PLAINTIFF'S EXHIBIT

CAP-1205

CAPCO PIPE COMPANY, INC.

Birmingham, Alabama

April 28, 1981

TO: Mr. C. F. Barber

FROM: Mr. W. T. Whitley

SUBJECT: A/C Pipe and Health

Attached please find the A/C Pipe Producers Association report on several studies involving the ingestion of asbestos and health.

I thought this would be of interest to you inasmuch as it mentions two studies that were done specifically on the State of Connecticut; one, the Harrington Study, and the other the Meigs Study.

If there is anything further which you feel may be of help in your community, please do let us know.

W. T. Whitley

WTW/gj
Enclosures

Copy to: Mr. K. W. Nelson

NEWS from

A/C Pipe Producers Association
1600 Wilson Boulevard ☐ Arlington, Virginia 22209 ☐ Telephone 841-1556 Area Code 703

CONTACT: Nancy L. Battle
Lewis & Gilman, Inc.
(215) 568-3775

COPY to Mr. Barber, Hash & Lamy
Mr Nelson

SCIENTIFIC AND MEDICAL RESEARCH:

ASBESTOS-CEMENT PIPE AND HEALTH

Some persons who have inhaled heavy concentrations of asbestos fibers in industrial settings have shown some increases in gastrointestinal cancer. Since there is evidence that the inhalation of asbestos under certain conditions can be harmful, some have reasoned that the ingestion of asbestos in drinking water may also be harmful. Considerable amounts of asbestos-cement (A/C) water pipe are used in North America, Europe and other parts of the world. Thus, questions have been raised about the possible health hazards associated with drinking water conveyed through A/C pipe.

In order to determine whether the ingestion of asbestos in drinking water represents a health hazard, two types of studies have been conducted: (1) Statistical or epidemiological* studies, in which the medical experience of one group, exposed to a high level of ingested asbestos, is compared to the experience of another group, exposed to a lower level or no ingested asbestos; and (2) animal studies, in which conclusions are derived from the ingestion by animals of asbestos under scientifically controlled conditions.

*Epidemiology: the study of the distribution and dynamics of disease in human populations.

One of the first major studies was conducted by a panel of government and independent authorities in pathology, epidemiology, analytical methods, and public health, commissioned in 1974 by the American Water Works Association Research Foundation. The committee concluded, "No firm evidence shows that the proper use of asbestos-cement pipe poses a hazard to health by reason of ingestion of asbestos fibers. Calculations comparing the probable ingestion exposure in occupational groups to that likely to occur as a result of ingestion of potable water from asbestos-cement pipe systems suggests that the probability of risk to health from the use of such systems is small -- approaching zero."

Substantial epidemiologic evidence exists that the ingestion of asbestos in drinking water does not cause cancer.

Thomas J. Masson et al. in 1974 conducted a study of ingestion of asbestos in drinking water, entitled "Asbestos-Like Fibers in Duluth Water Supply."

The study undertook to determine whether fibers present in the drinking water of Duluth, Minnesota produced increased cancer mortality. The study concluded:

> Thus, in Duluth, one would expect a greater excess of cancer in the esophagus and stomach than in the rectum, but this did not occur.

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B. S. Levy of the Minnesota Department of Health, together with other researchers, in 1976 continued the investigation made by Masson. Levy was the Acting State Epidemiologist for Minnesota and his co-authors of the report were associated with the University of Minnesota School of Public Health and the Mayo Clinic.

Gastrointestinal cancer incidence data for the cities of Duluth, Minneapolis and St. Paul were gathered and compared in the same manner as in the Masson study. (Minneapolis and St. Paul have populations similar to Duluth, but they have few, if any, asbestos fibers in their water supplies.) After a thorough investigation, the authors concluded that ... "there was no consistent pattern of statistically significant differences observed" among the three cities.

Thomas R. Fears of the National Cancer Institute published an article in 1976 in the American Journal of Epidemiology entitled "Cancer Mortality and Asbestos Deposits." The specific question posed in that study was: "Is there an increase in risk from cancer associated with naturally-occurring asbestos?"

The abstract of the study states:

> The study of cancer mortality rates in these matched counties provides no evidence that naturally-occurring asbestos is a great hazard to the general population of counties with asbestos deposits.

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Donald T. Wigle, M.D., Ph.D. and M.P.H., Bureau of Epidemiology, Health and Welfare, Canada, conducted an extensive study in 1977 of municipalities in Quebec Province entitled "Cancer Mortality in Relation to Municipal Water Supplies." These area comparison studies presented an unusual scientific opportunity to analyze cancer mortality in populations exposed to as much as 1.3 billion fibers per liter of drinking water. Despite the extremely high levels of asbestos in drinking water, this study concludes:

> A study of twenty-two municipalities in Quebec did not reveal excess cancer mortality that could be related to the presence of asbestos fibers in drinking water supplies.

The Commins report, published in 1979 under the aegis of the internationally prestigious Water Research Center, entitled: "Asbestos in Drinking Water: A Review" summarized the Wigle study in this fashion:

> It is reassuring that a recently reported, detailed, epidemiological study carried out in 22 municipalities in Quebec failed to reveal excess cancer mortality that could be related to the presence of asbestos fibers in drinking water supplies. This was despite the fact that some of the water supplies fed to these municipalities were reported to be fairly heavily contaminated with asbestos fibers.

The Harrington Study

The first of two studies made in Connecticut concerning the use of asbestos-cement water pipe and the incidence of cancer is entitled "An Investigation of the Use of Asbestos-

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Cement Pipe for Public Water Supply and the Incidence of Gastrointestinal Cancer in Connecticut." Referred to as the Harrington study, it was published in the American Journal of Epidemiology in 1978, and was co-authored by officials of the U. S. Center for Disease Control, Environmental Protection Agency, Yale University School of Medicine and Connecticut State Health Department.

As the Harrington study stated:

> The possibility of studying reliable cancer incidence data over a 35-year period through the Connecticut Tumor Registry and linking these data with information gathered on asbestos cement pipe studies conducted by US Environmental Protection Agency, prompted the present investigation.

The findings of the Harrington study are consistent with a determination that the use of asbestos cement pipe does not create a health hazard:

> ...This study detected no changes in incidence rates or patterns in Connecticut for cancers of the stomach, colon, or rectum over the period 1935-1973, that could be construed as related to the introduction around 1950 of A/C pipes to carry domestic water supplies to some or most of the residents of certain towns.

The Meigs Study

The Meigs study, entitled "Asbestos Cement Pipe and Cancer in Connecticut 1955-1974," was published in the January/February, 1980, edition of The Journal of Environmental Health. The principal author of the report, J. Wister Meigs, is Director of the Connecticut Cancer Epidemiology Unit and Clinical Professor of Epidemiology, Yale University School of Medicine. The Meigs

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study used essentially the same methods as those used in the Harrington study, but the procedures and techniques were more sensitive and refined. The study was supported in part by the National Cancer Institute and by the EPA.

Following are the principal conclusions of the Meigs study:

> These analyses give no consistent indication that use of A/C pipe in Connecticut public water supplies has been followed by increases in incidence either of "all cancers" or of the individual sites considered.
>
> Therefore, the lack of coherent evidence of cancer risks from use of A/C pipe is reassuring. (Emphasis in article.) It is consistent with most reports from other areas of the United States.

Hence, the Harrington study and the Meigs study represent independent, thorough and competent epidemiological studies carried out for the sole purpose of determining the question at issue: whether the use of asbestos-cement pipe creates a hazard to the public health. Both studies reached the conclusions: that there was no association between the use of the asbestos-cement pipe in Connecticut and the incidence of cancer; and, in the opinion of the authors of the Meigs study, there was no need to change water distribution policies in this State because of the use of such pipe.

The Kanarek Study

The Kanarek study (the results of which were first published in 1978-1979) was conducted in five California counties in the San Francisco Bay area by Dr. Robert C. Cooper (principal -

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vestigator), doctoral candidate Marty Kanarek (project coordinator), and others. The study found a weak statistical correlation between the ingestion of asbestos in drinking water and certain cancers. The Kanarek study was an indirect study in which census tracts with differing amounts of asbestos fibers in their drinking water were compared for cancer incidence, after attempting to take into account certain variables.

By its own admission, the study is of limited value in its relevance to asbestos-cement pipe:

> Samples were taken before and after passage of water through lengths of asbestos-cement pipe. In most of the districts sampled, there was not a substantial increase in fiber counts after passage through asbestos-cement pipe. The amount of asbestos-cement pipe in the various distribution systems was not included as a variable in the analysis because of the difficulty of determining its location, age and dimensions.
>
> The study design was that of an indirect epidemiological approach in which the observational unit was the census tract. Studies such as this one can only suggest associations, and cannot pinpoint definite causation.

Dr. J. Wister Meigs, author of the Meigs study was asked to comment on the Kanarek study at a Connecticut public hearing held on September 16, 1980:

> I believe that there are inherent problems with the California study that have (not) been addressed by the author, and I will explain to you what that problem, the basic problem is. We knew in Connecticut that there are other variables besides asbestos, and one would expect this to be true, that influence cancer (incidence) rates.

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> One of the necessary variables in Connecticut that we have studied in some depth is population density. For reasons that are not entirely clear to us ... people who live in more crowded areas where the population density is higher per square mile have and have had over a long period of time in Connecticut higher cancer (incidence) rates. This has been systematically true with a number of different cancers, and it continues to be true at the present time ...
>
> So far as I can make out from this study, he did not consider population density. I believe it is a major defect in the study. I believe that there is evidence from his thesis to suggest that population density would explain the results that he got...

Dr. Ian T. T. Higgins, Professor of Epidemiology and Professor of Environmental Health, Michigan University School of Health, also was asked to review and comment on the Kanarek study at the Connecticut public hearings. He, too, criticized its failure to adjust for the population density factor, and stated that the study should not be relied upon: "...I don't believe that its conclusions are valid."

The California Department of Health Services has taken the following view of the Kanarek study:

> The UC doctoral thesis abstract entitled: "Asbestos in Drinking Water and Cancer Incidence," contains no new or original evidence of a medical nature about cancer or asbestos, nor does it establish any causal link between asbestos in Bay Area drinking water and the incidence of cancer.

The Environmental Protection Agency (EPA) has stated of the Kanarek study:

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> The University of California investigators are among the first to report finding an association between ingested asbestos and cancer rates. They caution that causative inferences must necessarily be limited because of the indirect nature of the data being compared. This means that the results of this study do not prove that there is a link between Bay Area water and cancer.

Animal Feeding Studies Provide Substantial Evidence that the Use of Asbestos-Cement Pipe Does Not Create a Public Health Hazard.

Animal ingestion studies support and confirm the epidemiologic findings that there is no association between the ingestion of asbestos fibers in drinking water and the presence of a health hazard. Test animals have been fed diets containing substantial proportions of asbestos, without inducing related tumors or shortening lifespan.

All of the following scientific authorities have concluded that animal laboratory experiments do not support the proposition that the ingestion of asbestos in drinking water is harmful:

Bonser, G. M. and Clayson, D. B., "Feeding of Blue Asbestos to Rats," 45th Annual Report of the British Empire's Cancer Campaign, 242 (1967). An experiment was performed to ascertain whether feeding asbestos to rats, would induce peritoneal tumors. Sixty-five rats were fed 1,500 mg/kg body weight crocidolite ("blue asbestos") for life and no tumors were observed.

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Smith, W. E., "Asbestos, Talc and Nitrites in Relation to Gastric Cancer, American Ind. Hyg. Assoc. Journal 34:227-228 (1973). This too was a complete life span experiment in which hamsters were fed abnormally large amounts of asbestos.

> In 45 hamsters maintained throughout their lives on diets containing 1% of the chrysotile or amosite varieties of asbestos, we found no gastric carcinomas and no tumors in the gastronintestinal tract except for a neoplasm in the mesentery of the colon. We are unable to relate that lesion to the treatment, since ashing has revealed no asbestos fibers in it.

Webster, I., "The Ingestion of Asbestos Fibers," Environ. Health Persp. 9:199-202 (1974). Dr. Webster fed baboons heavy doses of crocidolite over considerable periods of time to determine if peritoneal or gastrointestinal cancers could be induced. The report states:

> In none of the many baboons used was there any evidence of a peritoneal tumor or gastrointestinal tumor.

Gross, P., et al., "Ingested Mineral Fibers: Do They Penetrate Tissue or Cause Cancer?," Arch. Environ. Health 29(6):341-347 (1974).

> 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. ...Short-term and long-term feeding (up to 1-1/2 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.

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Moore, J. H., "Biological Effects of Ingested Asbestos - Status Report, U.S. Department of Health, Education and Welfare, Public Health Service, National Toxicology Program, January, 1981."

The National Institute of Environmental Health Sciences is sponsoring a multi-million dollar study on the effects of ingested asbestos on rats and hamsters. Preliminary results released in January, 1981 were reported as follows:

> There was no indication of major differences in the mortality rate between the hamsters receiving the asbestos diet or the control diet. Preliminary analysis of the hamster data indicates that no carcinogenic or cocarcinogenic effect was observed.
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> Rat studies. The lifetime exposure phase of the study concluded ... longevity was not affected by exposure to the various types of fibers.

These animal feeding studies conducted by the federal government are the most extensive ever carried out to assess the effect of the ingestion of asbestos fibers on animals.

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