



**A/C Pipe
Producers Association**

Board of Directors
International Affairs Committee

J. F. Welch
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June 28, 1984

U.S. Environmental Protection Agency (EPA) - Drinking Water Standards for Volatile Organic Chemicals (VOCs)

ACTION REQUIRED: Review for information

On June 12, 1984, EPA proposed recommended maximum contaminant levels (RMCLs) for nine organic chemicals found in drinking water, among them vinyl chloride and tetrachloroethylene. RMCLs are non-enforceable health goals set to prevent any known or anticipated adverse health effects in humans. They have no legal impact on public water systems or the public. Proposal of the RMCLs will be followed by a ninety day comment period, public hearings and, eventually, final RMCLs. Enforceable maximum contaminant levels (MCLs), monitoring and reporting requirements will be proposed at the same time RMCLs are finalized.

Vinyl Chloride

The proposed RMCL for vinyl chloride is zero. This decision was based on the fact that vinyl chloride is carcinogenic in humans and animals. There is no mention in the enclosed Federal Register notice of vinyl chloride being released from PVC water pipe although this may be referenced in EPA's Draft Criteria Document for Vinyl Chloride. MCLs will be set as close to RMCLs as feasible.

Tetrachloroethylene

The proposed RMCL for tetrachloroethylene also is zero, based on an IARC assessment that the data suggests a carcinogenic effect in animals, but lacks confirmation in humans.

EPA and the Office of Management and Budget (OMB), the agency that reviews the rationale for and costs of regulations, were known to be at odds over the proposed drinking water standards. OMB felt that the proposal should take into account costs of monitoring, reporting and treatment and, therefore, should be realistic by not setting "zero-risk" levels. Further, OMB was concerned about the policy implications of recommending zero levels for all VOC's because they vary in potency and confirmation of carcinogenicity. EPA disagreed, even knowing that the decision to set zero RMCLs may impact standards-setting by EPA offices other than the Office of Drinking Water. Since the proposed standards are not enforceable, however, OMB could not disapprove them by authority of Executive Order 12291.

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The Chemical Manufacturers Association and the Vinyl Institute a segment of the Society of Plastics Industry, are expected to comment on the vinyl chloride proposal.

JFW/bwm

Enclosure

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ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 141

[OW-FRL-2514-3]

National Primary Drinking Water Regulations; Volatile Synthetic Organic Chemicals

AGENCY: Environmental Protection Agency (EPA).

ACTION: Proposed rulemaking.

SUMMARY: This proposed rule under the Safe Drinking Water Act (42 U.S.C. 300f *et seq.*) establishes Recommended Maximum Contaminant Levels (RMCLs) for the following volatile synthetic organic chemicals (VOCs) in drinking water: trichloroethylene, tetrachloroethylene, carbon tetrachloride, 1,1,1-trichloroethane, vinyl chloride, 1,2-dichloroethane, benzene, 1,1-dichloroethylene, and p-dichlorobenzene. RMCLs (goals) for non-carcinogens are proposed based upon chronic toxicity data, and RMCLs (goals) for carcinogens are proposed at the zero level. VOCs that are not included in this proposal may be considered for subsequent rulemaking as appropriate.

RMCLs are *non-enforceable health goals* which are to be set at levels which would result in no known or anticipated adverse health effects with an adequate margin of safety. This proposal is the initial stage in rulemaking for the establishment of primary drinking water regulations for the VOCs. Following this proposal, Maximum Contaminant Levels (MCLs) and monitoring/reporting requirements will be proposed when the RMCLs are promulgated. MCLs are *enforceable standards* and are to be set as close to the RMCLs as is feasible and are based upon health, treatment technologies, cost and other factors.

Public comments are solicited on the approach to setting RMCLs as proposed in this notice as well as on the alternatives presented. Specifically, comments are requested on the following: Should the RMCLs for carcinogens be zero or a level of exposure considered to constitute a negligible incremental lifetime risk, say one in one million, based upon a conservative risk estimate calculation procedure; or should the RMCLs for carcinogens be established at the limits of analytical detection?

DATES: Written comments should be submitted by September 10, 1984. A public hearing will be held in Washington, D.C. on August 6 and 7, 1984, if needed beginning at 9:00 a.m..

ADDRESSES: Send written comments to Comment Clerk, Criteria and Standards Division, Office of Drinking Water (WH-550), Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460. A copy of the comments and supporting documents will be available for review during normal business hours at the EPA, Room 55EB, 401 M Street, S.W., Washington, D.C. 20460. The public hearing will be held in Room 3908, EPA, 401 M St. S.W., Washington, D.C. It is requested that anyone planning to attend the public hearing (especially those who plan to make statements) register in advance by calling or writing Ms. Arnetta Davis at 202/382-7575, EPA, WH-550, 401 M St., S.W., Washington, D.C. 20460. Persons planning to make statements at the hearings are encouraged to submit written copies of their remarks at the time of the hearing.

References cited on section VII will be available for inspection at the Drinking Water Supply Branches of EPA's Regional Offices.

I. JFK Federal Bldg., Boston, MA 02203, Phone: (617) 223-6486, Jerome Healy
II. 26 Federal Plaza, Room 824, New York, NY 10278, Phone: (212) 264-1800, Walter Andrews

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VIII. 1860 Lincoln St., Denver, CO 80295, Phone: (303) 837-2731, Dean Chaussee

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X. 1200 Sixth Ave., Seattle, WA 98101, Phone: (206) 442-1225, Jerry Opatz

Copies of the nine draft health criteria documents will be available for a fee from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The toll free number is 800/336-4700; local: 703/487-4650.

FOR FURTHER INFORMATION CONTACT:

Contact Joseph A. Cotruvo, Ph. D., Director, Criteria and Standards Division, Office of Drinking Water (WH-550), Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460, telephone (202) 382-7575.

SUPPLEMENTARY INFORMATION:

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I. Statutory Requirements

The Safe Drinking Water Act (42 USC 300f, *et seq.*) ("SDWA" or "the Act") requires the EPA to establish primary drinking water regulations which: (1) Apply to public water systems; (2) specify contaminants which in the judgment of the Administrator, may have any adverse effect on the health of persons; (3) specify for each contaminant either (a) maximum contaminant levels (MCLs) or (b) treatment techniques. See section 1401(l), 42 U.S.C. 300f. A treatment technique requirement would only be set if "it is not economically or technologically feasible" to ascertain the level of a contaminant in drinking water.

The SDWA includes provisions for interim and revised regulations. See section 1412, 42 U.S.C. 300g-1. Interim regulations were to be established within 180 days of enactment of the SDWA. Revised regulations are to be developed in two steps: the Agency is to establish recommended maximum contaminant levels (RMCLs) and then establish maximum contaminant levels (MCLs) as close to the RMCLs as feasible. MCLs are to be proposed at the time of promulgation of the RMCLs. *RMCLs are non-enforceable health goals.* RMCLs are to be set at a level which, in the Administrator's judgment, "no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety". Section 1412(b)(1)(B). The House Report on the 1974 legislation provides congressional guidance on developing RMCLs:

... the recommended maximum [contaminant] level must be set to prevent the occurrence of any known or anticipated adverse effect. It must include an adequate margin of safety, unless there is no safe threshold for a contaminant. In such a case, the recommended maximum contaminant level should be set at zero level.

House Report No. 93-1185, July 10, 1974, at 20.

MCLs are the enforceable standards. MCLs must be set as close to RMCLs as is feasible. Feasible means "with the use of the best technology, treatment techniques and other means, which the Administrator finds are generally available (taking costs into consideration)." Section 1412(b)(3).

RMCLs of themselves have no impact on public water systems or the public. By promulgating RMCLs, no system is forced to reduce contaminants to this level or to take other action regarding contaminants. RMCLs serve as goals for the Agency in the course of setting MCLs and are therefore initial steps in the MCL rulemaking that will follow. In some cases, the MCLs will be set very close to the RMCLs; in other cases, control processes or economic considerations may dictate an MCL that is not as close. Public water systems must comply with the MCL; non-compliance with an RMCL cannot be the basis of an enforcement action under section 1414 of the Safe Drinking Water Act.

In addition, the SDWA specifies that primary drinking water regulations contain criteria and procedures to assure a supply of water that complies with the MCLs (i.e., *monitoring and reporting requirements*). Section 1401(1)(D). Section 1445(a) authorizes EPA to require by regulation any public water supplier to keep records, make reports, conduct monitoring and provide such other information as may be required to assist in determining compliance with the SDWA, in evaluating health risks of unregulated contaminants, or in advising the public of such health risks.

The SDWA also requires that the revised primary drinking water regulations be reviewed every three years and amended whenever changes in technology, treatment techniques or other factors permit greater health protection.

In addition to the regulatory mandates, the SDWA provides authorities for ensuring the safety of the nation's drinking water in a non-regulatory context. Section 1442(a)(2)(B) authorizes EPA to provide technical assistance to States and publicly owned water systems in response to and alleviation of any emergency situation which the Administrator determines to be a substantial danger to public health. In the absence of appropriate State or local action, section 1431 authorizes EPA to take such actions as the administrator deems necessary to protect public health from a contaminant that may present an

imminent and substantial endangerment to the health of persons.

II. Regulatory Framework

The issuance of Revised Primary Drinking Water Regulations is the third step in the evolution of the primary drinking water regulations mandated by the SDWA.

In the *first step*, the National Interim Primary Drinking Water Regulations (NIPDWR) were promulgated on December 24, 1975, with an effective date of June 24, 1977. Amendments were issued in 1976, and 1979 and 1980. See 40 CFR 141. Maximum contaminant levels (MCLs) and monitoring and reporting requirements were set for numerous microbiological, inorganic, organic, and radionuclide contaminants (40 CFR, Part 141, Subpart B). At the direction of the Congress, EPA based the NIPDWR in large part on the 1962 U.S. Public Health Service (PHS) Standards for drinking water which in turn were derived from previous standards dating as far back as 1915 for the microbiological standards and the 1940's for the MCLs for some of the inorganic chemicals.

As the *second step*, section 1412(e) of the SDWA directed EPA to arrange for the National Academy of Sciences (NAS) or an equivalent organization to conduct a study to assess the health effects of contaminants in drinking water and to provide proposals for RMCLs at levels at which there were "no known or anticipated effects on the health of persons . . ." and a list of contaminants whose levels in drinking water cannot be determined but which may have an adverse effect on the health of persons. The NAS submitted its initial report, "Drinking Water and Health," to EPA in 1977 which was published in the Federal Register for public comment; four additional reports have been received. While Congress envisioned that the NAS would provide proposals for RMCLs in the report, the NAS stated essentially that it would do toxicological assessments of contaminants in drinking water but that developing proposals for RMCLs was not an NAS responsibility but an EPA regulatory function. In the words of the Academy, "determining safe levels to protect the health of persons' drinking water containing contaminants requires consideration of other factors in addition to the harmful properties of the contaminants" (John S. Coleman, Executive Officer, NAS, Feb. 20, 1975). The NAS reports have provided EPA with toxicological assessments of contaminants in drinking water and, based upon this information and data from other scientific sources, EPA is developing the RMCLs.

As the *third step*, section 1412(b)(1)(B) provided that EPA must propose and promulgate National Revised Primary Drinking Water Regulations (NPDWR) that would include RMCLs, MCLs and monitoring and reporting requirements for those contaminants that may have an adverse effect on human health.

Regulatory Development Approach

Development of the NPDWR will be accomplished in four phases:

- Phase I Volatile Synthetic Organic Chemicals,
- Phase II Synthetic Organic Chemicals, Inorganic Chemicals and Microbiological Contaminants,
- Phase III Radionuclides,
- Phase IV Disinfectant By-Products including Trihalomethanes.

In general the approach for all four phases will be similar.

Initially an ANPRM will be published followed by a comment period and a public meeting. Public technical workshops will also be held. The workshops provide an opportunity for EPA to present the issues that must be addressed in development of the regulations and to receive information on scientific and technical matters as well as receive comments on regulatory approaches.

RMCLs will then be proposed followed by a public comment period and a public hearing(s).

RMCLs will then be promulgated and proposals published for MCLs or treatment techniques, monitoring and reporting, and other requirements followed by a public comment period and a public hearing(s). Technologies will be identified that were used as the basis of determining the MCLs; in addition, generally available treatment technologies (GAT) will be identified for use in compliance with the MCLs and the issuance of variances.

The MCLs or treatment techniques, monitoring and reporting, and other requirements including GAT will then be promulgated.

An ANPRM for Phase I (VOCs) was issued on March 4, 1982 (47 FR 9350, et seq.), and a public meeting was held in Washington, D.C., on April 28, 1982. In addition, four public technical workshops were conducted across the country (June-August 1982) on volatile synthetic organic chemicals (VOCs) in drinking water.

III. Background and Summary of Comments

The ANPRM identified the VOCs listed below as among those most commonly detected in drinking water based upon data available at that time.

trichloroethylene
tetrachloroethylene
carbon tetrachloride
1,1,1-trichloroethane
1,2-dichloroethane
vinyl chloride
dichloromethane
benzene
chlorobenzene
dichlorobenzene
trichlorobenzene
1,1-dichloroethylene
cis-1,2-dichloroethylene
trans-1,2-dichloroethylene

The purpose of the ANPRM was to solicit comments on the many scientific, technical, legal and economic questions associated with determining the proper approach under the Safe Drinking Water Act (SDWA) to limit human exposure to VOCs.

The ANPRM was published to initiate discussions that would assist the Agency in determining the proper approach under the SDWA for minimizing human exposure to VOCs. The public was invited to comment on the following broad issues:

- What is the significance of contamination of drinking water by VOCs?
- Should national standards be set for VOCs?
- If standards are appropriate, how should levels be established?

In addition to the above broad questions, comments were requested on specific technical and scientific questions. Also, available reference materials on occurrence, health effects, analytical methods, and treatment costs of VOCs in drinking water were provided for technical and scientific review.

Summary of Public Comments

A total of 136 public written comments were received with the comment period ending on September 30, 1982.

The National Drinking Water Advisory Council (NDWAC) met in Washington, D.C., on September 23-24, 1982, to discuss the VOC ANPRM and its related issues. The NDWAC provided its recommendations to the Administrator in a letter dated January 5, 1983.

Public comments pertinent to this proposal are summarized in this section and in Appendix A. Comments pertinent to proposal of the MCLs and monitoring/reporting requirements will be summarized in that proposal. The public workshops conclusions and recommendations and the NDWAC recommendations are briefly summarized below. As representative of comments received by drinking water

industry associations and public interest groups, comments submitted by the American Water Works Association and Natural Resources Defense Council (NRDC), respectively, are also summarized.

Summary of Comments From Public Workshops

Overall, it was concluded that contamination by VOCs is a national problem warranting action. There was sentiment in favor of establishing MCLs and some sort of monitoring program, provided the health effects data are valid and indicate the need to reduce human exposure.

The health effects work groups believed that there are sufficient data to cause concern. Three groups suggested that MCLs be set. However, every group qualified its recommendation by saying, variously, that the data are limited, more studies are needed, and that the difference between genotoxic and non-genotoxic carcinogens should be addressed by EPA.

Aeration and granular activated carbon were identified as generally available technologies, effective in reducing VOC levels to 10 µg/l (micrograms per liter or parts per billion (ppb)) or lower. Cost projections presented by EPA were considered to be reasonable but they should be updated.

The proposed analytical methods were found to be suitably accurate and the best available at this time.

Concerning monitoring, the consensus seemed to be that EPA should provide minimum requirements within which States could develop their own monitoring plans, if data show that VOC contamination can be adequately predicted; EPA would provide criteria and guidance to assist States in predicting which systems were vulnerable to contamination by VOCs and thus be monitored.

American Water Works Association (AWWA)

The AWWA recommended that contaminants be controlled at their source through EPA's existing statutory authorities. They believed MCLs are not appropriate at this time, since "safe" levels of VOCs cannot be determined from existing health-effects data. However, when the health effects data have been evaluated by a recognized independent scientific organization (i.e., National Academy of Sciences (NAS)), the AWWA felt that MCLs should be established if a significant health risk exists.

In the interim, AWWA recommended that national monitoring for specific compound identification should be

implemented for all water supplies, preferably using the purge and trap procedure (EPA Method 502.1 or equivalent), but requirements for systems serving less than 10,000 people would be at the discretion of the State. The initial monitoring frequency should be similar to the trihalomethane (THM) rule. In addition, guidance in the form of contamination levels, and action categories for five of the VOCs (i.e., vinyl chloride, trichloroethylene, tetrachloroethylene, carbon tetrachloride, 1,2-dichloroethane) should be established for all water supplies.

Natural Resources Defense Council (NRDC)

The NRDC recommended comprehensive national standards for volatile organic chemicals (VOCs) saying that the occurrence and health effects data show a significant national problem that warrants action under the SDWA. NRDC stated the EPA should establish RMCLs and MCLs for the 14 VOCs addressed in the ANPRM as well as an RMCL and MCL for total VOCs supported by mandatory national monitoring requirements. Other comments by NRDC included:

- Recommended Maximum Contaminant Levels (RMCLs) should be set at zero for carcinogens. RMCLs for non-carcinogens may be set at a no-observed-effect-level with an adequate margin of safety because RMCLs are health goals and are not intended to reflect feasibility of attainment.

- The multi-stage model as modified by the Carcinogen Assessment Group (CAG) should not be used in establishing RMCLs for carcinogens. Mathematical models at best provide crude estimates of the risks resulting from exposure to a carcinogen.

- Calculations of exposure levels corresponding to lifetime cancer risks of 10^{-6} should provide the upper limit for MCLs. That is, contaminant levels should be set at concentrations corresponding to lifetime cancer risks of no greater than 10^{-6} . MCLs for non-carcinogens should be set at correspondingly conservative levels.

NDWAC Recommendations

The National Drinking Water Advisory Council (NDWAC) provided the following recommendations and analyses.

1. The occurrence data derived primarily from the random surveys conducted by EPA and selected data produced by the States in conjunction with the health risk data, warrant establishing controls for 5 of the VOCs

found in drinking water. These are: trichloroethylene, tetrachloroethylene, carbon tetrachloride, 1,2-dichloroethane and 1,1,1-trichloroethane.

2. Regulations under the Safe Drinking Water Act should be established for those 5 chemicals at this time. Additional data would be needed before a decision could be made on other volatile organics found in drinking water. Health advisory type guidance should be provided for these compounds in lieu of establishing MCLs.

3. Sufficient animal toxicology does exist at this time for establishing RMCLs for those 5 chemicals noted in 1. above. Quantitative risk calculations using a linearized multi-stage model should be used for establishing RMCLs for the carcinogens. A 1 in 100,000 target risk is recommended as the RMCL. For 1,1,1-trichloroethane, which the current data indicate is not carcinogenic, the RMCL should be calculated from the No Observed Effect Level (NOEL) for neurotoxicity with appropriate safety factors.

4. The analytical methodology for detecting and quantitating VOCs is well established (i.e., EPA Method 502.1 using the Purge and Trap technique and similar procedures). No information was provided to the Council on the availability of laboratory services; however, it is assumed that services would be available to meet ultimate demand. The Council believes that monitoring is technically and economically feasible.

5. Sufficient data exists at this time to determine that granular activated carbon and aeration are "generally available technologies" for central treatment application. Appropriately designed point of use devices, when shown to be effective for VOC control, can also be considered for some small water systems if they are cost/effective and properly managed.

IV. Volatile Synthetic Organic Chemicals in Drinking Water

Hundreds of chemicals have been detected at one time or another in drinking water in the U.S., but the vast majority have been detected infrequently and at very low concentrations. Selection of candidate chemicals for revised national primary drinking water regulations is made from an analysis of data on the occurrence frequency, concentrations detected, size of the exposed populations and the toxicology of the chemicals. This section briefly summarizes the available occurrence data, provides an overview of population exposure estimates, and discusses the health effects data for the VOCs. Additional information can be

found in the references listed in section VII.

Occurrence of VOCs in Drinking Water

One or more VOCs have been detected in numerous public water systems across the country. Typically, contamination is at low levels (i.e., less than 1 part per billion, $\mu\text{g/l}$) but some systems have found higher levels. The VOCs are man-made chemicals, their presence may indicate that a pollution incident has occurred, and some of them are among the most frequently detected contaminants around hazardous waste sites. Several of these chemicals are suspected carcinogens, with differing degrees of evidence, while certain of these are mutagens and/or teratogens in some test systems.

In 1982, EPA conducted a national sampling (Ground Water Supply Survey (GWSS)) of almost 1000 drinking water systems using ground water; 500 were selected at random and 500 were selected by the States as having high potential for VOC contamination (non-random). Table 1 presents results of the random portion of the GWSS. Approximately 21 percent of the systems in the random set had one or more of the VOCs at detectable levels (mostly in the sub $\mu\text{g/l}$ range). The data showed a distinct difference in the frequency of occurrence of VOCs between larger and smaller systems; approximately 28 percent of samples in systems serving over 10,000 detected one or more VOCs in the drinking water whereas 17 percent of samples in systems serving less than 10,000 detected VOCs. Six tenths percent of all public water systems serving less than 10,000 were sampled in the survey whereas 15 percent of systems greater than 10,000 were sampled.

Six national surveys have been conducted by EPA since 1975. These include:

- National Organics Reconnaissance Survey (NORS)
- National Organics Monitoring Survey (NOMS)
- National Screening Program for Organics in Drinking Water (NSP)
- Community Water Supply Survey (CWSS)

- Rural Water Survey (RWS)
- Ground Water Supply Survey (GWSS)

Based upon the above six surveys, projections of national occurrence and human exposure potential for the VOCs are summarized in Table 2 for levels associated with various risk rates. These surveys were conducted for various purposes over an eight year period which saw a rapidly developing state-of-the-art in water analytical methods. Different analytical procedures were used and, consequently, some surveys were able to detect and measure particular VOCs at lower concentrations than other surveys were able to do. The most significant portion of the data base on VOCs, however, is derived from the Ground Water Supply Survey and the Community Water Supply Survey.

In combining the survey data, the national projections of the frequency of occurrence of VOCs at various concentrations can be provided only for those concentrations at or above the level at which all of the surveys were capable of detecting and measuring them. This level, referred to as the lowest common quantifiable concentration, is generally the highest detection limit or minimum quantifiable concentration from among the surveys that are combined. Table 2 shows the estimated frequency of occurrence of the VOCs at or above the lowest common quantifiable concentration. Individual surveys using detection limits or minimum quantifiable concentrations less than the lowest common quantifiable concentration may report a higher frequency of occurrence of some VOCs. For example, according to Table 2, 3.6% of the nation's ground water supplies are projected to have trichloroethylene at or above the lowest common quantifiable concentration of 0.5 $\mu\text{g/l}$, whereas the GWSS (random sample), using a minimum quantifiable nominal concentration of 0.2 $\mu\text{g/l}$, reported trichloroethylene to be present in 6.4% of the supplies sampled (Table 1). (Note: The GWSS random sample was found to have 4.1% at or above 0.5 $\mu\text{g/l}$.)

TABLE 1.—Summary of GWSS Occurrence Data

[Random sample: n=466]

Parameter	Quantification limit $\mu\text{g/l}$	Positives		Median of + $\mu\text{g/l}$	Max $\mu\text{g/l}$
		No.	Percent		
Tetrachloroethylene	0.2	34	7.3	0.5	23
Trichloroethylene	.2	30	6.4	1	78
1,1,1-Trichloroethane	.2	27	5.8	.8	18
1,1-Dichloroethane	.2	18	3.9	.5	3.2
1,2-Dichloroethylenes (cis and/or trans)	.2	16	3.4	1.1	2
Carbon tetrachloride	.2	15	3.2	.4	16

for chemicals considered to be potential carcinogens, but are provided to add some perspective on the chemical's total toxicity including potential non-carcinogenic end-points.

In addition, these values may have some practical application as guidance on the levels at which no adverse health effects would be expected to occur based upon non-carcinogenic data. This would be especially useful for substances considered to be "weak" carcinogens. Comment is requested on these values.

The AADI's were calculated by:

- Determining the highest No-Observed-Adverse Effect Level (NOAEL), or the lowest observed adverse effect level (LOAEL) in mg/kg body weight/day.

- Dividing by appropriate safety or uncertainty factor(s) (U.F.).

- Multiplying by the weight of an adult (70 kg), and

- Dividing by the amount of water consumed by an adult per day (2 liters/day). (This allocates the ADI totally to drinking water which would have to be modified to consider other routes of exposure when the RMCL or MCL is computed.) The formula for this calculation is as follows:

$$\frac{(\text{NOAEL in mg/kg/day}) (70 \text{ kg})}{\text{U.F.}(s) \times 2 \text{ liters/day}} = \text{AADI mg/l}$$

TABLE 6.—SUGGESTED ADJUSTED ACCEPTABLE DAILY INTAKE: VOC'S

(Does not consider carcinogenicity and excludes contributions from air and food)

Compound	AADI
Tetrachloroethylene	0.085 mg/L
Trichloroethylene	0.26 mg/L
Carbon tetrachloride	0.025 mg/L
1,1,1-Trichloroethane	1.0 mg/L
1,2-Dichloroethane	0.26 mg/L
Vinyl chloride	0.05 mg/L
Benzene	0.025 mg/L
1,1-Dichloroethylene	0.35 mg/L
p-Dichlorobenzene	3.75 mg/L

The calculated AADI's above assume that the total exposure was from drinking water. Since normally exposure also comes from air and food, in addition to drinking water, and since drinking water is frequently a minor contributor to the total exposure, the RMCL or MCL should be modified to take into account the relative source contributions. The World Health Organization, in "Guidelines for Drinking Water Quality" (1983), assigned as little as 1 percent of the ADI to drinking water where the chemical was known to bioaccumulate to a high degree, while greater proportions were

assigned where the chemical was known to bioaccumulate to a lesser degree. In "Drinking Water and Health" (1977), the National Academy of Sciences provided projections of 1 percent and 20 percent as illustrations of drinking water contributions. In the National Interim Primary Drinking Water Regulations for six organic chemicals, drinking water was assumed to contribute 20 percent of the total daily intake.

Because of the wide range of environmental exposure distributions that would occur across urban and rural populations as well as because of age and occupationally-related differences, assumption of a 20 percent contribution from drinking water would be reasonably conservative and protective. Thus, in this case, if an AADI value for a non-carcinogen were to be the basis for an RMCL, it would be reduced by 80 percent to account for up to 20 percent contribution from drinking water to the total daily burden.

Development of RMCLs for Carcinogens: Evaluations of the toxicology of substances which may possess carcinogenic potential is a two-phase process. In the first phase, the toxicological data base for non-carcinogenic end-points of toxicity was evaluated in the same manner as described above for "non-carcinogens" (Table 6). In the second phase, assessment was made of the evidence of the carcinogenic potential (e.g., long-term bioassays in rodents and human epidemiology) as well as information which provides indirect evidence (e.g., mutagenicity and other short-term test results). This process is complex since the production of cancer probably is a multi-stage event, determined by a multiplicity of mechanisms, the nature of which remain, for the most part, hypothesized rather than identified.

To date, scientists have been unable to demonstrate experimentally a threshold of effect for "carcinogens," according to the 1977 report of the NAS Safe Drinking Water Committee. This leads to the assumption that since no threshold dose can be demonstrated for carcinogens, any exposure might represent some finite level of risk. Depending upon the potency of the specific carcinogen and the level, such a risk could be vanishingly small at very low doses.

Human epidemiology data are extremely limited in their ability to identify carcinogenic risks. Thus, animal experiments are conducted from which potential human risk is extrapolated. In the first volume of *Drinking Water and Health* (1977), the NAS Safe Drinking Water Committee provided principles to

serve as guidance to EPA when assessing the irreversible effects of long term exposure to non-threshold substances at low doses:

Principle 1: Effects in animals, properly qualified, are applicable to man.

Principle 2: Methods do not now exist to establish a threshold for long term effects of toxic agents.

Principle 3: The exposure of experimental animals to toxic agents in high doses is a necessary and valid method of discovering possible carcinogenic hazards in man.

Principle 4: Material should be assessed in terms of human risk, rather than "safe" or "unsafe".

Tumors appear spontaneously in experimental animals, at different rates and different sites depending upon the species and strain. It is unlikely that any increased tumor incidence could be detected following exposure of experimental animals to most carcinogens at dose levels occurring in the ambient environment. Very large numbers of animals would be required to distinguish between treated and control groups. It is possible, as was shown in the 24,000 animal "mega-mouse" study on 2-acetylaminofluorene at the National Center for Toxicology Research (NCTR), that a definitive answer would not necessarily be forthcoming at the low dose levels. Mathematical extrapolation still would be required to project human risk. Relying on this type of study for individual assessments is impractical because of its great expense and lingering scientific uncertainty.

In order to produce quantitative estimates, the assumption has been made that estimated excess cancer risk in humans at low dose levels can be extrapolated using various techniques from results observed in animals at high dose levels. Conventionally, designed carcinogenicity bioassay studies are conducted using both sexes of two species of test animals (usually rat and mouse) with each group of 50 animals exposed at the maximum tolerated dose or one-half the maximum tolerated dose. In addition to the possible existence of thresholds, other sources of uncertainty in high to low dose extrapolation include: (1) heterogeneity of sensitivity in the exposed populations, (2) the pharmacokinetic behavior of the toxic agent in animals vs. the human and (3) mechanisms of action (i.e., whether the agent initiates the process or acts at a later stage). Classification of carcinogens into genotoxic vs. non-genotoxic carcinogens based on possible mechanisms has also been considered

but a scientific consensus has not been achieved. Fundamental changes in normal cells are the most probable basis for the conversion of normal cells to cancer cells; however, the nature of these changes and how they are brought about is still a scientific uncertainty. Many scientists believe that the most likely mechanism involves direct alteration of DNA by carcinogens. Many carcinogens are capable of altering DNA; chemically-induced alteration of DNA in germinal cells can also cause heritable changes, or mutations; thus, when a chemical shows a positive response in short-term mutagenicity tests, there is concern that it could also be a carcinogen. Scientists also generally believe that cancer results from a multi-stage process. However, these processes are not well understood and available evidence is insufficient to differentiate between carcinogens on the basis of mechanism (IARC, 1983). Therefore in this proposal EPA did not make a differentiation based upon potential mechanisms.

Thus, quantitative risk extrapolation procedures can provide only a rough projection of carcinogenic hazard because of the many unknown factors which enter into these estimates. Models using different assumptions may produce estimates ranging over several orders of magnitude. Since there is currently no way to demonstrate the accuracy of any model at low doses, this process is a subject of debate in the scientific community. However, in spite of these difficulties, quantitative risk estimation does provide the decision-maker one means of setting priorities among pollutants and some gauge of the potential seriousness of environmental hazards (see NCI Subcommittee report referenced in section VII).

EPA's Carcinogen Assessment Group employs a multi-stage model among various others to extrapolate potential excess cancer risk expected at doses of the chemical found in the environment from results in high dose animal studies (U.S. EPA, 1980). Equivalent human doses are established either on a body weight basis (mg/kg) such that the ratio of human to animal body weights is raised to the $\frac{1}{3}$ power:

$$\left[\frac{\text{human body weight}}{\text{animal body weight}} \right]^{\frac{1}{3}}$$

or on a body surface area comparison.

The multi-stage model is used for several reasons: (1) it is more systematic than the one-hit model, (2) it invokes

fewer arbitrary assumptions, (3) the assumption of low dose linearity is not essential in the use of the model and (4) it incorporates data from all of the dosage groups which are consistent with the multi-stage model. At the same time, it is conceptually consistent with the linear, non-threshold concept. With this model, CAG estimated the upper bound excess cancer risk rate at a specific exposure level for a 70 kg adult who consumes 2 liters of drinking water per day, every day over a 70 year lifespan.

These calculated risk rates have associated uncertainties. This uncertainty has many sources, including such uncertainties as the shape of the dose-response relationship at low doses, differences in responses between humans and laboratory animals, and the effects of artificial dosing regimens. A relatively minor source of uncertainty is statistical fluctuation that results from the finite sample size necessarily used in any experimental study. This is the only uncertainty that can be readily quantified; it is expressed in EPA's methodology by giving the upper-95% confidence limit of the observed response. Other confidence limits could also be calculated. (In more technically precise terms, the confidence limit is calculated on the coefficient of the linear term in the multi-stage model, assuming that all the statistical uncertainty is loaded on that term.)

Excess cancer risk rates also can be projected using variations within a specific model or other models, such as the one-hit model, the Weibull model, and logit and probit models. There exists no solid basis in the current understanding of the biological mechanisms involved in cancer to say that one model provides a better estimate of the true risk. The estimates of risk at low doses for these models can differ by several orders of magnitude. However, the linear non-threshold model usually has the best, even if limited, scientific biological basis of any of the currently available models for giving an upper limit estimate. The multi-stage model is presumed to usually give a conservative risk estimate (i.e., less likely to underestimate the actual risk) and thus would usually be consistent with a protective regulatory philosophy. A similar model was used by the NAS Safe Drinking Water Committee in the calculations provided to EPA in "Drinking Water and Health". The NDWAC recommended that the multi-stage model be used in the estimation of cancer risk associated with the VOCs. Various calculations using multi-stage models are presented in Table 7.

Shown along with the risk estimates in Table 7 is a qualification of the degree of evidence of carcinogenicity exhibited by the chemicals. The International Agency for Research on Cancer (IARC) provides guidance for categorizing chemicals having sufficient or limited evidence of carcinogenicity. In the IARC Monographs Supplement #1 the definition for sufficient evidence for carcinogenicity indicates that there need be an increased incidence of malignant tumors: (a) in multiple species or strains, or (b) in multiple experiments, or (c) to an unusual degree with regard to incidence, site or type of tumor, or age at onset. Sufficient evidence of human carcinogenicity indicates a causal association between exposure and human cancer. Limited evidence of carcinogenicity means that the data suggest a carcinogenic effect but are limited because: (a) The studies involve a single species, strain, or experiment; or (b) the experiments have an inadequate period of follow-up, poor survival, too few animals, or inadequate reporting; or (c) the neoplasms produced often occur spontaneously or are difficult to classify as malignant by histological criteria alone. Limited evidence of human carcinogenicity indicate a possible carcinogenic effect in humans, although the data are not sufficient to demonstrate a causal association. In general, although a single study may be indicative of a cause-effect relationship, confidence in inferring a causal association is increased when several independent studies are concordant in showing the association, when the association is strong, when there is a dose-response relationship, or when a reduction in exposure is followed by a reduction in the incidence of cancer.

The National Academy of Sciences in their report, *Drinking Water and Health*, Vol. I, (1977) classified chemical carcinogens into four categories: human carcinogens, suspected human carcinogens, animal carcinogens and suspected animal carcinogens.

Figure 2 presents a typical dose-response curve for animal experiments dealing with carcinogens. Usually only two data points are available either from an NTP bioassay or other chronic study. Points A and B represent the tumor incidence observed in the animal experiment at the high and low dose levels, respectively. Point C represents the mathematically extrapolated tumor incidence estimated to occur at an exposure level below those experimentally applied. This exposure level would correspond to a level likely to exist in the ambient environment (usually far below the experimental

dose). Identification of this point (B) and others along the extrapolated lower end of the curve then allows for the

projection of an assumed excess human cancer risk.

TABLE 7.—CANCER RISK ESTIMATES FOR VOCs; PROJECTED UPPER LIMIT LIFETIME CANCER RISKS

Compound	Projected upper limit excess lifetime cancer risk	Concentration in drinking water (µg/l)			Quality of evidence **
		CAG	CAG *	NAS	
Trichloroethylene	10^{-6}	28	18	45	Limited (animal).
	10^{-5}	2.8	1.8	4.5	Limited (animal).
Tetrachloroethylene	10^{-6}	10		35	Limited (animal).
	10^{-5}	1		3.5	Limited (animal).
Carbon tetrachloride	10^{-6}	4	2.7	45	Sufficient (animal).
	10^{-5}	0.4	0.27	4.5	Sufficient (animal).
1,2-Dichloroethane	10^{-6}	9.5	5.0	7.0	Sufficient (animal).
	10^{-5}	0.95	0.5	0.7	Sufficient (animal).
Vinyl chloride (††)	10^{-6}	20-25	0.15-2	10-20	Sufficient (human).
	10^{-5}	2	0.015	1	Limited *** (animal).
1,1-Dichloroethylene	10^{-6}	2.3	2.4		Limited *** (animal).
	10^{-5}	0.23	0.24		Sufficient (human).
Benzene (††)	10^{-6}	6.7			Limited *** (animal).
	10^{-5}	0.67			Limited **** (animal).
1,1,1-Trichloroethane (†)	10^{-6}	217		168	Inadequate.
	10^{-5}	21.7		16.8	
p-Dichlorobenzene					

† 95% confidence limit.

†† Vinyl chloride and benzene classified as human and suspected human carcinogens, respectively, by NSA. Both have been classified as human carcinogens by IARC (1982).

CAG=EPA Carcinogen Assessment Group; NAS=National Academy of Sciences Safe Drinking Water Committee; IARC=International Agency for Research on Cancer.

* Recent draft updated calculations by CAG.

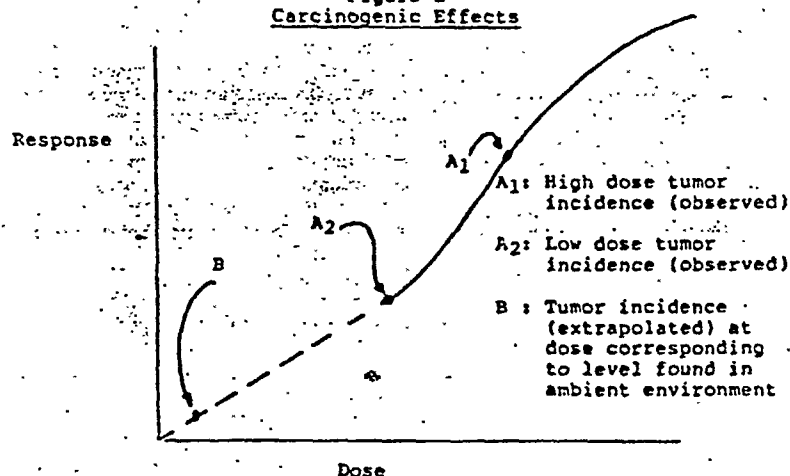
** Based upon IARC unless otherwise noted. Indicates strength of evidence as an animal carcinogen.

*** Assessment made by EPA Carcinogen Assessment Group (CAG), and IARC.

**** Limited evidence as determined by the NAS Safe Drinking Water Committee (1983) and CAG (1983) from preliminary data.

(†) Not considered in this proposal as a carcinogen. Risk estimates are provided for perspective. Developing data may change this classification. See text.

Figure 2
Carcinogenic Effects



Toxicology of VOCs

The following are short discussions of the toxicity of VOCs for which RMCLs are proposed. Detailed assessments are found in the draft health criteria documents that have been prepared for

each VOC and are provided for public comment; see section VII, References.

Trichloroethylene. Trichloroethylene has been shown to exhibit non-carcinogenic bioeffects at high (non-environmental) doses in humans and several other animal species, including

dogs, rabbits, guinea pigs, rats and mice. The major effects demonstrated are liver and kidney damage, central nervous system effects and depression in myocardial contractility.

In the calculation of a suggested adjusted ADI for trichloroethylene, liver toxicity was used as the most sensitive end-point with respect to adverse health effects, not including the potential carcinogenic risk that may result from exposure to the chemical. A study in which rats were exposed to trichloroethylene through inhalation with resulting elevation of liver weights was used to calculate a suggested Adjusted ADI of 0.257 mg/l. This value was calculated based upon a minimal-effect-level of 300 mg/m³ (55 ppm), since rats exposed to this dose level (5 days a week for 14 weeks) showed elevation of liver weights. An uncertainty factor of 1000 was applied due to the fact that an animal study, where the no-observed-adverse-effect-level was not identified, was used and because the study was only of 14 weeks duration. One hundred percent exposure from drinking water and a 70 kg adult consuming 2 liters of water per day were assumed in the calculations.

The NAS has not calculated a chronic non-carcinogenic Suggested No-Adverse-Response Level (equivalent to an Adjusted ADI) for trichloroethylene, because every long-term study, with the exception of the National Cancer Institute (NCI) carcinogenesis investigation, involves trichloroethylene administration by inhalation. The NCI bioassay did not determine a "no-effect level" and thus it was not considered appropriate for use in the derivation of a chronic, noncarcinogenic value.

Bacterial mutagenicity studies have shown trichloroethylene to be mutagenic in several systems, including metabolically activated *Salmonella typhimurium* and *E. coli* K12 strain; however, a later study reported trichloroethylene to be non-mutagenic in the Ames test system.

Commercial grade trichloroethylene was tested by the National Cancer Institute (NCI) (1976) and was reported to induce hepatocellular carcinomas in male and female mice by oral gavage. A repeat bioassay by the National Toxicology Program (1983) using purified trichloroethylene in corn oil found it to cause hepatocellular carcinomas in both sexes of mice, at a dose of 1,000 mg/kg per day, five days per week for 2 years, administered by gavage. Trichloroethylene was not carcinogenic in female rats under the test conditions and the results in male rats were determined to be insufficient to make an

adequate evaluation of the carcinogenicity. The doses administered to the rat were 1,000 and 500 mg/kg/day.

The International Agency for Research on Cancer (IARC) has concluded that trichloroethylene has limited evidence of carcinogenicity, based upon experimental animal studies and inadequate evidence from available human data. This means that the data suggest a carcinogenic effect in one species, but lack of confirmation in others. The World Health Organization (1981) has recommended a tentative guideline value of 30 µg/l for trichloroethylene in drinking water.

EPA's Carcinogen Assessment Group has used the linearized non-threshold multi-stage model to calculate projected excess cancer risk estimates extrapolated from high dose animal studies. For trichloroethylene, these estimates were based upon the NCI bioassay data. Calculated risks correspondingly to various doses are listed in Table 7.

Tetrachloroethylene. The principal non-carcinogenic effects of tetrachloroethylene in humans and other animals from both acute and longer-term exposures at relatively high (non-environmental) doses include central nervous system depression and fatty infiltration of the liver and kidney with concomitant changes in serum enzyme activity levels indicative of tissue damage.

A suggested adjusted ADI for tetrachloroethylene, considering adverse health effects other than the potential carcinogenic risk, was calculated based upon a series of studies in which rats were exposed by inhalation to tetrachloroethylene with effects observed on the central nervous system, immune system and certain blood components. The value of 0.085 mg/l was derived from these studies, based upon a no-observed-adverse-effect level of 10 mg/m³ (1.5 ppm) and an uncertainty factor of 100. This uncertainty factor was considered appropriate for use with a no-observed-adverse effect level from an animal study with no comparable human data. Daily exposure of a 70 kg adult drinking 2 liters of water per day was assumed in the calculations.

Tetrachloroethylene in corn oil was tested for carcinogenic potential in mice and rats by gavage in the NCI Bioassay Program (1977). In these bioassays, it was shown that tetrachloroethylene increased the incidence of hepatocellular carcinomas in both sexes of mice, but not in rats. A dose rate of 531 mg/kg per day, 5 days/week in male mice and 386 mg/kg in female mice resulted in a tumor incidence rate of 65

percent and 40 percent, respectively. Because of an excessive dose related mortality in the gavage experiment and low dose level in the inhalation study, no conclusion can be made about the carcinogenicity of tetrachloroethylene in rats. Data from the recent gavage study has been withdrawn for the time being pending the results of an indepth audit by the NTP due to unresolved problems with the study as conducted.

The majority of mutagenicity studies on tetrachloroethylene were negative. Two positive studies have been reported; however, the purity of the tetrachloroethylene was questioned in these cases.

The IARC has concluded that tetrachloroethylene has limited evidence of carcinogenicity in animals and inadequate evidence from available human data. This means that the data suggest a carcinogenic effect in one species, but lack confirmation in others. The World Health Organization has recommended a tentative guideline value of 10 µg/l for tetrachloroethylene in drinking water.

EPA's Carcinogen Assessment Group has used the linearized multi-stage model to calculate projected excess cancer risk estimates extrapolated from high-dose animal studies. For tetrachloroethylene, these estimates were based upon the 1977 NCI bioassay in mice. Calculated risks corresponding to various doses are listed in Table 7.

1,1,1-Trichloroethane. The principal toxic effects of 1,1,1-trichloroethane from which (non-environmental) dose exposure in animals and humans are depression of the central nervous system, increase in liver weight and cardiovascular changes.

Liver toxicity was used as the most sensitive end-point with respect to adverse health effects, not including the potential carcinogenic risk, in the calculation of an adjusted ADI for 1,1,1-trichloroethane. An inhalation study which examined exposure of mice to 1,1,1-trichloroethane was used to calculate a suggested Adjusted ADI of 1.0 mg/l. This study demonstrated changes in the livers of the mice at various dose levels.

Two animal bioassays by the National Cancer Institute (NCI) have been completed in rats and mice (1977; 1983). In the earlier bioassay, rats and mice were treated with 1,1,1-trichloroethane in corn oil by gavage. Because only 3 percent of the animals survived to the end of the experiment, due in part to chronic murine pneumonia which was determined to be the most probable cause of the high incidence of natural deaths among the animals, it was concluded that carcinogenicity could not

be determined from this study. A repeat carcinogenesis bioassay of 1,1,1-trichloroethane was conducted in which doses of 3,000 or 1,500 mg/kg were administered by gavage to both sexes of mice, and rates were given doses of 750 or 375 mg/kg. In the preliminary report of this study, 1,1,1-trichloroethane was carcinogenic in both male and female mice showing an increased incidence of hepatocellular carcinomas but not in rats; however, these initial results have been questioned.

1,1,1-Trichloroethane has been tested for mutagenicity in several test systems. Both negative and positive results were reported in mutagenicity tests in various *Salmonella typhimurium* strains, and 1,1,1-trichloroethane was not shown to be mutagenic in studies using yeast as an indicator organism.

EPA's Carcinogen Assessment group has used the linearized non-threshold multi-stage model to calculate preliminary excess cancer risk estimates extrapolated from the preliminary reported incidence of hepatocellular carcinomas in female mice in the study cited above. Calculated risks corresponding to various doses are listed in Table 7.

Similar calculations were made by the NAS (*Drinking Water and Health*, Vol. V) except that the average of the results in both male and female mice were used as the basis.

The latest bioassay data, on 1,1,1-trichloroethane is currently undergoing audit by the NTP and a final report has not been issued. Therefore this proposal will use the noncancer inhalation data as the basis for the proposed RMCL. This notice will be amended if the final NTP report determines that 1,1,1-trichloroethane was carcinogenic under the conditions of the tests.

Carbon Tetrachloride. Carbon tetrachloride (CCl₄) has been shown to exhibit non-carcinogenic effects in humans and animals following acute and chronic exposures. The principal effects seen at high doses are liver changes such as fatty liver with centrilobular necrosis developing if exposure is continued.

A chronic AADI for CCl₄ of 0.025 mg/l was calculated from a recent report of a study (Bruckner, et al., 1983) which has not yet been published or peer reviewed at this juncture.

Rats weighing 200-500 g were randomly divided into groups of 15 to 16 animals each. The animals were given by gavage 0, 1, 10, 33 mg CCl₄/kg bw (in corn oil). The animals were dosed on a daily basis, 5 times weekly, for a total period of 12 weeks. Blood samples were obtained from alternate animals at the

following intervals: 2, 4, 6, 8, 10 and 12 weeks post-treatment. The serum was analyzed for BUN, GPT, SDH and OCT. At 1 mg/kg, there were no significant biochemical/histopathological changes. SDH, the most sensitive index of hepatotoxicity, was elevated ($p < 0.05$) in rats receiving 10 mg/kg for 12 weeks. Also, these rats exhibited mild centrilobular vacuolization. At 33 mg/kg, levels of GPT, SDH, and OCT were increased ($p < 0.01$) and marked hepatic lesions were apparent. There was no evidence that CCl_4 was nephrotoxic.

Comments on the experimental protocols and interpretations of the data are requested.

Carbon tetrachloride has been shown to be carcinogenic in rats, mice and hamsters through oral administration. In the NCI (1976) bioassay for trichloroethylene, carbon tetrachloride was used as the positive control. Carbon tetrachloride was administered in corn oil by gavage to rats at two dose levels: 47 and 94 mg/kg for males and 80 and 159 mg/kg for females. In mice, the chemical was administered at 1,250 and 2,550 mg/kg. Carbon tetrachloride was determined to increase carcinomas of the liver in both rats and mice in this bioassay.

Carbon tetrachloride has not been shown to be mutagenic in any of the reported *Salmonella* (Ames) assays. However, mutagenic activity associated with carbon tetrachloride has been observed in a test system using the yeast *Saccharomyces cerevisiae*.

The IARC has concluded that sufficient evidence of carcinogenicity in animals exists for carbon tetrachloride. The NCI has also identified carbon tetrachloride as an animal carcinogen and has used it as a positive control in several bioassays. The World Health Organization (1981) has recommended a tentative guideline value of 3 µg/l for carbon tetrachloride in drinking water.

EPA's Carcinogen Assessment Group has used the linearized non-threshold multi-stage model to calculate projected excess cancer risk estimates extrapolated from high dose animal studies. For carbon tetrachloride, the latest draft estimates were based upon the geometric mean of the four cancer studies. Calculated risks corresponding to various doses are listed in Table 7.

1,2-Dichloroethane. The toxic effects of 1,2-dichloroethane in humans and other animals from both acute and longer-term exposures at relatively high levels include central nervous system depression, liver and kidney damage, gastrointestinal distress, adrenal and pulmonary effects and circulatory disturbances.

A series of inhalation studies in which a variety of animal species were exposed for up to 8 months to 1,2-dichloroethane were used to calculate a suggested Adjusted ADI for 1,2-dichloroethane. The most sensitive endpoints, not including the potential carcinogenic risk, identified in these studies were pulmonary congestion, diffused myocarditis, and fatty degeneration of the liver, kidney, adrenal and heart. A value of 0.260 mg/l was calculated, based upon a no-observed-adverse-effect-level of 405 mg/m³ (100 ppm). A variety of animal species exposed to this dose level for 6 to 7 hours/day, 5 days/week yielded no adverse effects as measured by general appearance, behavior, mortality rates, growth rates, organ function and blood chemistry. An uncertainty factor of 1000 was used to account for an animal study with no equivalent human data, and for the use of a study of less than lifetime exposure. One hundred percent exposure from drinking water and a 70 kg adult consuming 2 liters of water per day were assumed in the calculations.

1,2-Dichloroethane has been shown to significantly increase tumor incidences at several sites in both rats and mice when administered by gavage, but not following inhalation exposure. In the NCI bioassay, doses of 47 or 95 mg/kg in corn oil administered by gavage to rats and 97 or 195 mg/kg given to male mice and 149 or 299 mg/kg given to female mice were shown to increase the incidence of several types of tumors. 1,2-Dichloroethane has also been shown to be mutagenic in a number of biological systems, including *Drosophila melanogaster*, *Salmonella typhimurium* and *E. coli*.

The IARC has concluded that sufficient evidence of carcinogenicity in animals exists for 1,2-dichloroethane. The World Health Organization (1981) has recommended a tentative guideline value of 10 µg/l for 1,2-dichloroethane in drinking water.

EPA's Carcinogen Assessment Group has used the linearized non-threshold multi-stage model to calculate projected excess cancer risk estimates extrapolated from high-dose animal studies. For 1,2-dichloroethane, these estimates were based upon the NCI bioassay data. Calculated risks corresponding to various doses are listed in Table 7.

Vinyl chloride. Acute and chronic toxicity studies with vinyl chloride have shown the major non-carcinogenic effects resulting from high dose exposures to be congestion and edema of the lungs and hyperemia of the kidney and liver. Other non-carcinogenic effects have been noted, including disturbances

of the central nervous system, pulmonary insufficiency, cardiovascular manifestations, gastrointestinal symptoms and acroosteolysis.

A suggested Adjusted ADI for vinyl chloride of 0.06 mg/l considering adverse health effects not including carcinogenic risk, was calculated based upon an oral toxicity study in rats in which a variety of carcinogenic and non-carcinogenic effects were observed at all dose levels. A minimal-effect-level of 1.7 mg/kg was used in the calculations, as histopathological changes in the liver including clear-cell foci, extensive necrosis, cysts and liver-cell polymorphism were observed at this dose level. An uncertainty factor of 1000 was applied to account for an animal study where the no-observed-adverse-effect level was not identified. One hundred percent exposure from drinking water and a 70 kg adult consuming 2 liters of water per day were assumed in the calculations.

Vinyl chloride has been shown to have carcinogenic effects in animals and humans. Animal studies have demonstrated the production of liver angiosarcomas, mammary carcinomas, pulmonary angiosarcomas and other tumor types in rats following oral exposure and carcinogenic effects in mice, rats and hamsters by inhalation exposure have been reported. In humans, studies have linked vinyl chloride with angiosarcoma of the liver and other forms of neoplasm. The IARC has concluded that sufficient evidence of carcinogenicity exists for vinyl chloride from animal studies and human studies, and that vinyl chloride should be considered a human carcinogen with target organs of the liver, brain, lungs and haemo-lymphopoietic system.

Vinyl chloride was shown to be mutagenic in the test system using metabolically activated *Salmonella typhimurium*, *E. coli* K12 strain, in germ cells of *Drosophila* and Chinese hamster V79 cells.

EPA's carcinogen assessment Group has used the linearized non-threshold multi-stage model to calculate projected excess cancer estimates extrapolated from high dose animal studies. For vinyl chloride, these estimates were based upon an inhalation study in rats in which vinyl chloride concentrations ranging from 50 to 10,000 ppm resulted in a total tumor incidence rate of 17 percent to 62 percent, respectively. The NAS has also used the multi-stage model to calculate excess cancer risk values. They based their estimates upon the same study as did CAG (Maltoni, et al., 1975), except ingestion data instead of inhalation data were used. The NAS

6. None of the above.

van der Rest requested that AACPP Staff intervene on behalf of Eternit and appear at a special public hearing before the Subcommittee on Environmental Health of the Batasang Pambansa (Philippine Legislature) (Attachment 3). He was especially concerned about potential "ripple effects" from this adverse action affecting Far Eastern markets for A/C pipe. Eternit Corp.-Manila agreed to cover Staff expenses.

Temporary Lifting of Ban

On November 17, 1982, Eternit and Italit petitioned President Marcos to lift the ban until such time that an independent scientific and medical study was conducted (Attachment 4). This petition, coupled with the realization that prohibiting the use of A/C pipe would not only increase the cost of pipe currently being installed, but also would cost the Philippine government billions of pesos to replace the 20,000 kilometers of water pipe in the metro Manila area, prompted President Marcos to lift the ban for 90 days and create a special Presidential Advisory Committee to gather data and assess the safety of A/C pipe. The cabinet level committee will be comprised of the Minister of Health, the Executive Director of the National Environmental Protection Council, the Director General of the National Science and Technology Authority, the Director of the Product Standard Agency and President of the Philippine Chamber of Commerce and Industry (Attachments 5 and 6). The Advisory Committee study would be separate and distinct, though coordinated with Batasang hearings.

The temporary lifting of the ban and establishment of the Presidential Advisory Committee received widespread media coverage (Attachments 7, 8, 9, 10 and 11). There were some unfortunate side effects of this coverage, notably the misperception or misrepresentation of the asbestos content of A/C water pipe (5%) and a statement that drinking water did not come in contact with the fiber. It is not known whether these resulted from reporters' misunderstandings or MWSS zeal in defending the product.

Liaison with CDM, Inc. (U.S.)

Prior to departure, Staff contacted David Doran of CDM (Boston, Massachusetts) to obtain additional information on the situation. A meeting was set up with Deputy Resident Manager Elwood (Rich) Richardson in Manila.

Development of Strategy and Tactics

On November 22, 1982, Staff met with Jacques Cartuyvels (President) and Carlos Borromeo (Vice President-Marketing) of Eternit-Manila. Complete background information was provided; the positions of potential allies and adversaries were discussed along with the desirability of media contacts. The possibility of a compromise position i.e., asphaltic lining of A/C pipe, also was discussed and dismissed on economic grounds. (Competition between pipe suppliers is so high that the small increase in the cost of coating pipe would make A/C non-competitive.) Initial lobbying efforts were directed towards the Subcommittee on Environmental Health.

Lobbying - Subcommittee on Environmental Health

A brief meeting was held with Assemblyman Ramas at the Batasang. This meeting adjourned and reconvened at the offices of Assemblyman Narciso Monfort. Monfort is a physician and it was felt that his input, if favorable to the industry's position, would be most influential in Subcommittee deliberations. Also attending was

Monfort's wife who was performing special study responsibilities for the Assemblyman.

Staff gave a 45 minute briefing on the asbestos in drinking water issue. Although Monfort appeared to be impressed by the strength and cohesiveness of the animal and epidemiologic studies, he was quick to see the potential release (by corrosion) of asbestos from A/C pipe. He was particularly interested in how and when such release might occur. Staff stated it understood Manila's water was not highly corrosive based on the description of a 25 year old pipe sample removed from the San Juan section. According to Borromeo, the sample is said to exhibit calcium carbonate deposition on the interior surface.

Monfort went off on a tangent about occupational exposures to asbestos in A/C pipe factories and incidental exposures from the use of A/C sheet and corrugated products. It appeared as if he saw the A/C pipe controversy "dead ending" with the substantial medical evidence supporting product safety, so he was looking for another area for Subcommittee study. Staff and Eternit attempted to redirect his thinking to resolution of the matter at hand. It was recommended that studies of occupational exposures or other products be handled by another legislative resolution. A scientific/medical backgrounder was left for Assemblyman and Mrs. Monfort.

Liaison with CDM, Inc. (Manila)

Staff, Cartuyvels and Borromeo then met with Rich Richardson, Deputy Resident Manager, CDM, Inc. Richardson was fully aware of the situation but was unable to provide any information about its cause. He did say that the information provided to CDM - Boston by AACPP had been forwarded regularly to Oscar Illustre, General Manager of MWSS.

Briefing - Local Water and Utilities Administration (LWUA) and MWSS

We then met with Carlos Leano, Director of LWUA. The meeting was cordial and timely as Leano had directed a staff member to prepare a position paper on the asbestos and drinking water issue. AACPP Staff offered to review the LWUA internal files to determine their completeness and to provide additional information. Leano counter-proposed that AACPP brief the staffs of LWUA and MWSS that afternoon. However, the MWSS General Manager and Staff were at the Batasang Pambansa so the briefing proceeded without them.

Shortly after the briefing began, Marcial Manlaysay, Assistant General Manager-Engineering and Special Projects, MWSS, appeared and directed that the meeting be moved to his office. Unfortunately, this all but destroyed the continuity of the briefing as Manlaysay, who was dramatically argumentative, criticized the A/C pipe industry for not providing MWSS with current information on the health issue and for not mounting an effective defense on its own behalf. He vented considerable spleen saying, "We are not going to defend your product." He also underlined the importance of obtaining nonpartisan, independent data supporting the safety of A/C pipe.

Staff found much of Manlaysay's criticism hollow and misdirected because (a) he failed to acknowledge the inherent credibility problems raised by an industry defending its product before the media, and (b) in spite of his criticisms about the weakness of A/C pipe industry-generated data, a quick glance at a MWSS briefing package for President Marcos showed it to be packed with issues of A/C Advisory, "A/C Pipe and Drinking Water" and other information provided to CDM, Inc. by the A/C Pipe Producers Association.

The meeting adjourned amicably. Staff advised that a more comprehensive briefing would be given in its testimony before the Subcommittee on Environmental Health the next morning. LWUA and MWSS staffs were scheduled to monitor the hearing.

Cancellation of Public Hearing

Late in the day of November 22, the leadership of the Batasang and the Presidential Advisory Committee decided to cancel the public hearing. There had been rumors earlier of rescheduling the hearing until November 25. Staff heard the cancellation on the late evening news. The broadcast gave no explanation for the cancellation, nor was there any mention in the morning newspapers.

It is likely that the Presidential Advisory Committee and Subcommittee on Environmental Health were concerned about the hearing causing more media coverage, prolongation and exacerbation of the controversy. By that time, a number of Subcommittee members knew that Eternit/AACPP would vigorously defend the industry's position. It is also likely that the Batasang leadership and the Presidential Advisory Committee realized the need for coordinating data collection, review and assessment so the findings of the Committee and Subcommittee were in accordance with the facts, as well as the wishes of President Marcos. There is little doubt in Staff's mind that problems raised by the presence of 20,000 kilometers of existing A/C pipe loomed very large in this decision-making process.

On November 23, Eternit and AACPP appeared at the Batasang just to be sure the reported cancellation was true. We were advised by Assemblymen Monfort and Ramos and Dr. Priscilla Tablan (Officer in Charge, Lung Center of the Philippines) that the public hearing was indeed cancelled and that the Presidential Advisory Committee and Subcommittee on Environmental Health would meet jointly in executive (closed) session. Monfort stressed the need to coordinate the groups' activities and to set ground rules on how a study or hearing might proceed. He implied that the Subcommittee would defer to the Presidential Advisory Committee (which is reasonable) and that the entire matter of occupational exposures to asbestos and other carcinogens would be a matter of present and future discussions.

We also met with Minister of Health Azurin and expressed the industry's desire to cooperate with the government studies. Azurin was gracious and pledged a fair hearing of all sides but declined persistent offers by AACPP and Cartuyvels to appear before the joint meeting.

It was interesting to note the absence of anti-A/C pipe advocates and the presence of that ubiquitous parasite to field problems — the home water filter manufacturer. At least one such manufacturers' representative appeared for the obvious purpose of gathering information to promote its product for filtering asbestos fibers. (Note: Member companies should be aware that the U.S. Environmental Protection Agency does not recommend the use of such filters for the filtration of asbestos fibers or other chemical contaminants for that matter.)

Preparation of Industry Position Paper

Staff prepared a transmittal letter, scientific/medical brief and complete references supporting the industry's position on the safety of A/C pipe (Attachment 12). Copies were transmitted to all members of the Presidential Advisory Committee, the

Subcommittee on Environmental Health, and the General Managers of MWSS and LWUA.

Informal Meeting with MWSS

On the evening of November 23, Staff attended a dinner hosted by Italit. Although this was originally represented to be a small dinner between Italit officials and Staff, the General Manager of MWSS, a number of Assistant Managers, three World Bank officials from Washington and another consulting engineer also were in attendance. Staff took the opportunity to update Ilustre and advise him of industry intentions with respect to transmittal of medical evidence. Ilustre heartily endorsed this approach and was most appreciative of the fact that he also would receive copies.

Additional Lobbying

On November 24, a meeting was held with Assemblyman Gualberto Lumaig of the Subcommittee on Environmental Health. Again, data supporting the industry's position was presented. Lumaig was particularly impressed by Borromeos' argument that a ban on A/C pipe would reduce competition between materials and necessarily increase pipe prices. Moreover, he persuasively argued that 85% of the raw materials used in A/C pipe were Phillipine made whereas raw materials in steel and PVC pipe were imported and thus added to the country's trade deficit.

Staff Analysis

To the credit of Eternit, AACPP Staff was used effectively as a resource in defending the industry's position in this matter. What strategies or tactics were not already conceived prior to Staff's arrival were soon resolved in productive discussions.

The Eternit operation appears to be extremely well managed by Cartuyvels. Borromeo, an ex-government official, appears comfortable and well connected in necessary political circles. Both factors will be important in the successful resolution of this field problem.

In spite of the age of the plant, occupational exposure levels to asbestos and general appearance compare favorably with more modern facilities. The data Staff reviewed showed occupational exposures at all work stations to be below 0.5 f./cc. (TWA). It is not likely that this plant would be found wanting were legislators to be given a tour, as may be desirable in the future. Conditions at the Italit are said to be worse; Staff did not visit that plant.

Although the situation with respect to A/C pipe is stabilized, it is likely that occupational exposures to asbestos as well as installation or incidental exposures from A/C sheet or corrugated, asbestos in schools, etc. will soon be a matter of concern to the Batasang and Ministry of Health. This probably will not occur until 1983 and hopefully will not impede resolution of the A/C pipe issue. Until the pipe controversy is resolved, Staff recommended that Eternit-Manila not take further steps in encouraging the government to establish occupational standards for asbestos exposure or independent studies of other A/C building products. The current situation simply is too volatile to interject those potentially inflammatory subjects now.

At this point it is not known whether any public hearing will be held. Ideally, it should not since these issues are best resolved by scientists, such as those on the Presidential Advisory Committee, rather than legislators. Any decisions will have a substantial political component, regardless. It is particularly fortunate that the ground-

work done by Cartuyvels and Borromeo in advance of Staff's arrival allowed the timely dissemination of the same information to all parties studying the issue. Hopefully a harmonious and consistent conclusion will be drawn.

Finally, it is disconcerting to note that there appears to be a pattern developing in the Middle East and Far East with regards to concerns about the safety of A/C pipe. In addition to the Phillipines, the nations of Kuwait, Saudi Arabia and the Sultanate of Oman have organized study committees to evaluate the product. The causation for these events could be pure circumstance or the continued effort by competitive interests to discredit the product.

Action Plan and Recommendations

1. Eternit will closely monitor deliberations of the Presidential Advisory Committee and Subcommittee on Environmental Health, and respond to any questions or concerns that emerge. Both Borromeo and Cartuyvels are articulate and now knowledgeable about the health issue. Barring the emergence of difficult technical questions on the corrosion of A/C pipe or on less important studies, future liaison probably can be handled by Eternit.
2. Eternit will should monitor development of MWSS and LWUA position papers on A/C pipe and obtain copies of respective briefs in advance of any public hearing.
3. AACPP contacted CDM, Inc. on November 30 and requested chemical data on raw and treated waters in Metropolitan Manila. Deputy Resident Manger Richardson mentioned the possibility of taking asbestos counts in Manila. Eternit also should keep in touch with Kevin Reilly (CDM-Manila) in the event that such data is gathered.
5. Eternit should attempt to obtain a sample of the 25 year old A/C pipe removed from the San Juan section of the city, observe its physical appearance and conduct independent structural testing if possible.
6. Consideration should be given to conducting "backgrounders" with the print media. Staff recommends that this be done only after discussing industry intentions with the Presidential Advisory Committee and Subcommittee on Environmental Health. However, if adverse articles persist, Eternit should aggressively attempt to have the industry's position aired. Staff left some press kits to facilitate this effort, if required.
7. Eternit should scan major newspapers for home water filter advertisements that may perpetuate public or government concerns about asbestos in drinking water. If necessary, public relations or legal action should be taken to correct fallacious or inflammatory claims.
8. Since there will be a continuing need for Eternit-Manila and Italit to provide information to the government, Staff will solicit their membership in AACPP.

JFW/ajb

Enclosures

cc: A. Kahn, Esq.
Jacques Cartuyvels (Eternit-Manila)
Asbestos International Association
AIA/NA
Canadian Asbestos Information Center
South Pacific Asbestos Association

copies to: Executive Committee

L. Ambler
J. Cran
L. Taylor

International Affairs Committee

E. van der Rest	R. Dorner
L. Giannitrapani	P. Hart
A. Saoulis	S. Al-Tarkait
R. Jalan	V. Pattabhi
C. Barton	H. Hudson
M. Delcourt	J. Cuvelier
B. Giboin	G. Zaviezo
J. Schmaus	J. Rodrigues
Dubuc	Dimatit

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Chrono

AM:ANTUS
ASBESTOS SERVICES

Philippines TIMES JOURNAL, SEPTEMBER 5, 1982

ASBESTOS: Must it be banned?

THE World Safety Organization is pressing for a more thorough evaluation of asbestos which has been described as "a dangerous mineral."

During a meeting of the organization in Manila last week, safety professionals agreed that a systematic evaluation of asbestos is extremely necessary to determine if it should be partially or totally banned.

Barbara J. Peters of Santa Monica, California, said that certain diseases

have been associated with asbestos: asbestosis, lung cancer, mesothelioma, pleural plaques and adhesions, and colpulmonale. These diseases do not occur immediately but are incurable once contracted. Asbestosis, for instance, takes place after 10 to 20 years of exposure to asbestos, Peters said.

She added that a large segment of the society is open to asbestos "pollution."

Exposure reportedly

begins from the time the mineral is mined to the time it is used as an end product. "What's worse, exposure to the dangers asbestos creates is not limited to the people who directly handle it," she added.

Asbestos fibers are found to be airborne particularly in areas where it is sprayed on buildings or as a result of asbestos insulation.

Peters also discussed asbestos cement pipe as a present day controversy.

She cited a recent study

which tested 39 pairs of a water samples. The first 39 samples were taken from water before it had travelled through asbestos cement pipe, the second set of samples were taken after the water had flowed through the asbestos cement pipe.

The study found that the asbestos content of the second set of samples had increased by 115 times. In addition, asbestos concentration in the second set of samples were as high as 1,000,000 fibers per liter.

TIMES JOURNAL, SEPTEMBER 7, 1982

Asbestos pipes stay

THE GOVERNMENT will continue to allow the use of asbestos cement pipes by the Metropolitan Waterworks and Sewerage System in the absence of a conclusive study on the levels of asbestos that may be considered dangerous.

Health Minister Jesus Azurin said yesterday his ministry has already made inquiries from the World Health Organization on the matter but was told that WHO has yet to come up with its stand on it.

Concern about the

use of asbestos cement was triggered by a statement by the World Safety Organization that asbestos was a dangerous mineral.

The organization, meeting in Manila, said several incurable and long-term diseases have been associated with asbestos, such as lung cancer and other forms of pulmonary ailment.

The meeting, attended by safety professionals the world over, was also presented with a study that

To Page 10

Asbestos pipes to stay

From Page 1

water which had travelled through asbestos cement pipes contains as many as one million fibers per liter.

In response to a ministry query, Hiroshi Nakajima, WHO regional director for the Western Pacific, said the organization does not have an official stand on the safety, or lack of it, of asbestos cement pipes in water supply systems.

He said the international standards for drinking water issued by WHO in 1971 also do not specify any limitation on the presence of asbestos fibers in the water.

There are no sufficient data to warrant a specific recommended fiber level at present, he said.

Azurin said the Philippines would have to depend mainly on the conclusion of studies made by the World Health Organization in connection with the use of asbestos cement.

Meanwhile, the UN Commission on Transnational Corporations urged that consumer-protection provisions be clearly outlined in the code of conduct for transnational corporations to safeguard the interest of consumers in developing countries.

On the fifth day of the commission's meeting at the Philippine International Convention Center, a position paper was issued saying that "consumer-oriented information should not be limited to marketing information for the benefit of the producer or seller but should include information necessary for the protection of the health and safety of the consumer."

Times Journal, Nov. 14, 1982

Use of asbestos pipe stopped

PRESIDENT Marcos yesterday directed the Metropolitan Waterworks and Sewerage System to stop contractors from using asbestos pipes because asbestos is believed to cause cancer.

The MWSS is studying the harmful effects of asbestos water pipes. The study was prompted by widespread public concern over the continued use of asbestos pipes in MWSS installations all over Metro Manila.

In another move, the President sought to stop the dumping of wastes into Manila Bay, which he said causes marine pollution and undermines the national development efforts.

The President directed MWSS Manager Oscar Ilustre to set up immediately a sewage treatment plant on a five-hectare lot in the Tondo reclamation area.

He issued the order in the wake of com-

plaints from fishermen in the bay that indiscriminate dumping of waste has not only destroyed fish and other marine life but also endangered the health of communities along the bay.

The President told Ilustre to make a study of other sites in the Metro Manila area where sewage treatment plants may be set up to sanitize waste before it is pumped into the bay.

The President directed Ilustre to speed up the cleaning of all public and private septic tanks in the Metro Manila area.

The MWSS has scheduled to clean up some 300,000 septic tanks in Metro Manila for free.

Those who want priority in having their septic tanks cleaned will have to pay a minimal fee, Ilustre said.



Batasan Quiz on asbestos pipes readied

By C. VALMORIA, JR.

A full-dress inquiry into the continued use of asbestos water pipes was initiated in the Batasan yesterday. President Marcos had earlier directed the Metropolitan Water works and Sewerage System (MWSS) to stop using these pipes immediately.

If the Batasan has established that asbestos pipes are a health hazard, it can recommend the digging up and replacement of pipes already laid, which is a costly undertaking.

Among those who initiated the move during a breakfast conference with Batasan reporters yesterday, were Assemblymen Narciso Monfort, Gualberto Lumaug, Rogelio Quiambao, and Jesus Amparo.

Monfort, a doctor of medicine, said the public, particularly Metro Manila residents, have every reason to be alarmed, considering that asbestos pipes reportedly form one third of the entire pipeline network in the metropolitan area.

He said that the national government has a commitment to safeguard the people's health. He said this called for an impartial investigation by the Batasan, following reports about findings in the United States that asbestos fibers are "definitely cancer-causing."

Lumaug said he could not understand why the MWSS allowed the continued use of asbestos pipes, considering that as early as 1968, his brother, Romulo Lumaug, now deputy trade minister, has urged the government to prohibit use of asbestos material in air-conditioning systems and other installations.

Quiambao said that barangay residents in her area had taken it upon themselves to stop MWSS contractors from further laying asbestos pipes because they were not complying with the presidential directive.

Monfort cited a report that Dr. Irving Felikoff, a professor at Mt. Sinai School of Medicine in New York, had established a definite link between asbestos fibers and lung cancer. Felikoff, according to Monfort, believed that asbestos fibers are the likely cause of cancer of the gastro-intestinal tract, larynx, and kidney.

Monfort also referred to reports of Dr. William Blot of the American National Cancer Institute that asbestos fibers appear to be the greatest single cause of occupational cancer.

The resolution which is expected to be filed today will be referred to the Batasan committee on health for consideration.

The use of asbestos pipes as water conduits outside Metro Manila has been ordered stopped by the Local Water Utilities Administration.

LWUA assistant

ASBESTOS

(Cont'd from page 1)

mitivo Alava said that LWUA general manager Carlos Leano, Jr. has asked provincial contractors to stop the use of asbestos pipes as ordered by President Marcos.

The President, acting to protect the people's health, ordered the Metropolitan Waterworks and Sewerage System last Sunday to stop the use of asbestos pipes as water mains in Metro Manila.

The President's order was prompted by persistent reports that asbestos water pipes endanger public health and may cause cancer.

The LWUA, a government agency responsible for improving the water supply systems in areas not being serviced by the MWSS, had earlier approved the use of asbestos pipes in at least 15 water projects out of the 59 water system construction projects in the various regions of the country.

The notice to the contractors to desist from using asbestos pipes was issued by LWUA even as affected contractors and asbestos pipe manufacturers were reportedly pooling their resources to request a reconsideration of the presidential order.

Opposite views about the supposed harmful effects of asbestos water pipes on the health of the people have been expressed.

Alava himself said that asbestos materials are present in raw water and even with the use of filtration equipment, a small quantity of the allegedly harmful substance is left in drinking water. (Ben Rosario)

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Bulletin Today, Nov. 18, 1982

November 17, 1982

HIS EXCELLENCY
PRESIDENT FERDINAND E. MARCOS
REPUBLIC OF THE PHILIPPINES
MALACANANG, METRO MANILA

Sir:

ASBESTOS-CEMENT PIPES AND HEALTH

We are, Eternit Corporation and Italt Construction & Development Corporation, the two manufacturers of asbestos-cement pipes in the Philippines established for more than 30 years.

We are requesting His Excellency, President Ferdinand E. Marcos, to:

1. Lift the ban for the use of asbestos-cement pipes until such time that an independent scientific and medical study shall have been conducted to look into the relationship between the use of asbestos-cement pipes and health hazard for the consumers.
2. Enjoin the media from further generating undue alarm and concern with a populace, which has for more than three decades already been drinking water from asbestos-cement pipes unless valid findings prove a definite relationship to health as submitted by competent medical and scientific authorities.

Your Excellency, we ask you to consider:

1. The use of asbestos-cement pipes means substantial savings in foreign exchange for the country, since only 40% of the raw materials used for asbestos-cement pipes are imported, whereas this percentage for other types of pipes is at least 90%.
2. The \$100 Million invested in our facilities.
3. The annual capacity of 50,000 tons to serve the needs of the country and thus stabilizing prices.
4. The employment of 350 heads of families, affecting about 2,000 dependents.
5. The Dollar earnings realized by export of our products.

We maintain, Your Excellency, that:

1. There has been no established fact that asbestos-cement pipes is a health hazard. Reference Appendix A.

... 2/

2. Both developed as well as developing countries have been using and continue to use asbestos-cement pipes. A list of countries using asbestos-cement pipes would be too long in the present context but we likely to mention the following countries: the United Kingdom, Germany, Italy, France, Switzerland, Belgium, Canada, Japan, and the United States.

Your Excellency, we are inclined to believe that the unfavorable publicity given asbestos products, is motivated more by competitive and commercial reasons than by reasons of public health.

We maintain that third and second hand information have been quoted out of context in an effort to misrepresent as a consumer hazard what would be, at worst an industrial hazard related to the mining and handling of the raw fibers without due industrial safeguards.

We maintain that an objective, scientific and medical investigation will reveal the facts about asbestos-cement pipes and that the findings will uphold our contention and the contention of asbestos-cement pipe users the world over regarding the safety of those pipes.

Your Excellency, we reiterate our request for a scientific investigation into this matter.

Our faith in both your concern for public good as well as justice leads us to anticipate your favorable consideration of our request for the peace of mind of the public and the continued life of our industry.

Yours faithfully,

ETERMIT CORPORATION

JACQUES G. CHETUYVELS
President

JGC/RRP/est

Encls. - Appendix A

ITALIT CONSTRUCTION & DEVELOPMENT CORPORATION

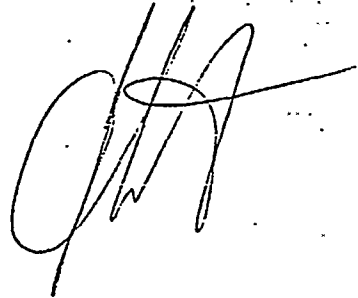
RAMON R. PASTOR
President

APPENDIX A

1. Memorandum Circular dated December 10, 1980 signed by Col. C. Leaño of LWUA. Re - Asbestos-Cement Pipes.
2. Asbestos in Drinking Water: A Review dated January 1979 issued by Water Research Centre
3. Asbestos in Water .. The Risks
4. A/C Pipe Producers Association Advisory dated October 1, 1981, Volume No. 1 Issue No. 2 - Minnesota Study Finds No Link Between Ingested Asbestos and Cancer.
5. Advisory dated January, 1982, Volume No. 1 Issue No. 3 - Evidence Pointing Strongly Away from Asbestos Ingestion and Cancer Link, Experts Report.
6. Advisory dated May, 1982, Volume No. 1 Issue No. 5 - Authority Reports "No Experimental Evidence of Harmful Effects" from Mineral Fiber Ingestion.
7. Advisory dated May, 1982, Volume No. 1 Issue No. 6 - Animal Study Reports No Penetration of Gastrointestinal Tract By Asbestos Fibers.
8. Advisory dated June, 1982, Volume No. 1 Issue No. 8 - Asbestos Feeding Study Finds No Gastrointestinal Cancer in Test Animals.

JGC/est

11.17.82

A large, stylized handwritten signature in black ink, located in the lower right quadrant of the page. The signature appears to be a cursive representation of the letters 'JGC' followed by a flourish.

JGC

INDUSTRY STATEMENT: ASBESTOS-CEMENT PIPES
AND PUBLIC HEALTH

The asbestos-cement manufacturing industry in the Philippines is happy to hear of the decision of the President to have a committee conduct an inquiry into the relationship between the use of asbestos-cement pipes and public health.

We have always maintained that an objective, scientific and medical investigation should be conducted in order to bring out the facts about asbestos-cement pipes. We are extremely confident that the findings will uphold our contention and that of asbestos-cement pipe users all over the world, that the use of these pipes pose no danger to public health.

We have always remained silent in the past whenever unfavorable commentaries and articles are printed about asbestos-cement pipes. We had elected to remain silent, knowing that any statements coming from the manufacturers would always be viewed as self-serving.

It is, therefore, with relief that we receive the news that an objective inquiry has been ordered by the President.

We confidently anticipate that the inquiry will produce similar findings to those of other inquiries conducted by medical and scientific authorities of other asbestos-cement pipe-using countries: that there exists no established hazard to public health from the use of asbestos-cement pipes.

We reiterate that we welcome this inquiry, so that this issue which has so one-sidedly plagued our industry can be objectively investigated, for the peace of mind of the public and the continued life of our industry.

ETERNIT CORPORATION

ITALIT CONSTRUCTION &
DEVELOPMENT CORP.

CARLOS M. BORRAMEO
Acting Secretary
Fibro-Cement Pipe Manufacturers
(Eternit Corporation/Italit Construction
& Development Corporation)

Times Journal, Nov. 19, 1982

Pipe changing to cost billions

AT LEAST one-third of Metro Manila's 20,000-kilometer water pipes are made of asbestos and it would cost the government billions of pesos to replace them.

A nationwide replacement of asbestos water pipes would in-

volve a staggering amount.

This was disclosed yesterday by officials of the Metropolitan Waterworks and Sewerage System and the Local Water Utilities Administration as they stopped all ongoing water projects using asbestos pipes.

Today, almost all ongoing projects of the MWSS costing 3.5 billion use asbestos pipes.

President Marcos earlier stopped MWSS contractors from using asbestos in the manufacture of water pipes after initial findings revealed that asbestos causes cancer.

Oscar Ilustre, general manager of the metropolitan water agency, proposed to the President the creation of a committee to undertake a thorough study on the effects of asbestos before any move to replace the pipes.

Ilustre said the use of other materials to place asbestos pipes is also uncertain.

He cited reports that polyvinyl chloride or plastic pipes which were earlier considered as a replacement for asbestos pipes may also cause cancer.

At the Batasang Pambansa, Speaker Gerardo Roxas directed the committee on health to



Ilustre: Staggering cost



Azurin: They can stay but

conduct its own investigation on the effects of asbestos pipes on the health of MWSS clients. His action was prompted by two separate resolutions signed by at least 50 assemblymen, which called for a legislative inquiry into the possible harmful effects of asbestos pipes.

Assemblyman Alfonso Garcia, chairman of the subcommittee on environmental health, scheduled a hearing at 9 a.m. Tuesday.

He invited experts from the World Health Organization, the National Science and Technology Authority, the U.S. National Science and Research Center and of other agencies involved in the protection of the nation's health. Also invited were Ilustre and Carlos Leaño Jr. of the Local Water Utilities Administration.

Four main diseases have been associated with asbestos, ac-

Replacing pipes to cost billions

From Page 1

According to a report of Barbara Peters to the World Safety Organization a few months ago, these are asbestosis, lung cancer, mesothelioma and pleural plaques, all respiratory ailments.

She said studies have also started to show that asbestos-related diseases are not confined to workers in asbestos mines or shipyards but also to people who may have been exposed to asbestos dust through other ways.

Peters also cited reports that gastro-intestinal cancer among asbestos workers increased two or three times over

those who do not tinker with asbestos. In this case, however, asbestos was not ingested through asbestos pipes but through the action of tiny fibers in the respiratory tract which catch and sweep away asbestos particles from the lungs, causing these to be swallowed.

But an article in the Water Engineering and Management's May 1981 issue cited the stand of Science on the pitfalls of making conclusions on cases where asbestos was ingested first through inhalation.

"The fact that exposure to air heavily polluted with asbestos mineral fibers often leads to diseases does not necessarily indicate that drinking water contaminated with an equally large number of such fibers may lead to the same diseases," the article said.

Continuing studies on the effects of asbestos ingested with water remained inconclusive.

This is why the World Health Organization's regional director for the Western Pacific informed Health Minister Jesus Azurin that the WHO has not taken any definite stand on asbestos cement

pipes. This prompted Azurin to announce a few months back that asbestos pipes could stay in the MWSS project. Nonetheless, Azurin was glad the President stopped the use of asbestos pipes because of their possible dangers to health.

In the case of plastic pipes, Peters in her report cited studies linking asbestos to cancer.

A report by Wal Davis in World Health, a WHO publication, confirmed this. "Vinyl chloride monomer, the main ingredient of plastic pipes, is a human carcinogen," he said.

Peters said: "The selection of plastic pipe as substitute (for asbestos pipes) would not be appropriate since it has a potential for similar or increased danger."

She suggested that it is possible to filter the water running through asbestos pipes to remove the fibers.

The asbestos pipe-day project here started 16 years ago when the government installed asbestos pipes in the entire length of Epifanio de los Santos Avenue. Before this, steel and pressure pipes were used.

The Manila Evening Post, Nov. 19, 1982

McRomm's Advisory Body on Water Pipe

President Marcos today created a special presidential advisory committee in the wake of mounting public concern on the danger of the use of asbestos cement pipes for distribution of potable water.

In Administrative Order No. 455 issued in Malacatang, the President empowered the special committee to gather data and materials and study to assess all the issues relevant to the asbestos pipes controversy. The President ordered the committee to submit the results of its study and recommendations within three

months.

The order provided that pending the promulgation of a national policy on the issue, the Metropolitan Waterworks and Sewerage System (MWSS) and the Local Water and Utilities Administration (LWUA) can still use and buy asbestos cement pipes.

The MWSS and the LWUA have been using asbestos cement pipes in potable water distribution.

At present, the MWSS is undertaking a foreign-assisted Metro Manila

By Jose Umali, Jr.
Staff Member

water improvement program costing P2 billion.

About one-third of the pipes to be used are reportedly of the asbestos type.

MWSS

The MWSS claimed that asbestos cement pipes have been certified as safe by a Swiss medical office.

However, several health sources revealed that asbestos pipes could cause cancer.

The President has authorized special committee to call upon office or government official for in its task.

Health Minister Jesus C. Azurin named chairman of the committee. He will be assisted by Dr. C. Roque, executive director of National Environmental Protection Council (NEPC); Dr. Emil Q. Ja, director-general of the National Science and Technology Authority (NSTA); Dr. Ignacio Salcedo, director of Product Standard Agency, and Dr. Elizardo, president of the Philippine Chamber of Commerce and Industry.

(Turn to p2)

FM Forms...

(Continued from page 1)

as members of the committee.

Earlier, the Batasang Pambansa (BP) scheduled for Nov. 23 a special public hearing on the asbestos pipes controversy.

Invited to the hearing were local and foreign health experts.

HEARING

The hearing will determine if asbestos

pipes are really dangerous to the people's health.

It was reported that US scientists claimed that "asbestos fibers cause cancer."

These initial findings on the danger of asbestos have forced the President to order the MWSS to stop using asbestos in the manufacture of water pipes.

The asbestos pipe controversy worsened because of the uncertainty of replacement.

Oscar Ilustre, MWSS general manager, said that polyvinyl chloride or plastic pipes, which were earlier considered as replacement for asbestos pipes, might also cause cancer.

FMM lifts ban on asbestos

PRESIDENT Marcos yesterday lifted the ban on the use of asbestos-reinforced water pipes until after a thorough study proves that they are dangerous to public health.

The President's move was prompted by a report of the Metropolitan Waterworks and Sewerage System that these water pipes are actually made of cement with asbestos merely used as an outer material to strengthen them.

The asbestos cover makes up only 5 per cent of the entire pipe and the asbestos itself does not actually touch the water, said Manager Oscar Ilustre of the water agency, in his talks with the President.

The asbestos scare was prompted by reports that it causes cancer. The reports said asbestos fibers in water pipes that contain the mineral, are carried in the water and pose grave danger to those who drink it.

The World Health Organization, however, has not made any stand on whether or not the material is, indeed, a carcinogen or cancer agent. This prompted Health Minister Jesus Azurin to say a few months back that the water agency can continue using the asbestos-reinforced water pipes.

Weeks later, however, the President issued the ban. Reacting, Ilustre said it would cost the government billions of pesos to dig up all the asbestos-reinforced water pipes in the country.

Ilustre brought with him to Malacanang for the President's personal inspection several excavated

To Page 6

Marcos lifts ban on asbestos pipes

From Page 1
pipes used by the water agency.

The President examined the pipes and agreed with Ilustre that they were largely made of cement with asbestos serving only as outer material.

To ease remaining anxieties, the President created a five-man presidential advisory committee to conduct a study on the dangers of using such pipes and issue a report within three months.

The report of the committee, to be headed by Azurin, will be the basis for a policy that will best serve the interests of the people, the President said.

Earlier, Ilustre also ordered a similar study on the use of polyvinyl chloride or plastic pipes, which earlier loomed as possible replacement for the asbestos pipes.

Reports had it that the plastic pipes were worst agents of cancer.

In his presentation to the President, Ilustre said cement pipes with asbestos support are being used in many countries. In the United States alone, he said, 450,000 kilometers of these pipes have been laid out.

The furor over the dangers of asbestos pipes started in the

Ilustre said asbestos pipes were first laid out in the country 29 years ago. These pipes were supported by cast iron and reinforced steel. It was only 16 years ago, however, when the entire length of the then Highway 54, now Epifanio de los Santos avenue, was laid out with asbestos pipes.

Ilustre said that in Metro Manila, there are only 1,700 kilometers of existing water pipelines. Of these, only 297 kilometers used the cement with asbestos casings.

Figures earlier cited by the water agency said there were at least 20,000 kilometers of water pipelines in Metro Manila alone and that one-third of these are made of cement with asbestos casings.

With the lifting of the ban, MWSS contractors can now continue their pipe-laying projects.

The water agency is in the midst of a waterworks expansion program. The program started in 1979 and calls for an additional 1,500 kilometers of water pipes to increase Metro Manila's water supply from 350 million gallons a day to 660 million gallons. The target date for the completion of the program is early next year.

300 kilometers will be made up of the cement with asbestos casing. The rest will be made of cast iron, reinforced steel and other materials.

The water expansion program is financed by the World Bank and the Asian Development Bank and involves a total amount of P3.4 billion about P1.2 billion has been set aside for pipes.

At the Batasang Pambansa, a group of assemblymen scored Ilustre for reportedly asking the President to lift the ban on the use of the asbestos-reinforced water pipes.

For the sake of the health and lives of eight million clients of the MWSS in Metro Manila, Mr. Ilustre should at least have the decency to withhold his request for the lifting of the ban until after the issue of whether asbestos pipes pose a danger to public health has been settled by competent health authorities and experts, the solons said.

Ilustre has been among those invited to appear at Batasang hearings starting Tuesday on the effects of asbestos pipes on the people's health. The hearings had been demanded

Times Journal, Nov. 24, 1982

The more present danger of asbestos

AN INTERNATIONAL health expert yesterday called attention to the "more present" danger of the use of asbestos as insulator and acoustics agent in theaters and supermarkets.

Studies have long established the ailments caused by inhalation of asbestos fibers, he said.

But it will take a couple or more years of study to determine if drinking asbestos-ingested water poses health problems.

The expert said the use of asbestos as insulator was banned

years ago in the United States.

The practice is also discouraged here, but building owners disregard the warnings and merely cover the asbestos lining of walls with extra coatings of paint.

Others leave the asbestos lining open to wear and tear.

Filipinos should therefore guard against large amounts of fiber possibly still floating around in theaters and supermarkets, the expert said.

He also warned against the use of as-

bestos in air conditioners to keep in the cold in the duct.

While some scientists claim asbestos could cause cancer of the gastrointestinal tract and other organs outside the respiratory system, no conclusive study has shown the ill effects of the fibers when ingested with drinking water.

Dr. Edwin Lee, regional consultant on environmental health of the World Health Organization, said yesterday even the International Standards for

To Page 6

More present dangers

From Page 1
Drinking Water of the WHO has not specified any levels of toxicity for asbestos in drinking water.

Lee said that in the absence of any conclusive study, asbestos was not included in the WHO guidelines. However, updated rules to be issued late this year may include asbestos if enough conclusive data can be obtained, he said.

The WHO official explained that even in the US and Canada, officials are careful about attributing high asbestos content in water to the asbestos cement pipes. They realized that in some cases, the fibers came from natural rock formations near the reservoir, or somewhere along the water routes.

Two main methods of reducing asbestos content are being tried: by filtering water at their main sources, or treating them with zinc, which sticks to the walls of the pipes, and acts as a coat to prevent the fibers from leaching, Lee said.

FM allows asbestos pipes' use

MWSS says they're safe

PRESIDENT MARCOS lifted yesterday the ban on the use of asbestos-strengthened cement pipes in the water distribution system pending a thorough study and the laying down of a policy on its use.

The President made the move after he was informed by the Metropolitan Waterworks and Sewerage System that the pipes are actually made of cement with asbestos used merely as an outer strengthening material, consisting of only five percent of the pipe.

By MIGUEL GENOVEA

Officials of the MWSS told the President that the asbestos itself does not touch the water.

The President had earlier expressed concern over the use of the asbestos pipes because of the disclosure of recent findings that asbestos fiber might be carcinogenic or cancer-causing.

THE PRESIDENT formed yesterday a five-man advisory committee to conduct scientific study on

pipes using asbestos.

The committee, to be headed by Health Minister Jesus Azurin, was told to submit within three months its recommendations for a policy on the matter.

While the study is going on, the President said, the asbestos pipes can be used and bought by both the MWSS and the Local Water and Utilities Administration (LWUA).

MWSS manager Oscar Ilustre took

(Please turn to Page 6)

MWSS says the're..

(From Page 1)

to Malacanang several excavated pipes being used in Metro Manila for the President's inspection.

The pipes included those made of cast iron reinforced by steel and cement reinforced by asbestos laid out 29 years ago.

In the presence of some of his callers, members of the President's staff and other officials, the President examined the pipes at the front door of Malacanang and found — according to a Malacanang press release — that in the case of those made of cement, the asbestos was merely used as a strengthening outer material and consisted of only 5 percent of the total pipe material.

He was informed that the water inside the pipe passes through the cement and is not touched by the asbestos.

HE DIRECTED Ilustre to submit to the Batasang Pambansa, which is conducting a separate inquiry on the use of these pipes, the MWSS assessment and to inform it of the creation of the special advisory committee studying the matter.

The MWSS submitted statistics showing that cement pipes strengthened by asbestos are used in many countries and that worldwide an estimated 1.5 million miles in length of such pipes have been constructed underground for water systems.

IN METRO Manila, out of about 1,700 kilometers of existing pipeline, only about 297 kms, or about 17 percent are made of such materials while the rest are made of cast

iron, reinforced steel and other materials.

LEARNING of these, the President said total prohibition on use of cement pipes using asbestos would mean digging up all of those already laid underground at a time when the MWSS has secured loans for its waterworks expansion.

Under this program ongoing since 1979, an additional 1,500 kilometers of pipes are to be laid out to increase the water supply in the metropolitan area from 350 million to 660 million gallons a day — a target hoped for by next year. Of the total length of pipeline, 300 kilometers are to be made of the asbestos-covered pipes.

With the President's directive, the contractors can proceed with the laying out of the pipes which had already been ordered. According to the MWSS, the bulk of these pipes is made locally.

The newly-created presidential advisory committee under the chairmanship of Azurin has as members Ministers Fmid Q. Javier of the National Science and Technology Authority, Dr. Celso Roque, executive director, National Environmental Protection Council, Dr. Ignacio Salcedo, director, Product Standard Agency, and Fred Elizalde, president, Philippine Chamber of Commerce and Industry.

IN ITS REPORTS to the President the MWSS cited opinion of then Minister of Health Enrique Garcia and the Philippine Cancer Society on the use of such pipes.

"It is the opinion of the Philippine Cancer Society that at present there is no definite finding which link the use of asbestos pipes to gastro-intestinal cancer," the PCS said in 1981.

Minister Garcia, in his opinion issued in 1980, on the other hand, said "the opinion of the Minister of Health that asbestos fiber, if ingested into the system, will not constitute a health hazard as it is normally discharged with excreta."

Garcia said that asbestos fibers are hazardous to human health when inhaled, but not ingested.

Bulletin Today, Nov. 20, 1982

Experts differ on safety of asbestos

Health professionals were divided on their views on the safety of the use of asbestos cement pipes for water supply.

Dr. Edwin Lee, World Health Organization (WHO) regional adviser on environmental health, said yesterday there is no conclusive evidence that asbestos cement pipes are hazardous to health.

He noted that a study on the safety of the pipes is being undertaken in the United States. He stressed, however, that sufficient evidence has shown that asbestos may be harmful if inhaled, prompting some countries to ban its use as insulators and roofing materials.

In view of this danger, Lee recommended that government authorities check on theaters, supermarkets, and other buildings which he suspects still use asbestos as insulators or materials for sound proofing.

He said that asbestos fibers which fall apart after several years are simply sprayed with paint in some buildings to keep them in place or cover them up but still pose a danger.

Dr. Priscilla Tablan, director of the Lung Center of the Philippines, con-

firmed that persons who inhale asbestos fibers, particularly those working in asbestos-related industries, develop lung diseases. Even families of these employees can develop lung ailments from the asbestos that remains on the clothing of the workers, she added.

The late Health Minister Enrique Garcia, in a statement sent to the Metropolitan Waterworks and Sewerage System (MWSS) and the Local Water Utilities Administration (LWUA) two years ago, said that asbestos fiber if ingested into the system will not constitute a health hazard since it is normally discharged from.

(Turn to page 11, col. 2)

SAFETY

(Cont'd from page 1)

the body. Emiliano I. Camarillo, president-director general of the World Safety Organization, earlier presented to the WHO a finding that asbestos cement pipes have been linked to cancer of the stomach, small intestine, abdomen, lung, and pancreas in areas of Duluth, Minnesota, and Quebec where these pipes are used.

In a study entitled "Systematic Safety Analysis of Asbestos Disease and Its Prevention," lawyer Barbara Peters of Sta. Monica, California, said that the danger in the use of asbestos cement pipes will not befall only persons consuming the water.

Persons involved in the manufacture of the pipe, those living near the factory, those who cut the pipe and thereby generate dust to which they and persons near them are ex-

posed, those who remove the pipe, and those who are exposed to the asbestos from the pipe after it has been placed at a waste site face grave danger.

Peters pointed out that exposure to asbestos can cause asbestosis — a progressive, untreatable thickening and hardening of the lung tissue brought on by asbestos in the lungs; lung cancer; and a rare form of cancer known as mesothelioma which spreads rapidly, affecting the lining of the heart and lungs.

Meanwhile, the subcommittee on environmental health and related matters of the Batasan committee on health said it will also review the possible involvement of multinationals in the procurement of these pipes.

Assemblyman Ronaldo Zamora (KBL, Metro Manila),

minister of state for youth affairs who presided over yesterday's meeting of Metro legislators, said the President's decision had cast doubt on whether or not the dangers posed by asbestos to human health was considered in the procurement of these pipes.

Meanwhile Assemblyman Alfonso Garcia (KBL, Western Visayas), subcommittee chairman, reported that MWSS General Manager Oscar Ilustre failed to appear last week in another hearing on diggings conducted by the subcommittee on public works which Garcia also heads.

Assemblyman Rogelio Quiambao (KBL, Metro Manila), co-author of the Monfort resolution and member of the two subcommittees investigating the Metro Manila diggings and asbestos pipes, urges Speaker Querube C. Makalintal to issue a subpoena to Ilustre for his failure to appear.

Makalintal, however, said Ilustre should be given a chance to attend the hearings voluntarily without any summon from the assembly.

Representatives of fibro-cement pipe manufacturers welcomed yesterday the

decision of President Marcos to set up a committee to look into the effect of asbestos-cement pipes on public health.

A spokesman of Eternit Corporation and Italic Construction and Development Corp., local manufacturers of the material, called for an objective and scientific investigation "to bring out the facts about asbestos-cement pipes."

Carlos M. Borromeo, acting secretary of the group said the manufacturers are confident that the findings will uphold their contention the use of these pipes pose no danger to the public.

Bulletin Today Nov. 20, 1982

FIM lifts ban on use of asbestos conduits

Pending full scientific inquiry

By WILLIE NG

President Marcos directed the Metropolitan Waterworks and Sewerage System yesterday to submit to the Batasang Pambansa, after further tech-

nical studies, its findings on asbestos-fiber-reinforced cement water mains. To safeguard public health and ease apprehension, the

President created a five-man presidential advisory committee headed by Health Minister Jesus Azurin to conduct an exhaustive scientific study

and to submit within three months its recommendations for a policy that would best serve the interest of all the citizenry.

The President, in effect, lifted the ban on the use of cement pipes reinforced by asbestos fibers.

In the presence of his staff and some callers at the front door of Malacañang, the President examined the pipes. He found that in the case of those made of cement, asbestos fiber was merely used as strengthening material and constituted a mere five per cent of the total pipe material.

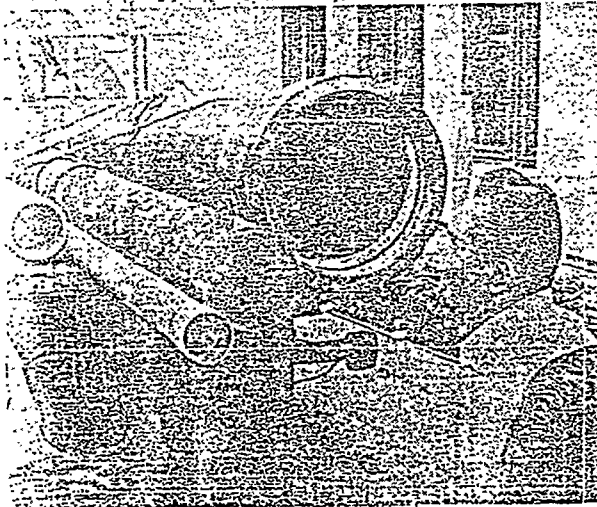
He reportedly inquired whether the water actually touched the asbestos. MWSS officials replied in the negative.

Asbestos dust or fibers inhaled into the lungs have been known to cause cancer, according to recent findings, and that asbestos fiber might be carcinogenic or cancer-causing.

The President directed the MWSS general manager, to

submit to the Batasang Pambansa which is conducting a separate inquiry into the effects on public health of these pipes the MWSS assessment, and to inform the legislature of the creation of the special advisory committee conducting a thorough study of the matter.

Pending completion of the two-pronged study and the formulation of a policy on the use of asbestos-reinforced cement pipes, the President said the cement pipes can be used and purchased by both the MWSS and the Local Water Utilities Administration. (Turn to page 8, col. 1)



The pipes

President Marcos looks over various pipes being used in the water distribution system in Metro Manila, including pipes of cement strengthened by asbestos. The pipes were taken to Malacañang by MWSS General Manager Oscar Ilustre.

ASBESTOS

(Cont'd from page 1)

tion or their contrac-

tors.

MWSS General

Manager Oscar Ilustre

brought to Malaca-

nang for the Presi-

dent's personal inspec-

tion several excavated

pipes being used in the

Metro Manila water

distribution system.

These included cement

pipes strengthened by

asbestos fiber, laid out

29 years ago by the

Metropolitan Water

works and Sewerage

Authority, and mains

made of cast iron and

reinforced steel.

The MWSS submit-

ted statistics to the

President showing that

cement pipes streng-

thened by asbestos fi-

ber were used in 40

countries with an

aggregate length of

1,500,000 miles. In the

United States, many

cities have laid out

300,000 miles of such

pipes.

According to Ilustre,

the Philippines has

only 297 kilometers of

cement pipes rein-

forced with asbestos fi-

ber. Plans call for the

laying out of 300 kilo-

meters more of such

pipes.

Earlier, in response

to complaints and pub-

lic apprehension over

the use of what are

considered carci-

nogenic materials for

public health purposes,

the President had sus-

pended the use of such

pipes because of re-

ports that "asbestos

pipes" were being used

for water mains.

The government has

an ongoing program to

improve the MWSS

water distribution sys-

tem in the metropoli-

tan area, assisted by

the World Bank and

the Asian Develop-

ment Bank, involving

a total outlay of P3.4

billion, P1.2 billion of

which is allocated for

EVP/100/62

ATTACHMENT 12

November 25, 1982

MINISTER JESUS AZURIN
Ministry of Health
San Lazaro Compound
M A N I L A

Dear Minister Azurin:

ASBESTOS-CEMENT PIPE AND HEALTH

By means of introduction, Sternit Corporation and Italit Construction & Development Corporation are manufacturers of asbestos-cement pipe and building products in the Philippines. The corporations, established over twenty years ago, presently employ 350 persons and have for the recent 2000 million invested in facilities.

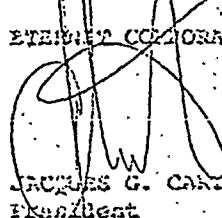
The Sternit and the Italit Corporations endorse the appointment of a Presidential Advisory Committee on the safety of A/C pipe for the conveyance of drinking water. We maintain that such objective, scientific inquiries best serve the interests of all parties: the public, government and industry. In the spirit of cooperation, enclosed are (1) a summary of the medical and scientific studies conducted on ingested asbestos, and (2) references cited in the summary. This summary was prepared by the A/C Pipe Producers Association, an international association headquartered in Washington, D.C. The Association is a worldwide information source on the manufacturing, design, installation and performance of A/C Pipe products, as well as the industry's spokesman on occupational health and environmental matters.

Sternit Corporation and Italit Construction & Development Corporation maintain the position that there is no link between asbestos in drinking water and any disease; A/C pipe is as safe as any other water piping material. This judgement is based on nine years of scientific studies of human populations exposed to asbestos in drinking water, and fifteen years of research on laboratory animals administered large amounts of asbestos in drinking water or food. All of these studies were done by independent or government scientists, who have no financial interest in and receive no financial support from the A/C pipe industry. None show that there is a cause and effect relationship between asbestos in drinking water, A/C pipe and any adverse health effect.

Eternit Corporation and Italt Construction & Development Corporation pledge their continuing support and cooperation during the Advisory Committee deliberations. We would be pleased to respond to any questions and concerns raised therefrom.

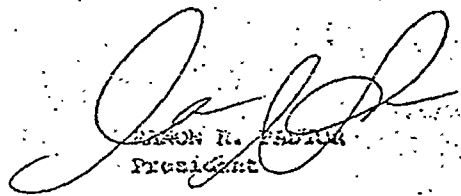
Yours faithfully,

ETERNIT CORPORATION


JACQUES G. CARUYVELS
President

JUC/RIS/est

ITALIT CONSTRUCTION & DEV. CORPORATION


JACKSON R. PADUA
President

cc: Emil Q. Javier, Minister, National Science & Technology Authority
Dr. Celso Roque, Executive Director, National Environmental Protection Council
Dr. Ignacio Salcedo, Director, Product Standard Agency
Fred Elizalde, President, Philippine Chamber of Commerce & Industry

Encls.: Summary of Medical and Scientific Studies on Ingested Asbestos
References Cited on the Summary of Medical and Scientific Studies
on Ingested Asbestos

EVP/101/22

November 25, 1982

ASSEMBLYMAN ALFONSO GARCIA
Batasang Pambansa
MANILA CITY

Dear Assemblyman Garcia:

ASBESTOS-CEMENT PIPE AND HEALTH

By means of introduction, Eternit Corporation and Italt Construction & Development Corporation are manufacturers of asbestos-cement pipe and building products in the Philippines. The corporations, established over twenty years ago, presently employ 350 persons and have for the moment \$100 million invested in facilities.

The Eternit and the Italt Corporations endorse the study by the Subcommittee of Environmental Health on the safety of the A/C pipe for the conveyance of drinking water. We maintain that such objective, scientific inquiries best serve the interests of all parties: the public, government and industry. In the spirit of cooperation, enclosed are (1) a summary of the medical and scientific studies conducted on ingested asbestos, and (2) references cited in the summary. This summary was prepared by the A/C Pipe Producers Association, an international association headquartered in Washington, D.C. The Association is a worldwide information source on the manufacturing, design, installation and performance of A/C Pipe products, as well as the industry's spokesman on occupational health and environmental matters.

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... 2/

EVP/101/92

-2-

Internit Corporation and Italit Construction & Development Corporation pledge their continuing support and cooperation during the Subcommittee deliberations. We would be pleased to respond to any questions and concerns raised therefrom.

Yours faithfully,

INTERNIT CORPORATION

JACQUES W. CARTUYVELS
President

JCC/SRQ/est

ITALIT CONSTRUCTION & DEV. CORPORATION

JOHN R. HASTON
President

cc: Assemblyman Narciso Montfort
Assemblyman Guillerio Llanusa
Assemblyman Rogelio Quintana
Assemblyman Jesus Amparo

encs.: Summary of Medical and Scientific Studies on Ingested Asbestos
References Cited on the Summary of Medical and Scientific Studies
on Ingested Asbestos



A/C Pipe
Producers Association

Internal Correspondence

TO Public Affairs Committee
International Affairs Committee

FROM *J. F. Welch*
J. F. Welch, Director, Public Affairs

DATE October 22, 1981

SUBJECT: News Article - Plastic Pipe Hazards

REF: JFW correspondence, Article on Potential Health Effects of Piping Materials,
March 26, 1981.

ACTION REQUIRED: Review for information

Enclosed is a news article forwarded by Winner/Wagner & Associates, Inc., AACPP's special counsel in California. It reports on an ongoing controversy about the safety of plastic pipe for use in home and commercial buildings. It is understood that the end uses primarily involve drain waste and vent applications.

If you have any questions, please do not hesitate to call.

JFW/ajb

Enclosure

cc: A. Kahn, Esq.
N. Rahn, Esq.
B. Garcia (Winner/Wagner) w/o enclosure

copies to: Public Affairs Committee

H. Olson
I. Adams
W. Perrell
J. Woods
J. Baker
T. Dougherty
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Group Fears Plastic Pipe Hazards

Coalition Opposes Expanded Use Until Safety Is Proven

By RON HARRIS, Times Staff Writer

Citing potential health and fire hazards, two legislators heading a coalition of environmentalists said Friday they will fight any efforts to expand use of plastic pipes in homes and commercial buildings in California until the plastic pipe has been proven safe.

Speaking for Californians for Safe Building Materials, Senate Minority Leader William Campbell (R-Hacienda Heights) and Assemblyman Louis Papan (D-Millbrae) said at a press conference preliminary tests indicate that using certain plastic pipe for drinking water is a fire hazard and that such pipes may cause cancer. They compared use of the pipes with use of asbestos.

"I don't want to have another system evolve like we have with the use of asbestos," said Papan, chairman of the Assembly Rules Committee. "We have schools in many areas where it is used and we can't find the necessary funds to remove that asbestos."

Members of the International Association of Plumbing and Mechanical officials, made up of hundreds of plumbing code enforcement officials from cities in 11 Western states, France and South America, are meeting Sunday in Reno to decide whether codes should be amended to allow builders to use certain types of plastic pipe for plumbing in homes and multi-story buildings.

The association establishes the uniform plumbing code, which is usually adopted by most cities and counties, according to Les Chatfield, Los Angeles chief plumbing inspector. Chatfield, a member of the association's code committee, said his panel has recommended approval of expanded use of the pipe, which is cheaper than metal pipe and easier to install.

In California, the amendments would be adopted by the state Housing Commission, which "traditionally sticks pretty close to the uniform code," Chatfield said. The coalition vowed to fight state approval.

Californians for Safe Building Material wants IAPMO to delay approval until the state's Department of Housing and Community Development completes a study on the safety of plastic pipe.

"We're not condemning the pipe, or saying that there is something wrong with it, but we think there is enough evidence that indicates further testing is necessary before it is approved," Campbell said.

The state agency undertook the study after preliminary tests found that water stored in plastic pipes for two weeks contained three carcinogens at levels far exceeding the acceptable risk standard approved by the Environmental Protection Agency, Campbell said.

The new study has been delayed because pipe manufacturers, who paid for the preliminary report, will not pay for the project, Papan said.

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