestos into water in amounts that can constitute any health hazard to the general public.

5. DECREASE IN FREQUENCY OF GASTROINTESTINAL (GI) CANCER IN THE UNITED STATES

Figures from both the National Office of Vital Statistics of the United States Public Health Service and from the American Cancer Society show a steady decline in the frequency of GI cancer in the United States from 1947 to 1966. The death rate per 100,000 of population from GI cancer dropped from 55.2 in 1947 to 48.4 in 1966. Available U.S. figures also show GI cancer declining since 1960 as a percentage of total deaths:

Table I. Deaths from Selected Causes for the U.S.

<u>Year</u>	<u>Total Deaths All Causes</u>	<u>Deaths from GI Cancer</u>	<u>GI Cancer as % of All Deaths</u>
1960	1,711,982	91,035	5.3
1962	1,756,720	92,047	5.2
1964	1,798,061	93,158	5.1
1965	1,828,136	94,305	5.1

Similar trends can be found in cities all across the country.*

Take for example the comparison between Nashville, Tenn., where no A/C pipe has been used and Knoxville, Tenn., where asbestos-cement pipe has been used since 1938. Here's how U.S. government figures apply to those two cities.

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Table II. Nashville-Knoxville Comparisons

	<u>Nashville</u> <u>(no A/C pipe)</u>		<u>Knoxville</u> <u>(A/C pipe since 1938)</u>	
	<u>1960</u>	<u>1965</u>	<u>1960</u>	<u>1965</u>
Deaths from All Causes	3,675	3,704	3,038	3,256
Deaths from GI Cancer	129	166	131	133
GI Cancer Deaths as Percent of Total	3.5%	4.5%	4.3%	4.1%

* (In considering these figures, it is important to remember (a) that cities tend to have higher rates of cancer than rural areas, so some city figures will run higher than the U.S. average, and (b) that minor fluctuations from year to year in the percentage figures, whether up or down, are of little or no significance, especially if the numbers are small.)

Similarly, in Europe, where asbestos-cement pipe has been in use for fifty years or more, the death rate from GI cancer is generally downward. For example, in Switzerland, where the use of A/C pipe is the highest per capita of any Western European country, the death rate for GI cancer has dropped from 81.9 per 100,000 of population in 1951 to 63.9 in 1962, according to the latest figures available from the World Health Organization.

Thus, the actual frequency of gastrointestinal cancer in no way supports the allegation that the use of asbestos-cement water pipe can cause an increase in this type of disease. In fact, during the very years that the use of A/C pipe has increased in

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the United States, the rate of GI cancer has declined. It is clear that no causal connection has been demonstrated between the use of A/C water pipe and GI cancer in human beings.

SUMMARY: "Substantial and increasing amounts of asbestos fiber have been used in various ways from 1930 on in the United States, and one would anticipate that if this fiber was playing a role in the causation of gastrointestinal tumors, it might be expected to have led to an increase in tumors, rather than the observed decrease."
(Dr. George W. Wright)

CONCLUSIONS

Five types of evidence have been examined: (1) occupational exposure of workers to inhaled and swallowed asbestos dust particles; (2) results of experiments with test animals exposed to large quantities of asbestos particles; (3) results of experiments to determine whether asbestos is absorbed in the intestinal tract; (4) results of tests to determine the amount of asbestos in municipal water supplies; and (5) the frequency of GI cancer in the U.S. and Europe, including those areas using asbestos-cement water pipe.

All of this evidence is against the allegation that the use of A/C water pipe has any influence on the development of GI cancer.

Finally, it is important to view this situation in its proper perspective.

Asbestos is by no means alone in having the finger pointed toward it as a possible health hazard. Literally hundreds of substances --

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as common and everyday as fuel oil, charcoal broiled steaks, iron rust and egg yolks are known or suspected of being cancer-causing agents under certain experimental conditions.

The point is that nearly everything we use and create in our increasingly complex society has been suspected, by someone, of being a potential hazard.

To forego the many benefits of these products of modern technology -- simply on the basis of suspicions that are unsupported by medical evidence, would be a great and unwarranted disservice to the American public.

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