

**A/C Pipe
Producers Association****Internal Correspondence**

TO Executive Committee, Industry Promotion and
Steering Committee, P. Kotin, A. Kahn

FROM *J. C. Jackson*
J. C. Jackson, President

DATE June 24, 1977

SUBJECT Health Effects of Asbestos in Water

Enclosed is a summary memorandum prepared by EPA's Health Effects Research Laboratory in Cincinnati dealing with the subject "Health Effects of Asbestos in Water". The report was provided by its author, J. Millette, during my June 20, 1977, visit to EPA's Cincinnati Laboratories. It was prepared at the request of EPA personnel in Washington for what purpose, one can only speculate. One must presume the issue of asbestos in potable water supplies is again quietly, but most assuredly, under review by policy makers within the Agency. A presumption I should be able to confirm or dismiss through a series of meetings with Agency personnel over the next few weeks.

JCJ:mcm
Enclosure

Copies to: Executive Committee
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Cincinnati, Ohio 45268

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SUBJECT: Health Effects of Asbestos in Water

DATE: June 8, 1977

FROM: Director, Health Effects Research Laboratory

TO: Deputy Assistant Administrator
for Health and Ecological Effects (RD-683)

There is no doubt that asbestos in its various forms is pathogenic in animals and humans. All types of asbestos fibers produce fibrotic reactions and tumors in animals. Current consensus is that the carcinogenic action of asbestos primarily depends on the size and shape of asbestos particles rather than on the presence of carcinogenic contaminants (Drury, et al. 1977). Nearly all of the positive evidence associating asbestos with human diseases comes from studies of occupational groups. Lung cancer and pleural and peritoneal mesotheliomas are the predominant forms associated with asbestos exposure, but gastrointestinal tract malignancies may also result.

The main health effects concern for asbestos in water is based on the epidemiological studies of workers exposed to asbestos by inhalation which have shown increased death rates from gastrointestinal cancer. With respiratory exposure it is likely that more fibers are swallowed than remain in the lungs (Rohlich; NAS, 1977). The Safe Drinking Water Committee of the National Academy of Sciences concludes that studies of occupational asbestos exposure and gastrointestinal cancer by Selikoff et al.; Mancuso (1965), and Elmes and Simpson (1971) "strongly suggest that ingestion of asbestos fibers can result in an increased risk of cancer of several sites" (NAS-Water and Health Report-Preprint, 1977).

Experimental (animal) evidence concerning the possible hazard from ingesting asbestos is both contradictory and inconclusive. Some animal studies indicated fiber penetration of the gut wall and formation of gastrointestinal tumors, while other such studies showed no tumors and indicated that the gastrointestinal tract is an effective barrier to penetration. The recent finding by EPA researchers (Cook, 1977) of amphibole asbestiform fibers in the urine of persons who had been drinking unfiltered Lake Superior water known to contain amphibole fibers is the first evidence that such fibers from drinking water can cross the gastrointestinal membranes of humans.

Epidemiologic studies in Duluth of the patterns of cancer mortality (to 1972) and incidences of gastrointestinal cancer (1969-1972) do not show any increased rates which could be attributed to the amphibole asbestiform fibers which have been in the water supply since 1955 (Masson et al. 1974 and Levy et al. 1976). Since many cancers have long latency periods (Selikoff et al. 1970 found that among asbestos insulation workers the mean lapsed time for peritoneal mesothelioma was 43 years) these epidemiology findings do not exclude the possibility that an increase in cancer rates may appear within the next fifteen years.

A recent epidemiology study of Connecticut Townships did not show any excess in cancer incidence for the stomach, colon, or rectum during 1935-1973 that could be related to about a 20-year use of asbestos-cement pipe for drinking water (Craun et al., 1977). Sample analysis is currently being conducted to determine the fiber concentrations to which the Connecticut residents were exposed. The preliminary results show that the fiber levels in the drinking water are several orders of magnitude below those reported for Lake Superior water.

Fears (1976) studied cancer mortality rates in counties in the U.S. with recognized deposits of asbestos and did not find excess cancer rates. Montgomery County, Maryland, was not one of the counties considered in Fears' study, nor was it reported if any of the counties used asbestos bearing rock for road surfacing as does Montgomery County. Water wells drilled into such deposits would be expected to have fiber counts. No well waters from the Rockville area have been analyzed by this laboratory. However surface waters which supply drinking water for the majority of the people in the area have been analyzed. The treated waters at the Washington-Potomac Filter Plant and the City of Rockville Water Treatment Plant did not contain significant numbers of asbestos fibers. A sample from the Dale-Carlia Filter Plant in the District of Columbia contained 0.2 million chrysotile fibers per liter. These plants receive water from the Potomac River within several miles below Rockville, Maryland.

Concentrations of asbestos fibers in effluents from mining operations may be as high as 10^{12} fibers per liter but concentrations in drinking water vary from less than 10,000 to 600 million fibers per liter. A few cities are known to have a fiber count consistently over one million fibers per liter. Counts as high as 30 million fibers per liter have been found in an A/C pipe system. Although dose-response relationships are indicated by epidemiological and other studies, especially for asbestos-related lung fibrosis, quantitative dose-response values, such as threshold limit values that show the maximum exposure level which can be tolerated without pathological effects, are not possible at this time. No consensus exists concerning safe environmental concentrations of asbestos fibers.

While there is general agreement that the size of the fiber is important to its carcinogenic potential, it is not clear which, if any, sizes are not carcinogenic. A long term animal feeding study now under way should provide some information in this area.

There is no conclusive evidence available which implicates present concentrations of asbestos fibers in drinking water as hazardous to the health or longevity of the general population. However, because of the health effects demonstrated by occupational exposure to asbestos and the long latency period involved, ingestion of asbestiform fibers through the drinking water should be kept to a minimum. Source waters which contain high amounts of mineral fibers should be treated by effective coagulation and filtration processes and asbestos-cement pipe should not be used in systems which transport aggressive water.

Prepared by: J. Millette, Exposure Evaluation Branch, HERL/CIN
FTS 684-7462, June 8, 1977.

REFERENCES

1. Drury, J.S., Dinger, C.A., Hammons, A.S., Whitfield, B., Huff, J.E., Cone, M.V., Lewis, E.B., Pardue, J.W., Chilton, J.M. Review of the Environmental Effects of Asbestos, Draft, April 1977, prepared for the Health Effects Research Laboratory by Oak Ridge National Laboratory under Interagency Agreement IA ERDA 40-443-73.
2. Rohlich, G.A., Chairman, Summary Report: Drinking Water and Health, A report of the Safe Drinking Water Committee, National Academy of Sciences, Washington, D.C., 1977
3. Rohlich, G.A., Chairman, Drinking Water and Health, A report of the Safe Drinking Water Committee, Advisory Center on Toxicology, Assembly of Life Sciences, National Research Council, National Academy of Sciences, Preprint 3, (report in final review) Washington, D.C., 1977.
4. Cook, P.M., (ERL-Duluth), Letter to P.P. Quinn, (USEPA Office of General Council) April 11, 1977.
5. Craun, G.F., Millette, J.R., Woodhull, R.S. and Laiuppa, R., Exposure to Asbestos Fibers in Water Distribution Systems, Presented at the American Water Works Association Conference, Anaheim, California, May 8-13, 1977.
6. Masson, T.J., McKay, F.W. and Miller, R.W., Asbestos-like fibers in Duluth Water Supply, J. Am. Med. Assoc., 228(8): 1019-1020.
7. Levy, B.S., Sigurdson, Mandel, J., Landon, E. and Pearson, J., Investigating Possible Effects of Asbestos in City Water Surveillance of Gastrointestinal Cancer Incidence in Duluth, Minnesota, Am. J. Epidemiol., 103(4):362-368.
8. Full references for the articles by Selikoff, et al., Mancuso(1965) and Elmes and Simpson(1971) will be found in Reference #3.