ALASKA LEGISLATURE COMMITTEE FILES 1983 - 1984 8672

2724 SLC HB 508 (FILE 1)

2724

Attachment #7

(Addendum #2)

<u>LISTS OF COMPOUNDS FOUND IN WATER SAMPLES</u>

1,2 dichloropropane

1,1,1 trichloroethane

trichloroethylene

1,1 dichloroethane

1,1 dichloroethylene

Ethyloxirane

Benzene

Methylpyrrole

Butane

Toluene

Xylenes

Trimethylbenzenes

Tetramethylbenzenes

Ethylbenzene

Chloroform

Item #4

UNIVERSITY OF CALIFORNIA, BERKELEY

BERKELEY · DAVIS · IRVINE · LOS ANGELES · RIVERSIDE · SAN DIEGO · SAN FRANCISCO    SANTA BARBARA · SANTA CRUZ

SCHOOL OF PUBLIC HEALTH
DEPARTMENT OF SOCIAL AND
ADMINISTRATIVE HEALTH SCIENCES

BERKELEY, CALIFORNIA 94720

November 1, 1982

Garry L. Butterfield
General Manager
Sweetwater Authority
386 Third Avenue
P.O. Box 2328
Chula Vista, California 92012

Dear Mr. Butterfield:

I have recently had an opportunity to review the analyses performed of the water samples taken from sites in the Chula Vista School District. In contrast to your evaluation of this data, I find several points that warrant additional attention.

First, it is neither appropriate scientifically nor legally* to dismiss the excessive levels of trihalomethanes in the School's as being simply problems warranting technical upgrading. Exposures of greater than 100 ppb of combined THM's should not be deemed "safe" since levels above this limit have been associated with population wide increases in the relative risk of cancer at at least three sites: colon, rectum and bladder (1). Moreover, as you are aware, the EPA and State authorities are working to generate a more appropriate standard, set at 75 ppb.

The fact that young children may ingest a significant amount of water while at school accentuates the toxicological concern about high trihalomthane exposure, since children are generally considered to bear greater risks from carcinogenic chemicals than are adults.

As you know, the recommended and legal limits for THM's were set based on adult ingestion patterns, not those of children for whom the relative dose on a volume/weight ratio is almost always greater. I also find it disturbing that you dismiss the apparant contamination of your water service system to the Allen Lane School with solvents and other chemicals indicative of industrial pollutants, that include known carcinogens. Trichloroethylene and 1,1 1 trichloroethane are both animal carcinogens (the latter is just completing a bioassay that appears strongly positive in at least one strain of test animal). Trichlorofluoromethane, a freon, is not carcinogenic but along with ethylbenzene provides corroborating evidence that an exogenous source of contamination, probably of an industrial nature, has entered the water. As such, excursions above the recorded levels of all three compounds are possible, and cause for prudent monitoring.

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* Legal notification of residents following excursions over the 100 ppb limit is mandatory.

Two other chemicals are of substantially greater concern. Both acrylonitrile and the nitrosamine chemical, N-nitrosodiphenylamine are strongly suspected human carcinogens. The first is regulated as a carcinogen by OSHA. Neither is an acceptable contaminant—even in the 0.50 to 2.0 ppb range—in water that will be ingested by school children.

Of these five compounds, I note that none are normally detected in the major water sources used in California, including Pasadena, Colorado and State Project water. In only one of these water sources is carbon tetrachloride found (Pasadena), and then at less than half the levels found at the other Schools. Although the State sets a limit of 5 ppb for this chemical, the fact that the Schools have roughly half this value is of considerable concern since carcinogenic effects are widely considered to be additive. In combination with the other chemicals (DEHP, acrylonitrile the nitrosoamine, solvents etc.) present in the water which are proven animal carcinogens, the addition of still another animal carcinogen like carbon tetrachloride in near-limit values is disturbing.

Finally, the elevated levels of carbon tetrachloride, phthalates and chloroform present at all of the schools suggests that plastic pipes may be contributing these pollutants at above "background" levels to your school system. The basis for such a possibility is suggested by the demonstration that these three classes of compounds are present in above background levels from water which has resided in PVC or cPVC (2); and the absence of similar contaminants at the detected levels in Chula Vista from raw water from other jurisdictions. (See attached chart). If such excessive levels are the result of plastic pipe systems, particular attention to this potential source of pollutants is indicated.

Certainly, the findings from these schools are not cause for celebration of the cehmical purity of the delivered water. In fact, the concomitant presence of at least six proven animal carcinogens at limit or near limit levels at the Allen Lane school (1,1 1 trichloroethane, trihalomethanes (especially, chloroform), trichloroethylene, acrylonitrile, carbon tetrachloride, and bis-2-ethylhexylphthalate) is of substantial public health concern. I say this in spite of alleged assurances that the admittedly excessive levels of trihalomethanes poses "no problems from the Department of Health Services short term use". Such a statement, if accurate seriously miscasts the fundamental premise of carcinogenesis that all carcinogenic events are irreversible and long-term in their additivity. In short: that each chemical exposure adds to the body burden of cancer-causing insults.

It is for this reason that the permissable levels of exposure to water-borne hazards is stated in terms of lifetime exposure. Where children are involved, the possibility that we are already subjecting them to carcinogenic insults at greater than the permissable rate, as is almost certainly the case if they are ingesting the water at any of the Schools that have been tests, makes any continued exposure border on the irresponsible. At a minimu, attempts to reduce the trihalomethane contaminants to below the 100 ppb level at the source in the school (e.g., through addition of activated carbon filters) would be a prudent and reasonable course. While other water districts have occasional excursions above this level and have not had to institute such protective measures, the concomitant presence of other pollutants in at least one school, (Allen Lane), makes this course desirable from a public health standpoint.

I hope that you take these observations into consideration in responding to the expressed concerns of citizens in your area.

Sincerely,

Marc Lappe, Ph.D.
Adjunct Associate Professor

ML:am

Contaminant Comparisons Between Raw Waters & Those Found in Chula Vista Schools

Table 1: Levels in PPB

| | Colorado River Water* | State Project Water* | Allen Lane School | Allen School | Feaster School Room:1 | 7 | 15 |
|---|---|---|---|---|---|---|---|
| +1,1,1 Trichloroethane | ND | ND | 0.47 | ND | ND | ND | ND |
| +Chloroform | 36 | 15 | 16 | 32 | 31 | 29 | 34 |
| Dichlorobromomethane | 25 | 3.6 | 25 | 43 | 44 | 40 | 45 |
| Bromoform | ND | ND | 4.6 | 9.7 | 11 | 11 | 10 |
| Chlorodibromomethane | 20 | 4.6 | 25 | 44 | 44 | 45 | 42 |
| Total THM's (Max Permitted 100 ppb) | 71 | 20.2 | 70.6 | 128.7 | 130 | 125 | 131 |
| Methylene chloride | ND | ND | 18 | 30 | 7.6 | 5.2 | 7.5 |
| Trichlorofluoromethane | 1.5 | ND | ND | ND | ND | ND | ND |
| +Acrylonitrile | ND | ND | 2.0 | ND | ND | ND | ND |
| Ethylbenzene | ND | ND | 1.0 | ND | ND | ND | ND |
| Toluene | ND | 0.1 | 0.33 | 0.25 | ND | ND | ND |
| +Carbon Tetrachloride | ND | ND | ND | 1.1 | 2.0 | 1.8 | 2.3 |
| +N-nitrosodiphenylamine | ND | ND | 0.50 | 0.49 | 0.60 | 0.57 | 0.60 |
| +Bis-2-ethylhexylphthalate | (not analyzed) | | 1.2 | 1.1 | 1.8 | 0.8 | 1.6 |
| Dibutylphthalate | (not analyzed) | | 4.8 | 4.9 | 5.7[illegible] | 2.6 | 5.2 |
| Diethylphthalate | (not analyzed) | | 1.2 | 1.1 | 1.8 | 0.8 | 1.6 |

+designates suspect carcinogen for which cancer bioassays have been reviewed by author (1,1, 1 trichloroethane, oral communication of data only: final report not yet published)

*representative control values of raw water from Table 3-12 of the Montgomery Laboratory Final Report on plastic pipe systems: Hazard Evaluation System, Department of Health Services "Final Report on Potential Health hazards Assocaited with the Use of Plastic Pipe in Potable Water Systems," Ocotber 17, 1980: Data given for comparison only as parallel controls not available for Sweetwater Authority Water, 90% from Sweetwater Lake; 10% from Colorado River Water & State Project Water; Mr. Robert Perdue, Personal Communication of November 1, 1982.

Office of the State Architect

Item #4

November 24, 1982

Mrs. Penny Allen, President
Chula Vista Board of Education
84 East "J" Street
Chula Vista, CA 92010

Dear Mrs. Allen:

It has come to my attention, through the State of California, Department of Consumer Affairs, that plastic pipe has been installed to carry drinking water on the grounds of the Feaster and Allen schools in your district.

The Office of the State Architect, as you know, has the responsibility under the Field Act (Sections 39140 through 39157 of the Education Code) to certify that all public school buildings comply with the rules and regulations adopted in Title 21 and the building standards published in Title 24, the State Building Standards Code.

The Office of the State Architect uses Part 5 of Title 24, the State Plumbing Code, as its guide for plumbing requirements. Part 5 does not permit the use of plastic pipe for potable water in public schools. As a rule, the Office of the State Architect has not been checking site improvements fully for compliance with this provision but clearly, if piping on-site connecting directly to potable water piping were plastic, it would render the intent of Title 24 inoperative.

I would suggest that you carefully evaluate whether the piping in the Feaster and Allen school sites poses a health hazard and then take whatever steps are necessary to correcting any problems found.

If you wish to discuss this further, please call.

Very truly yours,

Barry L. Wasserman

Barry L. Wasserman, FAIA
State Architect

BLW:bw (916) 445-4157

cc: Don Japhcott
Richard Spohn, Director
Department of Consumer Affairs

EXECUTIVE OFFICE

STATE OF CALIFORNIA—STATE AND CONSUMER SERVICES AGENCY EDMUND G. BROWN JR., Governor

DEPARTMENT OF
Consumer Affairs
1020 N STREET, SACRAMENTO, CALIFORNIA 95814

Item #4

November 5, 1982

Mrs. Penny Allen, President
Chula Vista Board of Education
84 East "J" Street
Chula Vista, CA 92010

Dear Mrs. Allen:

I am writing to express my personal interest and concern about the possibility that children at the Feaster and Allen schools may be exposed to unnecessary levels of toxic substances in their drinking water. I have asked Dr. Marc Lappe', the Department of Consumer Affairs Special Consultant on water quality issues, to write to the head of the Sweetwater Company evaluating the nature and extent of any hazards that these contaminants pose. A copy of his letter is enclosed.

Putting aside the technical issues and residual questions about the adequacy of this series of tests, it is clear from Dr. Lappe's letter that a very serious problem may exist in your school. There appears to be little question that one whole class of toxic chemicals (the trihalomethanes), which include proven animal carcinogens, are present at levels that exceed those permitted by the Department of Health Services. I am disturbed at what appears to be a cavalier attitude about these contaminants by the Sweetwater General Manager because of their existing association with increased risks of cancer in exposed human populations.

Both as a father of school-age children and as the principal Executive Officer in the State responsible for consumer protection, I would hope that the Board of Education would take responsible action to determine the full extent of the risks school-age children may experience at this particular time, and then take necessary steps to mitigate any hazard. If Dr. Lappe's analysis is correct, the problem seems to call for an immediate resolution. I find it inconceivable that we would tolerate the continuous exposure by school children to known carcinogens in a "captive" environment where their only source of potable water is a contaminated one.

While I realize that Sweetwater Authority has leveled allegations of faulty laboratory work by S-Cubed, I also note that Dr. Lappe' finds it unacceptable to dismiss the findings as a whole on that basis. The chemicals in question are of such concern because of their known ability to induce human cancer that urgent attempts to resolve the uncertainty are needed. In the interim, the burden on the Board must be on the side of protecting the children. If I were a parent whose children attended any of these schools, I would want immediate investigation into alternative water sources.

Since each day during which a child ingests a carcinogen adds irrevocably to the child's lifetime cancer risk, I would hope that you would expeditiously address this matter.

Sincerely,

RICHARD B. SPOHN
Director

Enclosure

cc: Board Members

# SUMMARY SHEET

## PLASTIC PIPE WATER SERVICE FAILURES

Breakdown of Costs:

| LOCATION | COSTS |
| --- | --- |
| Memphis, Tennessee | 6.2 million |
| Napa, California | $208,000 |
| San Antonio, Texas | 50 million |
| El Paso, Texas | 2 million |
| Irvine Ranch, California | 38.1 - 38.25 million |
| Germantown, Tennessee | 1.2 million (estimate) |
| Puerto Rico | 30 million |
| TOTAL: | 127.5 - 127.65 million |

SUMMARY OF PLASTIC PIPE

WATER SERVICE FAILURES

The following is a summary of plastic pipe water service failures which have occurred throughout the United States.

MEMPHIS, TENNESSEE

This community used polybutylene from approximately 1972 to 1979. The pipe was used primarily for water service lines to the hookup to individual residences. Failures were recognized as early as 1972, and included stress cracks, pinhole leaks and cramps and creases. The water utility discontinued use, and is replacing the pipe as it fails. Estimated cost to the community is 6.2 million dollars.

NAPA, CALIFORNIA

This community used polybutylene and polyethylene from 1972 to approximately January, 1982. Polybutylene was used exclusively from 1972 to 1978, and polyethylene from 1978 to 1982. The city experienced failures which included sidewall cracks, pinholes, penetrations by pebbles, splits on the sides, stress failures and sheer breaks at a fitting. The City of Napa is replacing the plastic pipe as it fails, and the use of plastic pipe has been banned by the City Council. Estimated cost for the failures is $208,000.

SAN ANTONIO, TEXAS

This community has used polyethylene and polybutylene 2110. Polyethylene was used from 1966 to 1970, and polybutylene from 1970 to 1978. The pipe was used as standard material for all service lines and was used exclusively for new services as a replacement for copper. The failures which were experienced included pinholes, splits and sheers throughout the system. The city is replacing the plastic pipe en masse. At first, they only replaced it as the pipe failed, but then decided it was necessary to replace the entire system because of the extent of failure. The estimated cost to the city, as determined from a lawsuit which has been filed, is approximately 50 million dollars.

EL PASO, TEXAS

This community used polyethylene, 3406, Hyd-molecular. It was used for approximately eight years and began to be phased out in approximately 1979. No plastic pipe is used at this time. The failures included fine stress cracks, longitudinal cracks, caused by stress on the pipe itself. The water utility is replacing the pipes as they fail, and is not doing mass replacement. The estimated cost for the failures is approximately 2 million dollars.

SUMMARY OF PLASTIC PIPE

WATER SERVICE FAILURES

(continued)

IRVINE RA[illegible]R DISTRICT, C[illegible]A

This community used polyethylene beginning in 1961 and discontinued use in approximately November, 1982. It was used primarily in new development areas, and was not used to replace copper unless the whole line had to be replaced. Failures included the pipe splitting in half, which was attributed to a stress problem, longitudinal cracking and soil conditions. In addition, there was a hardening and shattering of pipe. A management decision was made to replace the pipe as it fails. The cost from the failures is approximately 38.1 to 38.25 million dollars.

GERMANTOWN, TENNESSEE

This community used polyethylene and polybutylene from approximately 1973 to 1978. Ninety percent of the plastic pipe was polyethylene. It was installed primarily in all new subdivisions. Failures from the pipe included breaking due to brittleness and snapping, usually very close to the connection at the main or the meter where there was the most stress. The pipe split around the circumference rather than longitudinally. Costs from the failures are estimated, due to the fact that this community is also involved in a lawsuit against the manufacturer. Estimated cost is 1.2 million dollars.

PUERTO RICO

This island used polybutylene as a replacement for copper because it was cheaper and would not be stolen, as was the case for copper. It was introduced in the early 1970's but has been used in increasingly larger underground systems since 1979. Failures included cracking from the changes in temperature and leaks which they suspect are developing on lines leading to residences and in the main lines underground. The estimated cost of replacing the polybutylene pipes is set at $30 million.

TOTAL ESTIMATED COSTS FOR FAILURES FROM THE ABOVE LOCATIONS:

127.5 - 127.65 million

# Plastic Plumbing Pipe EIR

## Project History

### Plastic Pipe

Applications of plastic pipe for water supply can be grouped into three major categories: public utilities, mobilehomes and recreational vehicles, and dwellings and structures. In the 1960's the State Public Utility Commission approved the use of selected plastic pipes by public utilities for water distribution systems. During the same period, the Department of Housing and Community Development approved the limited use of plastic pipe in mobilehomes and in recreational vehicles. The Department is now considering whether to allow the expanded use of plastic pipe in dwellings and structures, expanded beyond the limited applications provided in the 1979 Uniform Plumbing Code (and adopted into State Housing Law) to those proposed in the 1982 Uniform Plumbing Code. The following two paragraphs describe the dwelling and structure applications of plastic pipe currently allowed and proposed.

Presently, the State of California allows the use of acrylonitrile-butadiene styrene (ABS) pipe for drain, waste, and vent (DWV) applications in non-fire-rated buildings and outside of buildings. (The terms "fire-rated" and "non-fire-rated" refer to the structure's ability to withstand a fire. In general, fire-rated buildings are three or more stories while non-fire-rated buildings are two stories or less. Technically fire-rating is a function of the materials and methods of construction.) The proposed expanded ABS use would include DWV applications in fire-rated buildings within fire-resistive construction. Polybutylene (PB) pipe is not presently allowed in California. The expanded PB use would include hot and cold water supply applications outside a building, in non-fire-rated buildings, and in fire-rated buildings within fire-resistive construction.

Polyethylene (PE) pipe is allowed presently only for water supply outside a building. No expanded PE uses are proposed. Polyvinyl chloride (PVC) pipe is presently allowed for DWV applications outside a building and in non-fire-rated buildings, and for cold water supply outside a building. The expanded PVC use is for DWV in fire-rated buildings within fire-resistive construction. Chlorinated polyvinyl chloride (CPVC) pipe is not presently allowed in California (except in manufactured housing). The proposed uses of CPVC pipe are for both DWV and hot and cold water supply outside a building, in non-fire-rated buildings, and in fire-rated buildings within fire-resistive construction.

### Past Agency Action

The Commission of Housing and Community Development was established in 1971 to assist the legislature and provide a public forum to find solutions to critical housing issues. Composed of nine governor-appointed individuals, the Commission met at monthly public meetings to adopt changes in the rules and regulations of the State Housing Law and other housing-related laws under their jurisdiction.

Since 1977, the Commission has held hearings and taken evidence, both oral and written, on whether to approve the expanded use of plastic pipe for drinking water intake pipe, and drain, waste, and vent pipe. In 1978, the Commission filed a

Negative Declaration on the use of plastic pipe. However, further questions were raised about the safety of such use, and in October, 1980, a draft report of tests performed by the James M. Montgomery Laboratory for the California Department of Health Services was presented to the Commission. These tests disclosed new information about the leaching of toxic chemicals from plastic pipe into drinking water.

Based on the Montgomery report and other evidence received, on November 24, 1980, the Commission determined that new information to the project contained substantial evidence upon which it could be fairly argued that the project may have a significant effect on the environment. Accordingly, the Commission determined to require an EIR prior to the approval of the use of PVC, CPVC, and ABS for drinking water and/or drain, waste, and vent pipe. On April 20, 1981, the Commission voted to also require the preparation of an EIR for PB pipe. The kinds of plastic now under consideration are polyvinyl chloride (PVC), acrylonitrile-butadiene-styrene (ABS), chlorinated polyvinyl chloride (CPVC), polyethylene (PE), and polybutylene (PB).

During 1981, however, the State Legislature removed funding for the Commission. The Department of Housing and Community Development, as the logical successor agency to the Commission, has given assurances that it would continue work upon the plastic pipe EIR without interruption and would follow the process through to completion. Myron Moskovitz, former chairman of the Commission, has been appointed State Hearing Officer on the plastic pipe issue as well as chairman of the plastic pipe EIR task force.

Issues of Concern

A brief review of the more significant evidence that was presented to the Commission concerning the need for an EIR will give a clearer understanding of the likely scope of the EIR. Allegations were made that the solvent used to glue plastic pipe as well as the different types of pipes themselves leached hazardous chemicals into the water supply. The James M. Montgomery report was a study of what actually leached from PVC and CPVC plastic pipes and the solvents used to join them. The following solvents used to join plastic pipe were detected by Montgomery in water stored in this pipe: methyl ethyl aketone (MEK), tetrahydrofuran (THR), dimethyl-formamide (DMF) and cyclohexanone. In addition, other chemicals of concern were detected such as chloroform, carbon tetrachloride, tetrachloroethene, and trichloroethene. The degree of any potential health risk associated with the presence of these chemicals has not been established. It is anticipated that the effect of these chemicals will be the primary focus of the EIR. Evidence was also submitted indicating that DEHP is found in PB pipe. Finally, there was evidence which suggested that acrylonitrile could leach from ABS pipe. The potential hazards associated with the use of ABS and PB pipes is not as well known since they were not part of the Montgomery study.

The California Department of Health Services prepared a report for the Commission based on the results of the Montgomery study. The report discussed the potential dangers to the public and to workers installing plastic pipe. The Health Services report concluded that if adequate flushing of the piping system is performed prior to occupancy of a dwelling, substantial reaccumulation of solvent concentrations to potentially toxic levels is unlikely and normal water usage is likely to further prevent the buildup of toxic levels of any of the major solvents.

Based upon field studies by the State Division of Occupational Safety and Health Administration, the Department of Health Services concluded that adverse worker health effects from inhalation of the major solvents is unlikely based on their relatively low toxicity and field measurement of worker exposure. The Department noted that further study was necessary to draw conclusions about suggestions made that there is a higher incidence of cancer among workers exposed to the solvents. Finally, the report also noted that some workers may not wear adequate protective gear such as rubber gloves when working with the solvents, raising the possibility of dermal exposures that were not part of the field study.

Another major issue of concern regarding the approval of the expanded use of plastic plumbing pipe is fire safety. In May 1980, the State Fire Marshal prepared a report on the fire hazards of plastic pipe. The report concluded that the use of plastic pipe in non-fire-rated construction, whether in residential, commercial, or industrial occupancies, did not present an unusual fire risk. The State Fire Marshal, however, concluded more fire testing was needed on the fire safety of plastic pipe in three or more story fire-rated construction. More testing was needed to ensure that plastic pipe will not contribute to unusual fire spread and that the toxicity generated by the combustion of plastic pipe will not extend beyond the area of initial exposure in quantities sufficient to prove hazardous.

Proposed Agency Action

The Department has hired an EIR Project Coordinator, Michael C. McMillan, to supervise an EIR consultant who will actually prepare the reports. The coordinator works with an established EIR task force of major interested parties and has prepared an RFP for hiring the consultant. This body will be responsible for advising the Department on the exact scope of the EIR.

It is expected the EIR consultant will be hired during July 1982. Their first task will be the preparation of an environmental review document. This document will assess the impacts of the expanded use of plastic pipe and identify those issues which cannot be resolved based on existing knowledge. Those specific issues which cannot be resolved without additional information will be identified as needing further testing. The environmental review document is expected to be completed by early November 1982.

Should additional testing be necessary, the Department would work with the Task Force to prepare an RFP to select a testing laboratory. Tests and related analyses should be completed during the six months following completion of the environmental review, that is by April 1983.

The results of the testing will then be combined with the environmental review document to form the Draft EIR on the project. The Draft EIR is expected to be made available for public review in July 1983.

After a minimum 45-day public review period, the Draft EIR will be revised in response to comments raised by the public. Any significant environmental issues raised by the public that were not addressed in the Draft EIR would then be discussed. The Final EIR would consist of a revised Draft EIR and a discussion of all new issues raised by the public. The Final EIR is expected to be completed in December 1983.

Item #7

Bull. Environm. Contam. Toxicol. 23,620-623 (1979)

# 2-Butanone and Tetrahydrofuran Contamination in the Water Supply[1]

T. C. Wang and J. L. Bricker
*Harbor Branch Foundation, Inc., RR 1, Box 196, Ft. Pierce, Fla. 33450*

MEK (2-butanone) and THF (tetrahydrofuran) were found in high concentrations in our laboratory's water outlets 6 mo after PVC (polyvinyl chloride) pipe installation. Subsequent analysis confirmed that the solvents from the PVC pipe cement used to join the tubing were leaching into our water supply. Water samples were taken at various residence times in the pipe to observe the solvents' leaching kinetics.

## MATERIALS AND METHODS

Before sample collection, the water was run for about 30 min to purge the contaminated water from the pipes. After flushing, the tap was closed for a predetermined time to establish a residence time for the water in the pipe. Twenty-five mL of water were collected and placed in a corning Midget bubbler unit (C): figure 1 shows the sample collection scheme: nitrogen gas (A), purified through charcoal and silica gel column (B), was then bubbled through the sample (C) to purge the volatile organics from the water onto the Tenax column (D). Nitrogen flowed at a rate of 35 cc/min for 15 min. The volatile organics were thus concentrated on the Tenax column (NOVOTNY 1974, PELLIZZARI 1975), a 13 cm x 6 mm ID stainless tubing packed with 0.2 g of 60/80 mesh Tenax and fitted with a Swagelok fitting on the inlet and a Luer-Lock syringe needle adapter on the outlet.

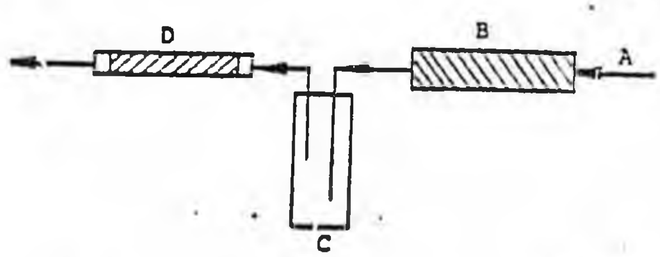


Figure 1. Sample Collection Scheme

ALSO SUBMITTED 12-?-?
Would be item 8-A.

[1]Harbor Branch Contribution No. 141

0007-4861/79/0023-0620 $01.00


Pg 620
621
622
623

After sample collection, the column (D) was removed from the bubbler unit (C), fitted with a No. 20 syringe (E) needle on one end and connected to the gas chromatograph nitrogen carrier gas line (A) on the other end as shown in Figure 2. With the carrier gas bypassing the Tenax column, a heating wire (K) was used to heat the column for 5 min to a final temperature of 165 C. The carrier gas was then switched using a three-way valve (L) to the column for 1.0 min, eluting the organic compounds from the Tenax column to the G.C. column (G).

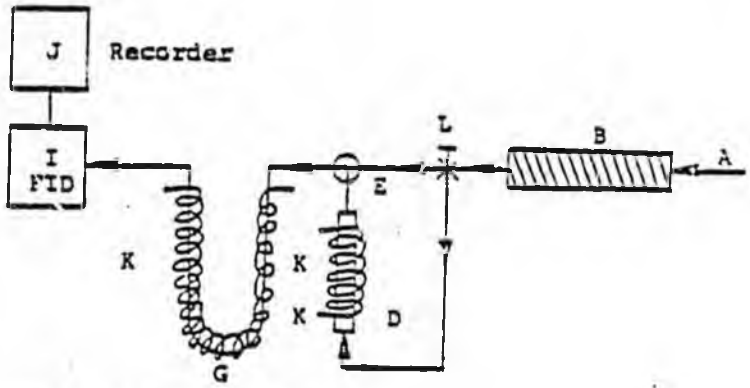


Figure 2. Sample Analysis.

Analysis was performed using a 1.2 m x 3 mm OD glass column packed with 0.2% Carbowax 1500 on 60/80 mesh Carbopak C; carrier gas low rate was 8 cc/min. Column temperature was maintained at 23.5 C for 5 min and then heated at a rate of 8 C/min to reach a final temperature of 60 C. The samples was measured by a flame ionization detector (I) and recorded on a strip chart recorder (J). The sample was also injected into a GC-mass spectrometer for positive confirmation.

Recovery. Distilled water (25 mL) fortified with 50 µL each of MEK and THF was preconcentrated and analyzed using the identical procedure as for sample analysis. A linear calibration curve was obtained for the range of samples analyzed. Average recovery efficiency was found to be 12 and 14% for MEK and THF, respectively. Results were corrected for the true values in the samples based on these values.

TABLE 1. Concentration (ppm) of MEK and THF in Water Samples at Various Residence Times in the PVC Pipe

| Residence Time (h) | Samples taken 6 mo after pipe installation | | Samples taken 8 mo after pipe installation | |
|---|---|---|---|---|
| | MEK | THF | MEK | THF |
| 0 | 0 | 0 | 0 | 0 |
| 4 | 0.4 | 1.0 | 0.1 | 0.7 |
| 8 | 0.6 | 1.7 | - | - |
| 16 | 1.8 | 5.8 | 0.6 | 2.4 |
| 24 | 2.2 | 8.9 | 1.1 | 3.7 |
| 48 | 3.9 | 12 | 2.1 | 6.8 |
| 64 | 4.5 | 13 | - | - |
| 72 | - | - | 2.2 | 7.5 |
| 96 | 4.5 | 13 | - | - |

## RESULTS AND DISCUSSION

Two sets of water samples were collected 6 and 8 mo after PVC pipe installation and usage in our laboratory. About 80 feet of 1.5 in. diameter PVC pipe was installed. Bond Tite[R] (Pearsall Polymer Co.) PVC pipe cement was used for joint connection. About 40 gal of water were used daily in the laboratory. The water temperature was about 21 C. Seven water samples at different residence times in the PVC pipe were taken for analysis. After each sample taken, water in the PVC pipe was thoroughly flushed out and one sample was immediately taken and analyzed. This sample was reported as zero residence time in the pipe. Each sample was done in triplicate, average data were used (Table 1). Deviation of each experimental run was 0.8% for THF and 0.6% for MEK.

When the residence time was zero, there was no detectable MEK or THF found in the samples. Both MEK and THF concentration increased with a longer residence time and finally approached an equilibrium condition. The final equilibrium concentration for THF and MEK in the first set of samples was 13 and 4.5 ppm, respectively. The second set of water samples, taken at 8 mo after PVC pipe installation and use, reached a final equilibrium concentration for THF and MEK of 7.5 and 2.2 ppm, respectively. The results show that the residence time for MEK and THF compounds in both sets of samples reach equilibrium concentration in about 48 h.

A comparison of the data from the two sets of samples indicates that concentration of both MEK and THF in the second set were reduced to 1/2 of the concentration in the first set. About 2,400 gal of water was used during the period of samples taken between Set I and Set II. This water presumably removed some of the MEK and THF from PVC pipe cement in the pipe.

## REFERENCES

NOVOTNY, M., M.L. LEE and K.D. BARTLE: Chromatographia 7, 333 (1974).

PELLIZZARI, E.D., J.E. BUNCH and B.H. CARPENTER: Environ. Sci. Technol. 9, 556 (1975).

Item #8

# FIRE HAZARDS OF PLASTIC PIPE

A REPORT TO THE
COMMISSION ON
HOUSING AND COMMUNITY DEVELOPMENT

BY THE

OFFICE OF
STATE FIRE MARSHAL

IN RESPONSE TO
ACR 98 - PAPAN

MAY 1, 1980

## SUMMARY

Assembly Concurrent Resolution 98 - Papan (Resolution Chapter 11, Statutes of 1980) requested the State Fire Marshal to prepare a written report to the Commission on Housing and Community Development on *"the potential flammability of plastic pipe and the fire hazards associated with its use, in which the State Fire Marshal analyzes the potential fire hazards in residential, commercial and industrial installations of plastic pipe and evaluates the need for specialized firefighting techniques or equipment when fighting fires involving plastic pipe."*

The State Fire Marshal concludes that:

(1) The use of plastic pipe in non-fire-rated construction, whether in residential, commercial, or industrial occupancies, does not present an unusual fire risk.

(2) In multi- (3 or more) story fire-rated construction, additional in-depth fire testing is necessary to: (a) ensure that plastic pipe will not contribute to unusual fire spread; (b) that the toxicity generated by the combustion of plastic pipe will not extend beyond the area of initial exposure in quantities sufficient to prove hazardous.

(3) The use of self-contained breathing apparatus affords the firefighting community necessary protection in combatting fires involving plastic pipe.

Item #9



DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
DIVISION OF CODES & STANDARDS Administrative Section
P. O. Box 1407, Sacramento, CA 95807 (916) 445-9471

November 10, 1982

INFORMATION BULLETIN SHL 82-5

TO: CITY BUILDING OFFICIALS
COUNTY BUILDING OFFICIALS
HOUSING CODE OFFICIALS
FIRE OFFICIALS
HEALTH OFFICIALS
ENVIRONMENTAL HEALTH OFFICIALS
INTERESTED PARTIES (SHL)
DIVISION STAFF

RE: PLASTIC PIPING SYSTEMS

The Department of Housing and Community Development has undertaken an Environmental Impact Report under the provisions of the California Environmental Quality Act before authorizing the expanded use of plastic pipe. The Environmental Impact Report is required because a significant controversy exists, and because evidence exists, although disputed, that plastic pipe may cause actual or potential significant adverse environmental or public health effects by leaching hazardous or carcinogenic chemicals, and/or may pose fire safety or worker safety hazards. The types of pipe being studied are PVC, CPVC, and PB for potable water and ABS and PVC for drain, waste and vent.

The Environmental Impact Report will also evaluate existing uses of plastic and metal pipe. Until the Environmental Impact Report is completed and reviewed, the expanded use of plastic pipe is not approved by the state beyond the uses adopted by the state in 1979.

Because of an order of the California Supreme Court, the Uniform Plumbing Code, 1982 Edition, is being distributed in California with a notice inserted by IAPMO which notifies recipients, among other things, that the Environmental Impact Report is being prepared and that the expanded use of plastic pipe "is not permitted in California." This notice of IAPMO, and its manner of insertion in the code, has caused misunderstanding as to the current status of the approved use of plastic pipe in California.

The Department of Housing and Community Development adopted the Uniform Plumbing Code, 1979 Edition, as part of the State Housing Law on December 31, 1979. The 1979 Edition is the current edition being enforced under the State Housing Law.

In accordance with the 1979 Edition, plastic pipe may be used as follows:

Drainage Systems

Section 401 - Materials

(a) Drainage pipe shall be cast iron, galvanized steel, galvanized wrought iron, lead, copper, brass, ABS, PVC, or other approved materials having a smooth and uniform bore, except: 1. That no galvanized wrought iron or galvanized steel pipe shall be used underground and shall be kept at least six (6) inches (152.4mm) above ground. 2. ABS or PVC installations limited to residential construction, not more than two (2) stories in height.

(b) Drainage fittings shall be of cast iron, malleable iron, lead, brass, copper, ABS, PVC, or other approved materials having a smooth interior waterway of the same diameter as the piping served and all such fittings shall conform to the type of pipe used.

Water Distribution

Section 1004 - Materials

(a) Water pipe and fittings shall be of brass, copper, cast iron, galvanized malleable iron, galvanized wrought iron, galvanized steel, lead, or other approved materials. Asbestos-cement, PE, or PVC water pipe manufactured to recognized standards may be used for cold water distribution systems outside a building. All materials used in the water supply system, except valves and similar devices shall be of a like material, except where otherwise approved by the Administrative Authority.

In addition, local jurisdictions may have adopted amendments to the 1979 Plumbing Code allowing additional uses of plastic pipe due to "local conditions" pursuant to their authority under the code. These ordinances are valid only if they were adopted in compliance with CEQA and other requirements of law.

At the present time, local amendments proposing the expanded use of plastic pipe beyond that authorized by the 1979 code should be undertaken with caution, and in a manner to ensure strict compliance with applicable law. The State of California has determined that sufficient information has been presented to require the preparation of an Environmental Impact Report. Therefore, for any new application of plastic pipe materials involving water supply for human consumption covered by the EIR (PB, PVC, CPVC), it is the opinion of this department that a negative declaration by a local jurisdiction is not sufficient, and such action would likely subject the jurisdiction to litigation. Local jurisdictions are advised to await the department's completion of its Environmental Impact Report, currently underway. The California Environmental Quality Act must be complied with if a local jurisdiction decides to amend its code.

Sincerely,

Jack L. Kerin
Chief

P.O. BOX 1079, SACRAMENTO 95805
1500 - 5TH STREET, SACRAMENTO 95814 • DEPARTMENT OF GENERAL SERVICES • STATE OF CALIFORNIA • EDMUND G. BROWN JR., GOVERNOR

Office of the State Architect

# OFFICE OF THE STATE ARCHITECT ADVISORY BULLETIN

DECEMBER 31, 1982

TO: ARCHITECTS, ENGINEERS, SCHOOL DISTRICTS AND COUNTY SUPERINTENDENTS

RE: USE OF PLASTIC PIPE IN PUBLIC SCHOOL BUILDINGS

The Structural Safety Section of the Office of the State Architect (OSA/SSS), which is charged with administering the "Field Act", has responded as follows to inquiries regarding the use of plastic piping in public school construction:

1. The current State Building Standard which applies to plumbing systems in public schools is the State Plumbing Code, Part 5 of Title 24, CAC, issued in Register 68, No. 41 dated November 2, 1968.

2. The restrictions on materials which can be used for piping and fittings for drainage systems, vent systems or water distribution systems are contained in Article P2 of Part 5, Title 24. In addition to the specific materials listed in Section P208, P211, P212 and P215 of Article P2, provision is made for use of "other approved materials" as determined by the enforcing authority.

3. The State Architect had determined in 1974 that in public school projects plastic pipe of the appropriate type and class could be used only for vent piping in buildings; waste lines in portable buildings; drains carrying acid wastes from laboratories; and plumbing lines carrying gas, water and drainage wastes underground outside of buildings. This has been the policy enforced by OSA/SSS since that date.

4. On the 10 November 1982 the Division of Codes and Standards of the Department of Housing and Community Development issued an Informational Bulletin No. SH 82-5 regarding plastic piping systems which states in part:

   "The Department of Housing and Community Development (HCD) has undertaken an Environmental Impact Report under the provisions of the California Environmental Quality Act before authorizing the expanded use of plastic pipe.

The Environmental Impact Report is required because a significant controversy exists, and because evidence exists, although disputed, that plastic pipe may cause actual or potential significant adverse environmental or public health effects by leaching hazardous or carcinogenic chemicals, and/or may pose fire safety or worker safety hazards. The types of pipe being studied are PVC, CPVC, and PB for potable water and ABS and PVC for drain, waste and vent.

The Environmental Impact Report will also evaluate existing uses of plastic and metal pipe. Until the Environmental Impact Report is completed and reviewed, the expanded use of plastic pipe is not approved by the state* beyond the uses adopted by the state in 1979**."

* (For residential uses.)
** (Uniform Plumbing Code, 1979 Edition)

5. Because of the particular concerns raised regarding the potential health hazards that may exist when plastic pipe is used in transporting potable water for use by school age children the Office of the State Architect is recommending that plastic pipe not be used on school sites for potable water distribution systems until the Environmental Impact Report being prepared by HCD is completed and reviewed.

6. Until the results of the Environmental Impact Report are reviewed and evaluated the OSA/SSS will continue to limit the use of plastic pipe for plumbing systems in public school projects to vent piping in buildings, waste lines in portable buildings and drains carrying acid wastes from laboratories.

Barry R. Wasserman

Barry R. Wasserman
State Architect
(916) 445-4167

DKJ:dw

RICHARD A. ELBRECHT, A. PAUL GRIEBEL,
ROGER DICKINSON, KATHLEEN E. DOYLE,
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AILEEN ADAMS

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Attorney for Plaintiff STATE BUILDING &
CONSTRUCTION TRADES COUNCIL OF CALIFORNIA,
AFL-CIO

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF LOS ANGELES

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|---|---|
| RICHARD B. SPOHN, DIRECTOR OF THE CALIFORNIA DEPARTMENT OF CONSUMER AFFAIRS, FRIENDS OF THE EARTH, CONSUMER FEDERATION OF CALIFORNIA, STATE BUILDING AND CONSTRUCTION TRADES COUNCIL OF CALIFORNIA, & AILEEN ADAMS, Plaintiffs, | No. C395294 |
| v. | FIRST AMENDED COMPLAINT FOR INJUNCTION AND OTHER APPROPRIATE RELIEF |
| INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAN OFFICIALS, a California corporation, and DOES I through XX, Defendants. | ~~[illegible]~~ ordered filed 10/20/82 |

Plaintiffs allege that:

FIRST CAUSE OF ACTION

1. Plaintiff, RICHARD B. SPOHN, Director of the Department of Consumer Affairs of the State of California brings this action under the authority conferred by Business and Professions Code Section 321 in order to protect the public from misleading and untrue statements and unlawful, unfair, and fraudulent business practices, and to prevent damage to the interest of consumers due to violations of the California Environmental Quality Act (hereinafter CEQA), Public Resources Code Section 21000 *et seq.*, and negligent misrepresentation.

2. Plaintiff, FRIENDS OF THE EARTH is and was at all times herein mentioned a non-profit association committed to the preservation, restoration, and rational use of the earth. Friends of the Earth has over 27,000 members in fifty states and outside the United States of which approximately 9,000 members reside in California. Friends of the Earth brings this lawsuit on behalf of itself, its members, and the general public.

3. Plaintiff, CONSUMER FEDERATION OF CALIFORNIA, is and was at all times herein mentioned an unincorporated association of about 80 organizations, representing approximately one million Californians, and about 200 individual members. The Consumer Federation of California exists to protect all consumers against fradulent, unfair, and unsafe practices and for better programs of consumer education to address the needs of consumers for information. The Consumer Federation of California brings this lawsuit on behalf of itself, its members, and the general public.

4. Plaintiff, STATE BUILDING AND CONSTRUCTION TRADES COUNCIL OF CALIFORNIA (hereinafter referred to as "Building Trades Council"), chartered by the Building and Construction Trades Department of the American Federation of Labor--Congress of Industrial Organization, is and was at all times herein mentioned an unincorporated association organized and existing under the laws of the State of California with its principal place of business in the City and County of Sacramento. The Building Trades Council is a statewise organization representing more than 357 local unions, 28 local councils, 35 craft councils, and over 360,000 state residents, of which the latter generally provide over 90 percent of the building and construction labor force in the State of California. The Building Trades Council has among its principal purposes:

> "To provide for the general welfare of its affiliates and their members and employees represented by its affiliates and all employees and working men, women and minors insofar as in the opinion of this Council, their general welfare has or may have any effect, direct or indirect, upon the general welfare of its affiliates, and members of its affiliates or the employees represented by its affiliates or both, and without in any way limiting the foregoing:
>
> "To promote the development of health and safety practices and procedures to the end of protecting the health and safety of the members of its affiliates and all employees and working men, women and minors."

The Building Trades Council brings this lawsuit on behalf of itself, its members, and the general public.

5. Plaintiff, AILEEN ADAMS, is and was at all times herein mentioned an individual consumer, a homeowner, and a resident of the State of California and the County of Los Angeles.

She brings this lawsuit on behalf of herself and the general public.

6. Defendant, INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS (hereinafter IAPMO) is, and at all times herein mentioned was, a California corporation, with its principal place of business in the City of Los Angeles, County of Los Angeles.

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7. Plaintiffs do not know the true names and capacities of the defendants sued as DOES I through XX.

8. Whenever reference is made in this First Amended Complaint to any act of defendants, such allegation shall be deemed to mean that defendants and any officers, directors, agents, and employees of any defendants did or authorized such acts to be done while actively engaged in the management, direction, or control of the affairs of defendants, and while acting within the course and scope of their employment.

9. Whenever reference is made in this First Amended Complaint to any acts of defendants, such allegations shall be deemed to mean the act of each defendant acting individually jointly and severally.

10. IAPMO is the functional equivalent of a public agency. Its voting membership is comprised of governmental jurisdictions and government building officials from western states, including California, who regulate plumbing, heating, air conditioning, and related mechanical construction. A major source of financial support for IAPMO is derived from dues paid by member governmental jurisdictions.

11. IAPMO publishes a variety of material for wide dissemination to the public, including, but not limited to, its "Uniform Plumbing Code" (hereinafter UPC) and its research Directory which is generally used in conjunction with its code. IAPMO represents that these publications provide for the "minimum requirements and standards for the protection of the public health, safety, and welfare." IAPMO further represents in its publications

COURT PAPER
STATE OF CALIFORNIA
STD 113 (REV. 8-72)

that "the consumer is entitled to more than a safe and sanitary plumbing system." These publications in a multitude of places contain the reproduction of a seal of IAPMO which contains the inscription, "plumbing safety."

12. The unmistakable message of the IAPMO publications is that approved and listed plumbing products and materials can be viewed by the public as meeting the minimum standards for health and safety.

13. In fact, IAPMO performs no independent testing to determine if its various plumbing products contain harmful chemicals or fire properties that would adversely affect human health. Instead, IAPMO decides to either approve or list various plumbing products in its publications by an organizational determination that is wholly unaccompanied by any scientific scrutiny of the so-called listed or approved products. Thus, plumbing materials are routinely approved or listed in IAPMO publications as if they meet certain minimum health and safety standards when in actuality IAPMO conducts no independent testing of the health, safety, fire or environmental factors that are involved with a prospective plumbing product.

14. IAPMO represents that on-site inspections by IAPMO of manufacturing processes of products listed in the research Directory assures that minimum standards of health and safety are maintained. In fact, IAPMO never tests for organic chemicals or any other chemicals that may pose human health problems, nor does IAPMO test for fire properties of such plastic pipe, nor for

adverse health effects from fumes to workers who install such plastic pipe.

15. IAPMO is paid an application fee, a listing fee and an evaluation fee by plumbing manufacturers who have their product either approved or listed in various IAPMO publications. A manufacturer continues to pay a listing fee yearly for the annual listing of its product. Such fees, when paid, permit manufacturers to affix to their product the IAPMO seal or logo with the words "plumbing safety."

16. The purpose and effect of the IAPMO publications is to induce and promote materials and products by providing a plumbing code and research Directory which is acceptable to as many governmental jurisdictions as possible and which receives widespread adherence among those who purchase and install plumbing systems. IAPMO has achieved such purpose in that California Housing and Community Development Department (hereinafter HCD), Health and Safety Code section 50550 et seq., which is responsible for approving building standards for residential dwellings, must impose substantially the same requirements as, <u>inter alia</u>, the UPC. Failure by the HCD to do so within one year of the publishing of the UPC leads by operation of law to the automatic approval of the UPC. (Health and Safety Code section 17922(a).) Within one year after the effective date of changes adopted pursuant to section 17922, California cities and counties

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are required to adopt the same changes by local ordinance. (Health and Safety Code section 17958.)

17. Due to the legal requirements set forth in paragraph 16, supra, which, in effect, mandate the adoption of the UPC in California, new editions of the UPC, which are published by IAPMO and widely disseminated within California, are treated as though they represent current law. Many local governments adopt new editions of the UPC into local ordinance verbatim without regard to any action by HCD, and local building officials, contractors, plumbers, architects, and others in California rely on the UPC from the date it is disseminated to guide them in installing safe and legal plumbing materials. The dissemination of the 1982 version of the UPC within California is imminent. The research Directory listings are disseminated with the same intent

18. The current editions of the various IAPMO publications, viz., the UPC and the research Directory, include approvals and listings of various plastic plumbing components including polyvinyl chloride (PVC) plastic pipe, polybutylene (PB) plastic pipe, chlorinated polyvinyl chloride (CPVC) plastic pipe, and acrylonitrile butadiene styrene (ABS) plastic pipe.

19. The California Environmental Quality Act (CEQA), Public Resources Code section 21000 et seq., and the Guidelines for the Implementation of CEQA (hereinafter Guidelines), 14 California Administrative Code sections 1500 et seq., require a public agency to prepare an Environmental Impact Report (hereinafter EIR) on any project which "may have a significant effect on the environment." (Public Resources Code section 21150.) "A significant effect on

the environment means a potentially substantial, adverse change in the environment." (Public Resources Code section 21068.)

20. In 1977, the Commission on Housing and Community Development (predecessor to HCD for this issue) began an investigation into the safety and utility of using plastic pipe for various purposes in residential dwellings. After a long series of hearings and preliminary studies, the Commission finally concluded that all of the plastic pipes noted above, viz., PVC, PB, CPVC, and ABS, involve substantial evidence of potential or actual significant adverse environmental effects with respect to their expanded use in California. Accordingly, the Commission voted to have an EIR prepared as required under CEQA. Preparation of this EIR is going forward at this time, and will address a wide range of issues involving potential adverse effects from the above-noted plastic pipes in regard to their possible toxicological dangers for drinking water, possible fire hazards, and possible hazards to workers involved in the installation of plastic products. These safety and chemical issues are so complex that HCD now estimates that the EIR will not be done any sooner than mid-1984, and because of its complexity, HCD has contracted to have the Stanford Research Institute do the entire task.

21. At its annual conference on October 13, 1981, in Reno, Nevada, those attending, including voting delegates, were informed, both orally and in writing, that the Commission had voted to require preparation of an EIR for CPVC, PVC, PB, and ABS plastic pipe for use before approving the expanded use of these plastic pipe components due to the existence of substantial

evidence of potential or actual significant environmental effects from the use of such pipe, including but not limited to, adverse toxicological and fire hazard problems.

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STD 113 (REV. 8-72)

22. Defendant IAPMO knows or with the exercise of reasonable care should know that the promotion of PVC, PB, CPVC, and ABS plastic pipe as it exists in various publications of IAPMO is misleading and deceptive, in that IAPMO creates the false impression that such types of plastic pipe have been determined to present no actual or potential danger of public health and safety and that they may be lawfully used in California. In fact, until such time as the EIR is completed by HCD and a decision is made regarding the use of plastic pipe, the safety of the use of such plastic pipe is unknown and remains impermissible under the law, except for limited drain, waste, and vent pipe purposes.

23. In order to prevent potential and irreversible harm to consumers and other members of the public in California, an injunction should be issued pursuant to California Business and Professions Code section 17535 as requested in the prayer below.

SECOND CAUSE OF ACTION

24. Plaintiff realleges and incorporates by reference paragraphs 1 through 23, inclusive of the First Cause of Action as though set forth at length herein.

25. IAPMO's Research Committee receives application fees, listing fees, and evaluation fees from manufacturers in order to list plumbing products and materials in IAPMO's research Directory. Further, during its annual business meeting, IAPMO decides by a simple majority vote of its active members present at the meeting whether to amend the UPC code by adopting recommendations of its Code Change Committee.

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26. Approval or listing of plumbing materials in the UPC or research Directory has the potential for resulting in a physical change in the environment, directly or ultimately, as determined by the HCD.

27. IAPMO has either approved or listed PVC, PB, CPVC, and ABS plastic pipe in its various publications without doing sufficient independent testing on its own or reviewing and considering environmental examinations being prepared for these plastic pipe products by the HCD.

28. By failing to await a final determination under CEQA by HCD prior to adopting and disseminating the 1982 edition of the UPC and by listing such products in its research Directory, IAPMO has violated CEQA. Consumers and other members of the public in California may suffer serious, potential injury as a result of such action since the public's health may be adversely affected and significant costs may be incurred by consumer and other members of the public to replace the UPC-approved or UPC-listed types of plastic pipe if the EIR should conclude there are significant adverse environmental effects which cannot be mitigated. To prevent such unfair, unlawful, or fradulent business practices, an injunction should be issued pursuant to California Business and Professions Code section 17203.

## THIRD CAUSE OF ACTION

29. Plaintiffs reallege and incorporate by reference paragraphs 1 through 28, inclusive of the First and Second Causes of Action as though set forth at length herein.

30. In approving and listing PVC, PE, CPVC, and ABS plastic pipe components for various uses and allowing its seal to be affixed to such pipe, IAPMO negligently and without exercising ordinary care represents that such pipe is safe for the purpose for which it is intended, whereas such pipe has yet to be determined under California law to be safe, and in fact, HCD has found that substantial evidence of potential or actual adverse environmental effects exists and has determined an EIR is required, prior to a decision for use, if at all, in California, to determine the safety of using such pipe. IAPMO has ignored such information unreasonably in making its representations that such pipe is safe.

31. Relying on the UPC and seal affixed to such pipe with IAPMO's consent, and believing that the representations are true, contractors, plumbers, and the general public will install such pipe and local building inspectors will approve such pipe before the EIR is completed and reviewed and a determination regarding the safety of such pipe is made.

32. As a proximate result of IAPMO's negligence, consumers and other members of the public in California may be subject to harm. In order to prevent such harm, an injunction should be issued pursuant to California Business and Professions Code section 17203 as requested in the prayer below.

FOURTH CAUSE OF ACTION

33. Plaintiffs reallege and incorporate by reference paragraphs 1 through 32, inclusive of the First, Second, and Third Causes of Action as though set forth at length herein.

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34. Because IAPMO knows or should know that the UPC is relied upon and will be relied upon in the future by contractors, plumbers, architects, local building officials, and the general public as though it is the law in California prior to a decision by the appropriate state agencies, the course of conduct set forth above violates California Business and Professional Code section 17200 in the following respects:

a. It is an unfair business practice;

b. It constitutes a violation of section 17500 and thereby section 17200; and

c. It constitutes a violation of CEQA and thereby section 17200.

35. In order to prevent potential harm to consumers and other members of the public in California, an injunction should be issued pursuant to California Business and Professions Code section 17203 as set forth in the prayer below.

WHEREFORE, plaintiff CALIFORNIA DEPARTMENT OF CONSUMER AFFAIRS, and all other plaintiffs pray for judgment as follows:

1. For injunctive relief enjoining IAPMO from distributing any of its publications including but not limited to its UPC and research Directory without notice in at least 10 pt. bold type placed at such location in these publications where reference is made to CPVC, PVC, PB, and ABS plastic pipe to the effect that an Environmental Impact Report is now being prepared in California to determine whether the use of CPVC, PVC, PB, and ABS plastic pipe poses a danger to public health because of contamination of drinking water, unreasonable fire risk, and installer

exposure to toxic chemicals. Further, such notice should include a disclaimer that IAPMO has not tested such products for any of its chemical characteristics, fire properties, or installer risks. And, that the use of the IAPMO seal is permitted upon payment of a fee and demonstrates that such plastic pipe meets only manufacturer standards and is not tested for public health and safety standards. Lastly, that until such time that the EIR is completed by HCD and a final decision is made regarding the use of plastic pipe, its use remains generally impermissible in California.

DATED: September 30, 1982.

Respectfully submitted,

LEGAL SERVICES UNIT
DEPARTMENT OF CONSUMER AFFAIRS
DIVISION OF CONSUMER SERVICES

RICHARD A. ELBRECHT
Supervising Attorney

A. PAUL GRIEBEL
Litigation Coordinator

By: ______________________
ROGER DICKINSON
Attorneys for Plaintiff
RICHARD B. SPOHN, Director
CALIFORNIA DEPARTMENT OF
CONSUMER AFFAIRS

LEONARDINI & FATHY
A Professional Corporation

By: Richard G. Fathy
RICHARD G. FATHY
Attorney for Plaintiff
STATE BUILDING & CONSTRUCTION
TRADES COUNCIL OF CALIFORNIA,
AFL-CIO

Item #12

2 CIVIL No. 64671

# IN THE SUPREME COURT OF THE STATE OF CALIFORNIA

## IN BANK

SUPREME COURT
FILED
APR 1 1982
Clerk

SPOHN, AS DIRECTOR, ETC., ET AL.

v.

INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS, ETC., ET AL.

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Petition for hearing is granted. Cause and application for stay pending appeal are transferred to this Court. Pending final determination of the appeal herein, distribution within the state of the 1982 edition of the Uniform Plumbing Code is hereby enjoined, unless listings of the varieties of plastic pipe known as PB, PVC, and CPVC are omitted, or such listings are accompanied by a warning substantially in the form suggested by the Department of Consumer Affairs with respect to the possible toxicity of, and pending Environmental Impact Report concerning, such varieties of plastic pipe. The cause is re-transferred to the Court of Appeal, Second District, Division Four.

Bird
Chief Justice

Richardson
Justice

Newman
Justice

Justice

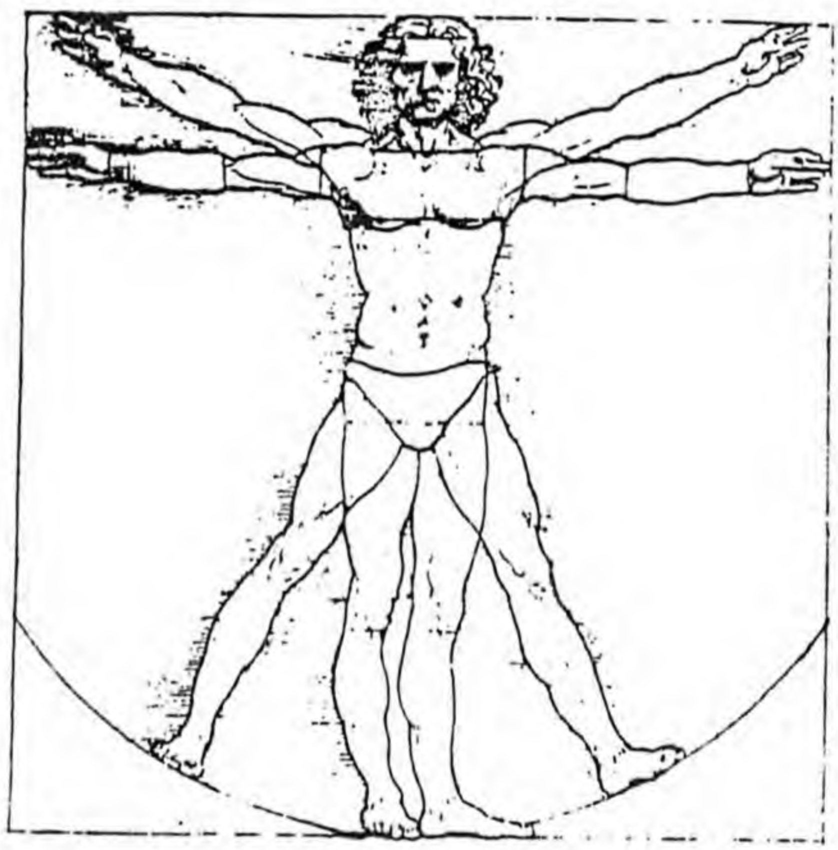
Justice

Justice

Justice

Item #13

# CLEAN YOUR ROOM!



## A COMPENDIUM
## ON
# INDOOR POLLUTION

DEPARTMENT OF CONSUMER AFFAIRS

# CLEAN YOUR ROOM!

A Compendium Describing a Wide Variety of Indoor Pollutants and Their Health Effects, and Containing Sage Advice to Both Householders and Statespersons in the Matter of Cleaning Up,

AND INCLUDING

A List of Experts Who Know What They're Talking About

AS WELL AS

A Consumer Clean-Up Kit

REPLETE WITH

A Body Chart

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EDMUND G. BROWN JR.
Governor

ALICE A. LYTLE, Secretary
State and Consumer Services Agency

RICHARD B. SPOHN, Director
Department of Consumer Affairs

Consumer Affairs

February 1982

Chapter III.N

# PLASTIC PIPE FOR POTABLE WATER

## 1. SUMMARY

The general topic of the quality of potable water is beyond the scope of this study. However, a new kind of piping is being introduced that raises questions about the quality of the potable water that it delivers. Recent tests suggest that such water may contain organic chemicals, principally plasticizers and solvents, most of which were introduced into the environment within the last generation. Several are known or suspected carcinogens. Plastic pipe represents a specific example of the generic way in which we are restructuring our indoor environment. Thus, a discussion of this topic belongs in our consideration of indoor environment quality. What, if any, government actions are called for is a timely challenge.

## 2. BACKGROUND

Residential plumbing contractors in certain parts of the country are beginning to utilize plastic pipe for potable water distribution. Polyvinyl chloride (PVC) plastic pipe is used from the property line to the house, and chlorinated polyvinyl chloride (CPVC) plastic pipe is used for potable water distribution within a residence. Each of these pipes requires a host of formulations called primers, degreasers and sealant cements which contain organic solvents (for installation). These formulations rely principally on four major solvents for their major constituents - methyl ethyl ketone (MEK), dimethylformamide (DMF), cyclohexanone (CH) and tetrahydrofuran (THF). Other chemicals are substituted from time to time, such as methyl butyl ketone. Government agencies have not yet examined the safety or purity of ingredients in these formulations.

Because of sporadic, unexplained symptomatology reported by some plumbers who install plastic pipe,* the California Health Services Department (DHS) conducted exhaustive bibliographic research on the toxicology of the solvents. Tentative association between symptoms and toxic effects on the liver and central nervous system (CNS) prompted concern. An article indicating that plastic pipe leaches its solvents into drinking water was uncovered.

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* The pipes are cut, usually at the construction site, and installed by way of primers and cements, through various configurations and joints. The joint per foot of pipe for CPVC (inside residences) averages 1 joint per 1-1/2 foot of pipe.

DHS was unable to find any further research on this subject. Because plastic pipe for potable water in California is in the initial stages of code approval by the State's Housing Commission and by one model code organization, and because of the potential for consumer exposure to toxic chemcials, DHS decided that more comprehensive research on the leaching phenomenon was necessary.

## 3. THE MONTGOMERY STUDY ON PVC & CPVC PLASTIC PIPE

DHS commissioned the Montgomery Testing Laboratory (MTL) to conduct the first government-authorized study to measure the amount of solvents that leached into drinking water from plastic pipe (2). These tests provided the first substantive evidence that certain plastic pipe for potable water systems may pose a health hazard for consumers.

Two exposure conditions were simulated in the study. The first, using static systems, simulated leaching in newly constructed plumbing systems (PVC and CPVC) in which water is allowed to remain stagnant for a period of time prior to the occupation of a new dwelling, or during any prolonged absence from a dwelling.

The second condition, simulating normal household usage, employed CPVC pipe. Hot and cold water were used for both sets of tests, as well as "good" and "poor" joints*and various types of water (3).

The precision of the analytic instruments was reduced by the high concentration of solvents found in the system. Also, the study design itself underestimated average joint per running foot of pipe. Thus, DHS estimated that laboratory values understated true exposure by as much as 50 percent.

### 3.A. TEST RESULTS

Results of the MTL tests were analyzed by DHS (4). Since none of the solvents had previously been found in potable water, DHS developed long-term and short-term exposure limits by reference to available literature, mostly based on industrial exposure. (Table I)

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* Care was taken to prevent any excess of primers and cements in the "good" joints. Normal installation procedures were used for "poor" joints.

TABLE I

California Department of Health Suggested Maximum Acceptable Concentration of Solvents in Potable Water (in ppm)

| | Long-term Exposure | Short-term Exposure |
|---|---|---|
| A. Methyl ethyl ketone (MEK) | 36 ppm | 360 ppm |
| B. Tetrahydrofuran (THF) | 36 ppm | 360 ppm |
| C. Cyclohexanone (CH) | 17 ppm | 170 ppm |
| D. Dimethylformamide (DMF) | 1.8 ppm | 3.6 ppm |

NOTE: Concentr[illegible]ion expressed in parts per billion are 1,[illegible] times these values.

Based on DHS [illegible]sure criteria, the combined concentrations of the major solvents came to within 75 and 80 percent of the suggested short-term maximum acceptable concentration (STMAC). Assuming a possible underestimation of 50 percent, the true values may actually be above the suggested STMAC. Both THF and DMF actually exceeded the short-term maximum acceptable concentration suggested by DHS (5).

According to data analysis by DHS, in "worst case" formulations (ingestion of powdered infant formula prepared with tap water), the suggest STMAC (18 ppm) is greatly exceeded by measured values -- as much as twenty-fold -- in the case of THF (375 ppm). DMF also exceeded the "worst case" suggested STMAC (0.2 ppm) by twenty-one fold (4.3 ppm). The DHS found this amount to suggest a "substantial potential hazard for infants in newly-plumbed, unflushed homes."*

While the carcinogenicity of DMF has not been sufficiently studied, the National Cancer Institute plans a three-year carcinogenicity test to assess the

* There has been considerable scientfic debate on the question of whether flushing newly plumbed systems decreases or increases the risk of exposures. Statistical evidence varies depending on the variables of elapsed time and dwell time, as well as the chemical's solubility or insolubility. Moreover, as discussed below, what may happen with the components of the formulations may be the reverse for volatile organics.

potential of DMF for producing cancer. Similar testing is planned by the National Institute for Occupational Safety and Health (NIOSH) on the toxicity of THF and CH.

III.B. HALOGENATED COMPOUNDS FOUND

In addition to solvents, the MTL data show that water that has been left standing for two weeks can accumulate over 100 ppb (the EPA standard) of the trihalogenated methanes. DHS hypothesized that these compounds may have come from the pipe itself and not from the solvent (See Table II).

Preliminary epidemiological studies prepared by the Environmental Protection Agency (EPA) for the Council on Environmental Quality (CEQ) have considerably strengthened the evidence linking elevated risks of cancer with chloroform, bromoform, dichlorobromomethane and dibromochloromethane (6,7,8). Moreover, EPA suggests a water quality criterion for total trihalomethanes in ambient water at zero (0). Because of technological and economic feasibility factors, however, the proposed criterion is set at 0.19 ppb. If this measurement is followed, the average total trihalomethanes (77.8 ppb) represents a 409-fold increase over the EPA suggested criterion. In one pipe test system, the amount of total trihalomethanes (152.7 ppb) represents a level equal to 803 times the suggested criterion. (see Figure I)

III.C. CARBON TETRACHLORIDE, TETRACHOLOROETHENE AND TRICHOLOROETHANE

Excessive levels of these chemicals were also found in the MTL data (see Table III). Because of the cancer risks associated with all of these chemicals, EPA suggests zero as the safe, i.e. non-threshold assumption level.

The EPA suggested water quality criterion under the Clean Water Act is 0.4 ppb for carbon tetrachloride (9), 0.8 ppb for tetrachloroethene (10) and 2.7 ppb for

TABLE II

FOUR VOLATILE HALOGENATED COMPOUNDS IN WATER (TWO WEEKS STATIC SAMPLES)

CONCENTRATED (ug/l) (ppb)[1]

| TEST SYSTEM | TEST VARIABLES | CHLOROFORM | DICHLORO-BROMOMETHANE | DIBROMO-CHLOROMETHANE | BROMOFORM | TOTAL TRI-HALOMETHANES* | |
|---|---|---|---|---|---|---|---|
| 1 | CPVC/Good/ Hot Pasadena | 92 | 3.0 | 2.4 | 0.7 | 98.1 | (31.5)++ |
| 2 | CPVC/Poor/ Hot Pasadena | 69 | 3.3 | 3.0 | 1.3 | 76.6 | (31.5)++ |
| 3 | CPVC/Good. Cold Pasadena | 78 | 3.5 | 2.9 | 0.9 | 85.3 | (32.6)++ |
| 4 | CPVC/Poor/ Cold Pasadena | 146 | 3.3 | 2.6 | 0.8 | 152.7 | (32.6)++ |
| 5 | PVC/Good/ State Project | 3.1 | 0.2 | 0.1 | ND | 3.4 | (0.1) ++ |
| 6 | PVC/Good/ Colorado River | 25 | 12 | 11 | 2.4 | 50.4 | (53) ++ |
| TOTAL (average) | | | | | | 77.83 | +++ |
| EPA/CALIFORNIA STANDARD | | | | | | 100 | |
| EPA SUGGESTED WATER QUALITY CRITERIA[2] | | 0.19 | | | | 0.19 | |

* Value represents a 1.5-fold increase over the EPA/California Standard and a 768-fold increase over the EPA Suggested Water Quality Criterion.

\++ Values in parentheses represent total of all four individually listed trihalomethanes from control samples, i.e. not passed through pipe system.

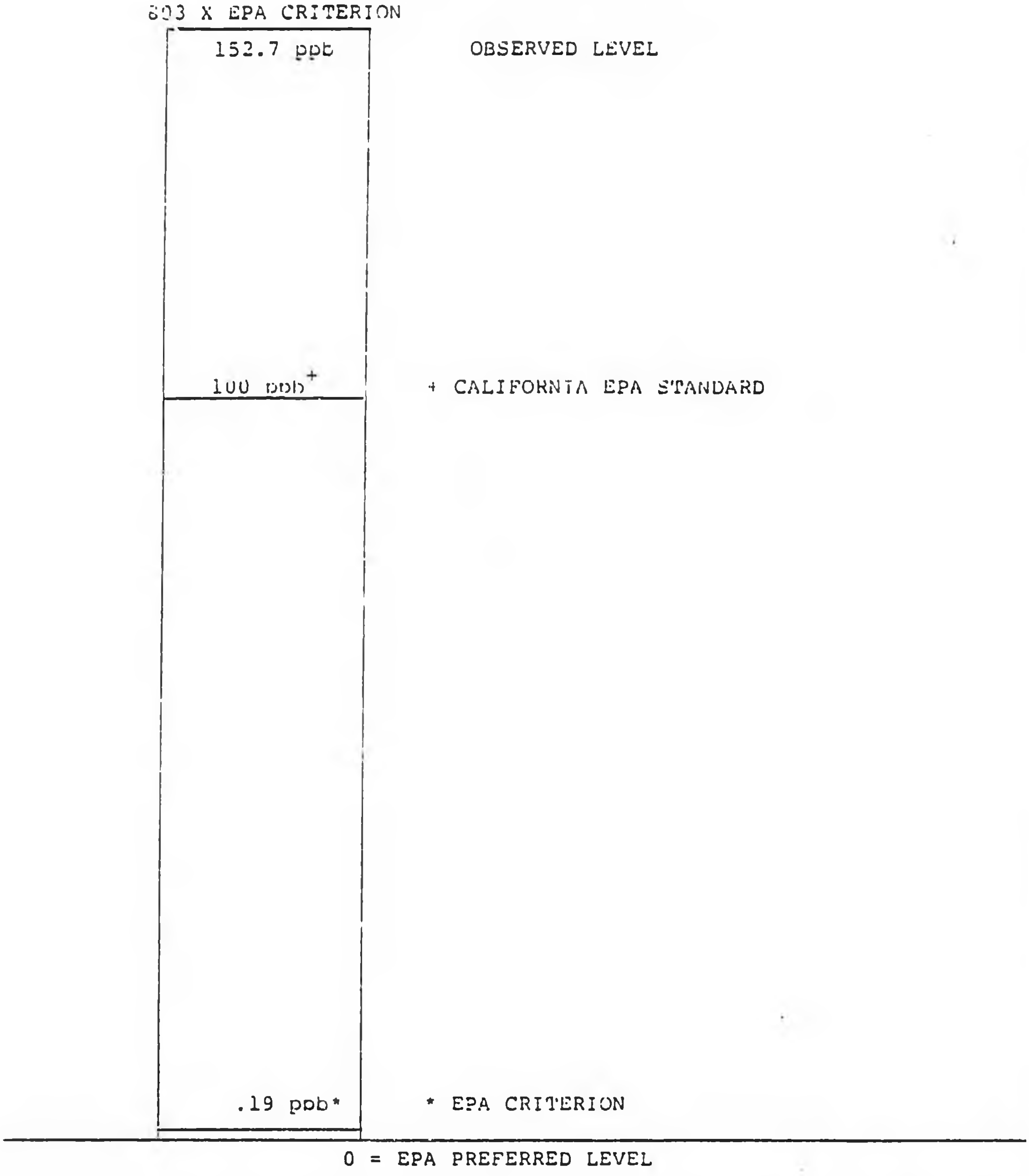
+++ The average total trihalomethanes (77.83) represents a 409-fold increase over the EPA Suggested Water Quality Criterion.

(1) All data in table are from Appendix XI, p.2 of DHS Report. Please see footnote 3 for an explanation of test systems 1-6. Figures shown in boxes exceed either the EPA/California Standard, EPA Suggested Water Quality Criterion, or both.

(2) EPA Suggest Water Quality Criterion, estimated at $10^{-6}$. This means that at the stated level of concentration, one person in a million would be expected to get cancer.

FIGURE J

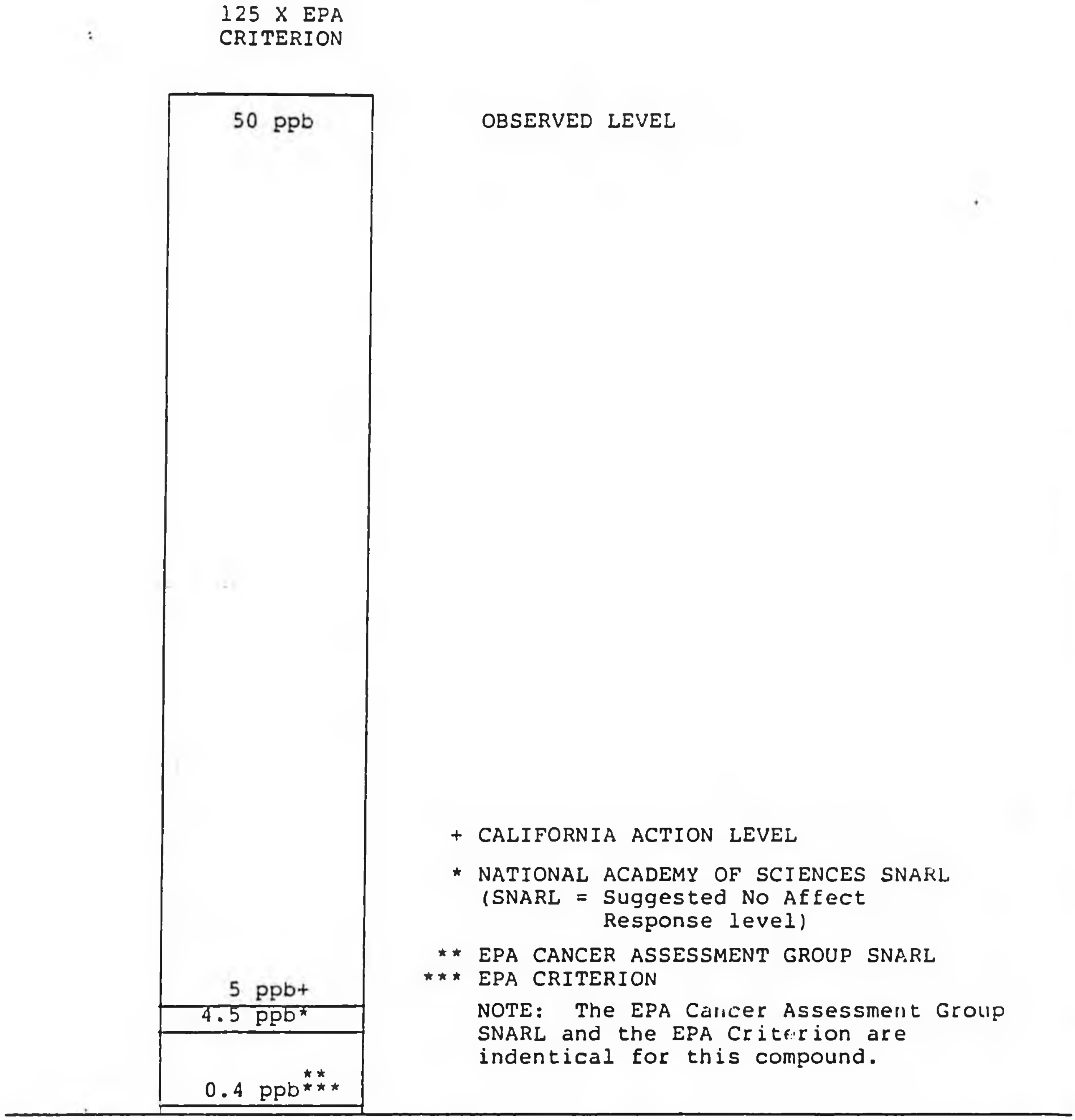
TOTAL TRIHALOMETHANES
(includes CHLOROFORM, DICHLOROBROMOMETHANE,
DIBROMOCHLOROMETHANE and BROMOFORM)




EPA SUGGESTED AMBIENT WATER CONCENTRATION SHOULD BE 0 FOR MAXIMUM PROTECTION OF HUMAN HEALTH.

FIGURE II. Test 4 Result

CARBON TETRACHLORIDE




0 = SAFE LEVEL
EPA SUGGESTED AMBIENT WATER CONCENTRATION SHOULD BE 0 FOR MAXIMUM PROTECTION OF HUMAN HEALTH

trichloroethene. The MTL data illustrates an increase as high as 125-fold over the EPA-suggested level for carbon tetrachloride (see Figure II), a 12-fold increase for tetrachloroethene (see Figure III), and in one test system, an excessive level of trichloroethene. (See Table III Test System 5). By California's own action level (5 ppb), the increase is 10-fold for carbon tetrachloride and over 2-fold for tetrachloroethene (see Figures II and III).

III.D. DI-(2-ETHYLHEXYL)PHTHALATE (DEHP)

Recent studies by EPA (11), partially relying on data from the National Cancer Institute, demonstrate the carcinogenicity of DEHP in animals. The EPA study suggests a risk assessment threshold of 3.8 ppb from DEHP-contaminated drinking water.* Although this suggested criterion does not yet have regulatory force, levels up to 246 ppb of DEHP were found in the state's tests 144 hours after filling a CPVC pipe segment. This represents a 64-fold increase over the EPA recommended criterion (see Figure IV). Moreover, preliminary evidence suggests that DEHP and dibutyl phthalate (also found in the MTL tests) migrate more slowly into water after days or weeks of pipe use. The migration is independent of whether the initial joint was "good" or "bad." This suggests an increased appearance of these compounds with time, perhaps due to the aging or fatiguing of the pipe.

III.E. POLYBUTYLENE (PB) TESTS

Polybutylene (PB) does not require solvent formulations for installation. Preliminary tests on this type of pipe were conducted for the same administrative proceeding of the California Housing Commission. The tests were not as comprehensive as the tests on PVC and CPVC. These initial tests were conducted on PB pipe itself, on the assumption that if a chemical were not in the pipe, it would not be found in the water. California Analytical Labs (C.A.L.) conducted two sets of tests on PB pipe. The first test reported 50-500 ppm (mg/kg) of DEHP and a similar amount of butylated hydroxy-toluene (BHT) in the pipe itself. The subsequent test by C.A.L. reported 20-30 ppm (mg/kg) of DEHP. The manufacturer of PB resin (used to manufacture the pipe) sponsored tests on PB pipe by Radian

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* Assuming a person consumes two liters of water per day with an average weight of 70 kg and 100 percent absorption, at a risk of 1 X 10-6.

## TABLE III

Three Volatile Halogenated Compounds in Water (Two Week Static Samples)
Concentration (µg/l) (ppb)

| TEST SYSTEM | TEST VARIABLES | CARBON TETRACHLORINE | TETRA-CHLORETHENE | TRI-CHLORETHENE |
|---|---|---|---|---|
| 1 | CPVC/Good/Hot Pasadena | 32 | 9.7 ++ | 0.7 |
| 2 | CPVC/Poor/Hot Pasadena | 21 | 5.4 | 0.3 |
| 3 | CPVC/Good/Cold Pasadena | 32 | 7.6 | 0.7 |
| 4 | CPVC/Poor/Cold Pasadena | 50 + | 7.5 | 0.7 |
| 5 | PVC/Good/State Project | 0.4 | 0.1 | 4.0 |
| 6 | PVC/Good/Colorado River | 0.5 | 0.1 | 1.1 |
| CALIFORNIA ACTION LEVEL | | 5.0 | 4.0 | 4.0 |
| EPA SUGGESTED WATER QUALITY CRITERIA | | 0.4 | 0.8 | 2.7 |

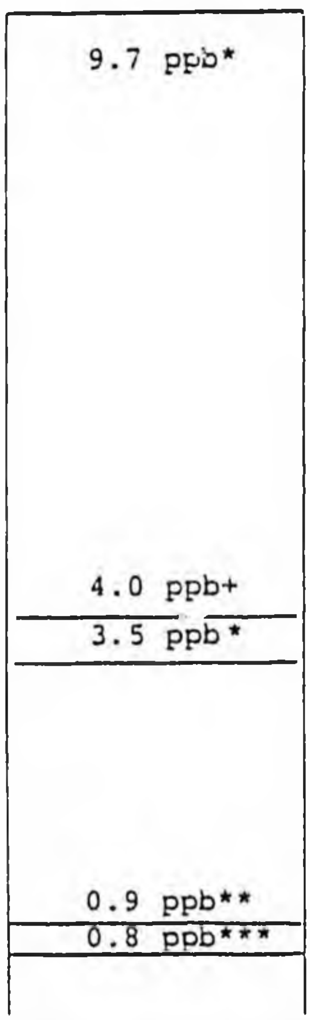
\+ Value represents a ten-fold increase over the California Action Level and 125-fold increase over the EPA Suggested Water Quality Criterion.

++ Value represents a 2-fold increase over the California Action Level and a 12-fold increase over the EPA Suggested Water Quality Criterion.

Note: See reference for decription of test systems. Tests 1-4 were on CPVC, while 5 and 6 were for PVC pipe. Other difference tested were joints and water sources. Figures shown in boxes exceed either the EPA Criterion or the California Action Level.

FIGURE III. Test 1 Result

TETRACHLOROETHENE




* 12 x EPA CRITERION

\+ CALIFORNIA ACTION LEVEL

* NATIONAL ACADEMY OF SCIENCES SNARL
(SNARL = Suggested No Affect
Response Level)

** EPA CANCER ASSESSMENT GROUP SNARL

*** EPA CRITERION

0 = SAFE LEVEL

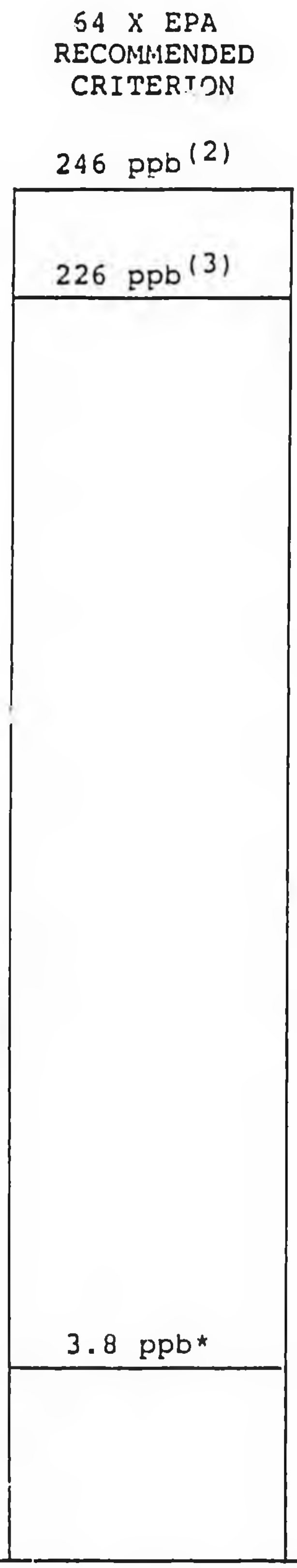
EPA SUGGESTED AMBIENT WATER CONCENTRATION SHOULD BE 0 FOR MAXIMUM PROTECTIO
OF HUMAN HEALTH

## FIGURE IV

Di-(2-ethylhexyl)phthalate (DEHP)

VOLATILE COMPOUND LEVELS FOUND IN TWO STATIC SAMPLES

CONCENTRATION (µg/1) (ppb) (1)




* EPA SUGGESTED SAFETY LEVEL ESTIMATED AT 1 X $10^{-6}$

(1) Data from Table 3-11 of the Montgomery Study entitled: "Concentration of Volatile Organic and Base Neutral and Acid Extractible Compounds in the Static CPVC/Poor Joints/ Cold Water System." (See Footnote 2.)

(2) Data derived from 144-hour sample time with 24-hour dwell time.

(3) Data derived from 48-hour sample time with 24-hour dwell time.

Laboratories of Sacramento, California and Austin, Texas. These tests stand in stark contrast to tests by C.A.L. Radian's tests reported negligible levels (1 ppm) of DEHP in extracts of PB pipe. Radian also reported the presence of alkylbenzene sulfonate (13). This chemical and BHT (12) are commonly used antioxidants and are currently receiving increased toxicological attention for possible consumer hazards. Simultaneous analysis of samples by both lab groups has not been done. The controversy is unresolved. However, testing of PB pipe in a manner similar to the comprehensive tests on PVC and CPVC will be conducted in the near future under the authority of the California Department of Housing.

## 4. CONCLUSIONS

Recent tests in California on plastic pipe are the first comprehensive tests run by any government agency. These tests provide a valuable beginning for a complete understanding of the leaching of certain chemicals, some of them known carcinogens, into drinking water from these pipes. Until such time as rigorous investigations are completed, consumers should know that newly installed plastic pipe or water left standing in plastic pipe may well present a potentially serious health hazard.*

Test Results Indicate:

1. A 20-fold increase of THF over the suggested short-term maximum acceptable concentration in "worst case" formulations.

2. A 21-fold increase of DMF over the suggested short-term maximum acceptable concentration in "worst case" formulations.

3. Because of the toxicity of DMF, the California Health Services Department found a substantial potential health hazard for infants in newly plumbed, unflushed homes.

4. Trihalogenated methanes exceeded the EPA action level (100 ppb) in water that has been left standing

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* The DHS has determined elsewhere that metals from iron or copper pipes are unlikely to pose a human health problem in California residences (14). However, since the report on iron or copper pipes is not a parallel study to this plastic pipe analysis, direct comparisons cannot be made.

for two weeks. Average levels exceed suggested EPA criterion for ambient water by 409-fold and in one instance by 803-fold.

5. Carbon tetrachloride and tetrachloroethene, both suspected human carcinogens, exceeded the EPA suggested criteria by 125-fold and 12-fold, respectively.

6. DEHP, a known animal carcinogen, exceeded the EPA suggested action level by 64-fold.

7. All the reported levels in the Montgomery tests may well have been underestimated by 50 percent because of the concentration of chemicals in the testing equipment and because the test system's pipe configuration did not fully reflect average joint per running foot of pipe.

8. Two tests on polybutylene pipe for potable water systems by C.A.L. reported DEHP in the pipe in varying amounts, in one test up to 500 ppm (mg/kg). Radian Labs reported negligible amounts of DEHP in four (4) tests. The California Department of Housing will conduct further, more comprehensive tests in the near future.

9. Polybutylene pipe appears to contain butylated hydroxy-toluene (BHT) and alkylbenzene sulfonate. Recent toxicological studies raise the question of possible toxic effects of long term ingestion of these compounds.

## LIST OF WORKS CONSULTED

1. Wang, T.C., and Bricker, J.L.. "2-Butanone and Tetrahydrofuran contamination in the water supply." Bull. Environ. Contam. Toxicol. 23, 620-623 (1979).

2. James M. Montgomery, Consulting Engineers, Inc.: "Solvent Leaching From Potable Water Plastic Pipes." Final Report of the Hazard Alert System, California Department of Health Services/Department of Industrial Relations. October 1980.

3. The following information outlines the specific differences between the variables included in the six Montgomery test systems mentioned in the text and incorporated into the accompanying tables and charts. Each system is described by pipe system, joint and water source:

| | |
|---|---|
| Test System 1: | CPVC/Good/Hot Pasadena |
| Test System 2: | CPVC/Poor/Hot Pasadena |
| Test System 3: | CPVC/Good/Cold Pasadena |
| Test System 4: | CPVC/Poor/Cold Pasadena |
| Test System 5: | PVC/Good/State Project |
| Test System 6: | PVC/Good/Colorado River |

4. "Final Report on Potential Health Hazards Associated With the Use of Plastic Pipe in Potable Water Systems." Hazard Evaluation System and Information Service, Department of Health Services/Department of Industrial Relations. October 17, 1980.

5. Throughout the tables and charts of this chapter, reference is made to "standards," "maximum acceptable levels," "action levels," "suggested water quality criterion," "suggested no-affect response levels" (SNARLS) and "suggested maximum acceptable concentrations" (STMAC). All of these measurements are helpful to a greater understanding of the relative toxicity and potential carcinogenicity of the chemicals in question. They have varying degrees of legal relevance and scientific usefulness.

Only "standards" have binding legal, i.e. mandatory effect. These standards are sometimes called "action levels" or "maximum acceptable levels." The others are suggestive scientific measurements, many times made as "recommendations" for a standard-setting proceeding. It is critical to note that "standards" (and its synonyms) are a combination of recommended scientific levels for safety and economic feasibility factors that are based on the status of current technological equipment. In short, "water quality criteria" and "SNARLS" are the most specific scientific measurement as it relates directly to health and safety for people who drink the water.

Further, "criteria" developed by EPA under the Clean Water Act are normally relevant to ambient water, not tap water. However, if chemicals found in ambient water, e.g. streams, ground water, etc., are not affected by water treatment or may enter potable water systems after treatment, these "criteria" are highly relevant to safety considerations for the consuming public.

Lastly, "criteria" and "SNARLS," whether developed by the National Academy of Science or EPA's Cancer Assessment Group, are usually not aimed at the greatest risk portion of the population, i.e. young children and pregnant women. Rather, they are geared to a general adult population base. As a result, the author has chosen these criteria and SNARLS at a risk level for cancer at 1 X 10-6. In the words of EPA, "the ambient water concentration should be zero based on the non-threshold assumption for (these) chemicals."

Comprehensive public policy assessment of safety factors for drinking water as it affects human health should take all of the above into consideration.


6. "Contamination of Ground water by Toxic Organic Chemicals." Council on Environmental Quality. January 1981.

7. "Drinking Water and Cancer." Review of Recent Findings and Assessment of Risks." Prepared by Science Research Systems, Inc., for the Council on Environmental Quality. December 1980.

8. "Ambient Water Quality Criteria for Halomethanes.," U.S.E.P.A. 440/5-80-051.

9. "Ambient Water Quality Criteria for Carbon Tetrachloride." U.S.E.P.A. 440/5-80-026, October 1980.

10. "Ambient Water Quality Criteria for Tetrachloroethene." U.S.E.P.A. 440/5-80-026, October 1980.

11. "Priority Review Level 1-Di-(2-ethylhexyl)phthalate (DEHP)." Office of Toxic Substances, U.S.E.P.A. November 28, 1980.

12. Vorness, C.V., et al.: "Developmental neurobehavioral toxicity of butylated hydroxytoluene in rats." Food Cosmet. Toxicol. 19, 153-162 (1981).

13. Pigott, G.H., and Ishmael, J. "A comparison between in vitro toxicity of PVC powders and their tissue reaction in in vivo." Ann. Occup. Hyg. 22, 111-119 (1979)

14. DHS Report, op. cit. p. 37 (footnote).

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# PLASTIC PIPE - PROBLEMS OR PERFORMANCE?

By

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A paper presented on October 30, 1981, at the Fall Conference of the California-Nevada Section, AWWA, Palm Springs, California.

This paper provides an update on the experience of the East Bay Municipal Utility District in its use of plastic pipe.

About fifteen years ago the District standardized on plastic pipe for all small services two inch and under in size. Also from that time until the present numerous plastic pipe main installations were made.

The performance of the plastic pipe and some of the problems encountered during this period are detailed.

The use of plastic pipe by some water utilities in the United States dates back approximately 30 years. Some of the early materials* experimented with as substitutes for metal pipe included PVC, ABS, CAB, and polyethylene. Some of these test installations failed immediately; however, others showed promise and over the years with improved technology these plastics became the ones that are in general use within the industry today.

The East Bay Municipal Utility District has been installing plastic pipe since 1951 on a nearly continuous basis. Early District installations included CAB, ABS and linear polyethylene. The use of CAB was discontinued relatively soon because of many failures, and the District's experience with this material was repeated at other utilities.

A number of ABS and about 1,000 linear polyethylene services were installed with few failures. By 1966 all of the ABS and most of the PE were still in service, and this is still the case today. Lower cost and ease of handling resulted in a preference for PE over ABS.

## Plastic Services

About 16 years ago a decision was made to use high molecular weight polyethylene pipe for all 3/4" and 1" services, and PVC pipe for all 1-1/2" and 2" services. At that time the use of these materials resulted in a savings in material costs of about 60 percent.

*PVC - Polyvinylchloride
ABS - Acrylonitrile-Butadiene-Styrene
CAB - Cellulose-Acetate-Butyrate

A difficulty encountered in the use of polyethylene involved heating the material in order to make a proper flare. Heat was applied by a torch and in the hands of an inexperienced worker control of the required amount of heat was difficult. Improvements were soon made to polyethylene pipe so that it could be cold flared, but by this time polybutylene pipe was on the market and the District finally settled on the types of plastic service pipe that are presently in use. These consist of polyethylene and polybutylene, specifications allowing for bidding of either. Polybutylene is now the predominant pipe used by the District because of its lower cost. This is due primarily to the greater strength of polybutylene, allowing thinner wall construction and consequently a smaller amount of material used.

The District now uses 1" polybutylene pipe for 5/8", 3/4" and 1" metered services. Class 315 polyvinylchloride pipe is used for 1-1/2" and 2" services. All services 3" and larger are installed using welded steel plastic coated and mortar lined pipe. At this date the District has installed nearly 60,000 polybutylene and polyethylene services and 3,000 PVC services. The 1" polybutylene service pipe is installed with a flare connection at the corporation stop and a flare connection at the angle stop at the meter. Normally no joints are allowed between these two flares. The PVC pipe is installed utilizing solvent weld fittings. Both of these materials are easily pushed through bore holes made under streets much like the way metal pipe had been installed. PVC being rigid pipe requires ells for the riser to the meter behind the curb.

The District's experience with both these materials in the past sixteen years has been excellent. There have been no greater installation or maintenance problems than occurred in using metal pipe, and obviously no problems caused by corrosion. Good installation practices are required when installing plastic pipe, as with any pipe. If a Utility has good installation procedures, then these will be carried over in plastic pipe installations and many problems others have encountered can be avoided.

For many years, because of code requirements and ease of compaction, this District has imported backfill material almost exclusively for its excavations throughout the cities and the two counties in which it performs its work. This use of imported backfill involving sand, screenings, or crusher run help satisfy the requirement for proper backfill material around the plastic pipe. The District's practice of making taps at or near the springline of the pipe minimizes the bend in the plastic tubing and helps to get it quickly down to the bottom of the trench for proper support. In the case of rigid PVC pipe, adequate and proper blocking and bedding for the entire length of the pipe is essential for good performance. A practice developed is to support the pipe on blocks while making it up in the trench and then compacting fill material around the blocking using tampers, finally tamping in backfill under and alongside the entire pipe length.

Making a good solvent weld joint on the PVC pipe requires some care and experience, particularly involving the required amount of solvent used and the proper setting time before the pipe and fittings are moved or the water turned on. Good installation procedure by the crew foreman allows making up all possible joints above ground before trench installation.

At the present time comparative material costs for 1" copper pipe versus 1" polybutylene pipe for an average 25' long service are approximately $31.25 versus $3.85. There is very little cost differential in the fittings required for either polybutylene or PVC services versus copper services.

Plastic Main Installations

With a few exceptions, the District's experience in plastic main installations has been exclusively with PVC pipe, belled end or utilizing couplings. At this date 15 miles have been installed and future considerations are to increase the amount of this pipe and decrease the amount of asbestos cement pipe.

The recent controversy that occurred over the possible danger of ingesting asbestos fibers in drinking water has caused this District to have other alternatives in nonmetallic pipe besides asbestos cement. Presently the District's distribution system is roughly composed of one-third old grey cast iron pipe, one-third asbestos cement pipe of which some of the earliest was laid in 1937, and one-third welded steel pipe, concrete mortar lined and coated and more recently plastic coated. Only welded steel pipe is used for mains 12" or larger. 4", 6" and 8" main pipe installations until recently have been asbestos cement pipe. The PVC pipe that has been installed has been in these smaller sizes. Good installation, bedding and backfill practices are required for plastic main pipe just as they are for asbestos cement pipe. Care must be taken in backfilling PVC pipe since strength of the pipe is dependent on properly compacted backfill along the sides of the pipe. Historically, the District has always direct tapped its main pipe, with the exception of welded steel pipe. Manufacturers' recommendations are followed where the size of the tap hole requires a service clamp or saddle. No. 12 insulated solid copper wire is used as a tracer wire and installed with all plastic mains and services.

As noted before, taps are made at the springline of the pipe and this serves two purposes: (1) it prevents the service piping from extending to a higher elevation than the main pipe where it would be endangered during street reconstruction and (2) it reduces the degree of bend required to bring the pipe down to the bottom of the trench and minimizes settlement during the backfilling process. The District's practice in tapping PVC main pipe is to use a standard tapping drill in which the drill portion has been replaced by a shell cutter of the proper size so that a coupon may be removed from the PVC pipe during the drilling operation. The District's corporation stops have iron pipe threads and this required in-house modification of tapping drills since only AWWA thread were available on the market. The use of iron pipe thread versus AWWA thread has not been detrimental based on the District's experience, though not recommended by manufacturers. For services too large for direct tapping, a stainless steel single bolt service clamp with a rubber ring gasket is used. Manufacturers' recommendations are followed when tapping under pressure in that a blanket made of rubberized fabric is used over the pipe to minimize any danger from possible shattering of the pipe during the tapping operation. The District has not experienced this type of failure during tapping operations; however, it has been known to occur, generally due to the pipe being exposed to sunlight for a long period of time. Good installation practice involving proper handling and storage of PVC pipe should minimize any dangers of this type.

Presently the cost of PVC pipe is a little more than asbestos cement pipe and considerably less than either ductile iron or steel pipe. The actual costs of District installed PVC mains have been steadily dropping until now the costs of installation are approximately equal to that of asbestos cement pipe. One reason for this could be attributed to the fact that 8" AC pipe requires equipment for laying whereas the PVC pipe can be laid by hand due to the lighter weight. Field crews prefer to lay PVC pipe over asbestos cement pipe, because of the longer laying length (20 feet) and the fact that the pipe is able to bend in long radius turns which occur frequently on jobs in suburban areas.

An important reason for gaining experience in installing PVC pipe is to have an alternative in the event of increasing public resistance to asbestos cement pipe which the District has already experienced to some degree. Another reason is the expectation of fewer circumferential or shear breaks in PVC pipe than this District has experienced over the past number of years in asbestos cement pipe. Longevity of PVC pipe has been fairly well proven based on the use of the pipe in Germany in installations made during and at the end of the war.

Problems Encountered

This District, like many other agencies, has not been without its share of problems over the years in its experimentation and standardization of plastic main and service piping. When failures occurred, the reasons were sought and in the majority of cases were due to faulty installation practices. These practices could be corrected.

Where there were instances of product failure, going back to the manufacturer and working out the problems, or seeking out manufacturers with better quality control and utilizing them as suppliers was done.

One of the first problems encountered a few years ago, and not recognized until it had occurred several times, was petroleum product penetration of the pipe wall of polyethylene or polybutylene service piping. This first occurred on a service installed to a chemical company in which the ground appeared to be saturated by chemicals produced or used by the company over a long period of time. The report of a taste and odor in the water from the newly installed service caused the superintendent to believe in this case that the service pipe had picked up some dirt during the installation process and he promptly replaced the service with copper. Subsequently, several other complaints came in over a period of time of a strong gasoline taste and odor in the water, generally at a residence. The writer personally observed this in one of the early occurrences, a residence in the Castro Valley area on a relatively steep street. The odor of gasoline in the water drawn from the kitchen faucet was extremely strong, and identified as originating in the service or main. The service was immediately replaced by copper and during the process close observation was made of the street excavation to determine what caused the problem. The backfill material around the plastic pipe, in this case polybutylene, was a crusher run material which was saturated with water containing petroleum or gasoline. The source of the gasoline or petroleum distillate causing the odor in the backfill material could not readily be determined; however, it was eventually traced to the cleaning of motorcycles on the driveway where the drainage entered the meter box and apparently saturated the backfill material around the pipe. What seemed very improbable was the ability of the plastic pipe to absorb the petroleum distillate through its wall.

Testing soon took place in the District's Water Quality Laboratory in a controlled environment in which ultra-high molecular weight polyethylene, polybutylene, and PVC pipe were tested. The tests consisted of filling a length of each pipe with water. The pipe was then capped at both ends and immersed in a vermiculite that had been saturated with a mixture of water and gasoline. A second test involved the same procedure but the water in the pipe was put under 40 pounds per square inch pressure. In one week's time, samples were taken and analyzed using gas chromatography. Gasoline-related peaks from the chromatograph were found in the samples exposed to the vermiculite-petroleum distillate surrounding material. In three weeks' time, a strong odor of gasoline was detected in the water inside the pipe. This occurred in both the polybutylene and the polyethylene. In the case of the polyvinylchloride after approximately one month of exposure, no gasoline-related peaks were found by the analysis nor was there any odor in the water inside the pipe. Control samples were run in all cases and no peaks corresponding to gasoline or odor were present in any of the control samples. Up to the present time there have been about a dozen incidents in which the District has had to replace plastic services with copper where there have been complaints of gasoline or petroleum distillate taste and odor problems. Our standard drawings for service installations have been modified to indicate that if, in the judgment of the installing foreman, copper pipe should be used because of the possibility of contamination in the backfill by petroleum products that this be done. Based on the District's experience, problems with polyethylene or polybutylene picking up gasoline taste and odor can possibly occur in installations near underground gasoline storage tanks or in hill areas where automobile gas tanks overflow. Several instances of this type were recorded where gasoline leaking from cars parked on hills eroded the asphalt concrete pavement and soaked up the ground directly over a water service.

Another instance occurred in which a water system inspector reported a consumer's water as having a strong petroleum taste and odor and the service was renewed to copper. During the renewal it was found that the polybutylene service pipe was resting directly under and in contact with a small polyethylene natural gas service pipe to the same house. It appeared that the inspector had possibly mistaken the taste and odor problem as being gasoline related when it was actually caused by the odor producing butyl mercaptan component of the natural gas. A similar test was performed on polybutylene tubing in which the pipe was filled with water, the ends capped and the pipe surrounded by vermiculite saturated with butyl mercaptan. Three samples were drawn from the tubing, one after 14 days, one after a month, and then a higher concentration of butyl mercaptan was introduced and a third sample was drawn after 7 days of contact with the higher concentrate. The first sample of two weeks' duration showed no odor. The second sample after a month showed a very slight stagnant odor when heated to 106°C. Sample three, however, in seven days' time indicated a very strong butyl mercaptan odor with material floating in the sample. It appeared that the mercaptan was able to penetrate the walls of the polyethylene gas service and then penetrate the polybutylene service pipe wall. The tests led to some conclusions, certainly that it is desirable not to install plastic services where there is a possibility of petroleum distillate or gasoline being present in the ground. Additionally, it would seem good practice for any number of other reasons not to have plastic water service pipe in direct contact with a gas service. The subject of absorption of material through the walls of plastic tubing probably deserves a more detailed testing than was done at the District. The few incidents that have been reported compared to the number of services installed is not cause for alarm.

Another problem encountered some years ago was pinholing of the plastic tubing. Several hundred services were installed in a large tract using linear polyethylene blue-colored tubing. Over a period of several years many of these services had to be replaced. The cause of the problem could be laid to the manufacturer and secondarily to the deficiencies in the linear polyethylene pipe. Subsequent to these installations, the District changed to ultra-high molecular polyethylene and later polybutylene and no further pinholing developed. Some instances of pinholing have been attributed to sharp rock backfill material penetrating the plastic, but this did not seem to be the case here since there was no change in the backfill material.

A lesser problem did develop during one period when polybutylene pipe first came out color coded blue for water. The District changed to this blue pipe in place of the black pipe that it had previously used. After a period of time it became evident that some pinholing and splitting was occurring in the blue polybutylene pipe. This was finally attributed to the fact that in many of the tract installations in this District the polybutylene service was installed prior to the curb and gutter, and several feet of pipe are brought up behind the line of the proposed curb and gutter, tied to a stake, and blocked off with an angle stop. Depending on the schedule of the developer, many of these services would remain in this condition for several months or up to a year before they were finally cut back and placed inside a meter box. It was determined that the lack of carbon black in the blue polybutylene made it more vulnerable to decomposition when exposed to sunlight for this length of time and that the failure was caused from this exposure. Based on this, the District switched back to black service piping and the problem disappeared.

Pipe ballooning or bursts have not been experienced since the District has standardized on polyethylene and polybutylene piping. There have been a few infrequent occurrences of flares pulling out. Most of these could be attributed to the lack of proper workmanship.

Some initial start-up problems were experienced when the District standardized on 1-1/2" and 2" PVC services. These generally involved improper blocking and consolidation of backfill material under and around the pipe. At the beginning some experience was required by the crews in learning how to solvent weld and wait for the prescribed period of time before the pipe was moved or pressure introduced. During a short period several years ago a number of failures of the 1-1/2" and 2" PVC were experienced in which the pipe split. The District's average distribution system pressure is around 80 to 90 pounds per square inch and often services are installed where the pressure exceeds 100 psi. Initially, Class 160 PVC pipe was used for the service piping. After experiencing some failures, the District changed to Class 315 PVC and no further failures of this type have occurred.

Brief mention should be made of a problem involving polybutylene pipe that arose earlier this year when a controversy developed based on a report that water from polybutylene piping contained the chemical DEHP. This compound has been linked to cancer and also is alleged to be linked to a cause of sterility. The District's Water Quality Supervisor immediately had samples taken from two typical in-service plastic services, including both polybutylene and polyethylene pipe. In addition, samples were collected from plastic pipe services that had lain dormant for a considerable period of time. The samples were tested by the State Department of Health Services Sanitation Radiation Lab and by an independent research laboratory. The results of the tests were that no DEHP was found in any of the samples.

Summary

Almost without exception this District has used plastic pipe in all of its small services, 2" and under, for the past 16 years. Additionally, there has been an increase in the use of plastic pipe for distribution mains so that it is not uncommon to have plastic pipe carrying water through the mains and service piping to the consumer's plastic house line. The performance of this material during this period has been excellent. There have been the usual problems associated with poor installation practice and the problems associated with learning how to use any new material. Some problems have been caused by faulty manufacturing processes and a lack of good quality control in the manufacturing process. If anything can be gained from the District's experience, it is the necessity for proper training in initially using a new type of product, and good communications so that the field forces know what is to be expected of the product and how it is to be used to get maximum performance. Proper installation practices must be stressed, and they are just as important to plastic pipe as they are when installing other types of materials. When failures can be attributed to faulty material, a thorough investigation should be initiated immediately to determine the cause of the problem and to get immediate correction. Utilizing suppliers that have a proven record of success in plastic piping in the waterworks industry is one good method of minimizing the problem of faulty material.

Plastic pipe is certainly cost effective, especially in the small sizes used for service piping. Substantial savings are available in the purchase price alone. Additional cost savings are available due to the ease of installation of plastic pipe. Plastic pipe available for main installation is rapidly becoming cost competitive with asbestos cement pipe and is priced well below other pipe available. The District undoubtedly will continue to increase its use in this area in the future, not only to control costs but also because of the ease of installation and to develop experience. Some test installations are now underway using fiberglass wrapped PVC pipe. This material, although slightly more expensive than PVC or AC pipe, has the advantage of being extremely lightweight. 12" diameter pipe can be laid by hand and this in itself may prove the pipe to be competitive. Evaluation of these installations and of future installations as new materials come on the market will allow the District to keep abreast of the state of the art and provide a flexibility so that changing from one material to another in instances where this is required will not prove to be a great problem. Based on past experience, no one can predict when a certain material will suddenly become hazardous or unavailable and require the water utility to quickly adapt to new situations.

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ALASKA STATE LEGISLATURE
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January 27, 1984

MEMORANDUM

TO: Representative John Cowdery, Chairman
House Labor and Commerce Committee

FROM: Susan Brody, Director SEB

RE: Adoption of Uniform Plumbing Code, 1982 Version
Research Request 84-18

Ken Johnson of your staff requested information about adoption of the 1982 version of the Uniform Plumbing Code. Specifically, he asked us to survey selected municipalities in the state to find out if they had adopted the 1982 version of the code, with or without amendments. He was particularly interested in sections 4,5 and 10 of the code. Ken also asked us to find out which other western states have adopted the 1982 version of the code.

Adoption of the Code in Alaska

Within the time available to complete this request, we were able to survey the following seven municipalities: Anchorage, Bethel, Fairbanks, Juneau, Kenai, Ketchikan and Sitka. Our findings are summarized below.

Anchorage has adopted the 1982 version of the Uniform Plumbing Code. However, a number of amendments were made when it was adopted, including changes to the following sections: 401(a), 503(a), 506(b), 506(f), 1003(k), 1004(a), 1004(e), and 1007(e). In addition, two new sections were added--1010 and 1011. Some of the sections noted above deal specifically with the use of ABS, PVC and PB pipe.

Bethel has not adopted the Uniform Plumbing Code. According to planning director Tony Stigall, the city has a study underway currently to consider the possible adoption of a number of codes, including the plumbing code.

Fairbanks is currently in the process of adopting the 1982 version of the code; a hearing is scheduled before the city council in February. Amendments are being considered to sections 1002(d), 1004(a), 1007(e) and 1008(e).

Juneau has adopted the 1982 version of the Uniform Plumbing Code with amendments to the following provisions in sections 4,5 and 10: 401(a), 506(a), 506(c), 506(f), 1004(a), and 1007(e). See Attachment A for a copy of Juneau's amendments.

Kenai adopted the 1982 version of the Uniform Plumbing Code in March of 1983; apparently no changes were made to sections 4,5 and 10.

Ketchikan has not yet adopted the 1982 version of the code. According to Steve Elenberger, the building inspector, the city is waiting for the State to adopt the 1982 version before they proceed with adoption.

Sitka has adopted the 1982 version of the code. The code was adopted in its entirety with no amendments.

Adoption of the Code in Other Western States

I was not able to obtain a comprehensive listing of all other states which have adopted the 1982 version of the Uniform Plumbing Code. I called a number of sources which only had incomplete or out-of-date information. However, Tom Higham with the International Association of Plumbing and Mechanical Officials, informed me that, to the best of his knowledge, the following western states have adopted the 1982 version: California, Colorado, Hawaii, Idaho, Montana, New Mexico and Utah. He also mentioned that Oregon is currently in the process of adopting the code.

Mr. Higham pointed out that not all states choose to adopt the Uniform Plumbing Code at the state level. Instead, they leave adoption to local county and city governments. For example, Arizona and Wyoming are two western states which take this approach.

* * * * *

I am sorry I was unable to provide more complete information. I hope this information is useful to the committee.

Attachment A
City of Juneau, Uniform Plumbing Code Amendments.



this section, subject only to the following enumerated additions, deletions and changes:

(1) Delete Section 103.

(2) Delete Chapters 2, 5 and 6.

(3) Delete Section 910.

19.11.010 PLUMBING CODE ADOPTED AMENDMENTS AND DELETIONS.

For the purpose of regulating the erection, construction, reconstruction, addition, enlargement, conversion, equipment, use and maintenance of all plumbing within and without all buildings and structures or portions thereof within the city and borough, there is adopted by reference as the Plumbing Code of the city and borough, that certain compilation of rules and regulations prepared and published by the International Association of Plumbing and Mechanical Officials, a nationally recognized technical trade organization, which compilation is entitled "Uniform Plumbing Code, 1982 Edition," and five copies each of which have been filed in the office of the clerk of the city and borough or at such places as designated by the clerk, for public use, inspection and examination and which compilation is made a part of this chapter as if fully set forth in this section, subject only to the following enumerated additions, deletions and changes:

(1) Delete Sections 10.1 through 10.4; 10.5(b); 20.1 through 20.3; 20.4(b) and (c); 20.6 through 20.14; and 1303.

(2) In Section 310, add a new subsection (h) reading as follows:

"(h) Galvanized or black steel pipe shall not be used for soil pipe."

(3) In Section 401(a), add new exceptions 3 and 4 reading as follows:

"3. ABS and PVC shall not be used underground where it passes underneath within one (1) foot of building walls or footings unless adequately sleeved with cast iron or ductile iron to a point two (2) feet on each side of the wall or footing.

4. ABS and PVC shall not be used underground where it passes through building walls or footings unles it passes through an opening with a minimum of a two-inch annular space around the pipe which space shall be filled with a waterproof material which will permit the pipe to move within the space without damage."

(4) In Section 506(a) change the phrase "six (6) inches (152.4 mm)" to read "one (1) foot (.3 m)".

(5) In Section 506(c) change the phrase "six (6) inches (152.4 mm)" to read "one (1) foot (.3 m)".

(6) In Section 506, delete the existing subsection (f) and substitute a new subsection (f) reading as follows:

"(f) Vents through the roof shall be a minimum of two (2) inches diameter. The increase in vent size shall be at least six (6) inches below the roofline."

(7) In Section 1004(a), in the second sentence, delete the letters "PB" and delete the entire third sentence reading "PB waterpipe and tubing may be used for hot and cold water distribution systems within a building."

(8) In Section 1007, delete subparagraph (e) and substitute the following:

"(e) Relief valves shall be located inside a building and shall be provided with full sized drain or galvanized steel or harddrawn copper piping and fittings and shall extend from the valve to a point not less than 6 inches or more than 12 inches above the floor. No part of such drain pipe shall be trapped and the terminal end of the pipe shall not be threaded."

(9) In Section 1307(c)(3), delete the first sentence and substitute therefore the following:

"(3) Combustion air requirements for gas and oil burning water heaters shall consist of two openings as described below, with each opening containing not less than one square inch of free area per 5,000 Btu per hour input.'

(10) In Section 1307, delete subsection (e), including Table 13-1 and the footnotes thereto, and substitute the following:

"(e) Alternate Methods of Supplying Combustion Air. In lieu of the requirements of Section 1307(c)(3), combustion air supply may be designed in accordance with recognized engineering principals when first approved by the Administrative Authority."

(11) Add a new Section 1326 reading as follows:

"1326 Check Valves. Check valves shall not be installed on any domestic water heater installation unless approved by the Administrative Authority."

(12) Appendices A, B, C, E, G, and H are adopted.

(13) Appendix D is adopted with the following additions: Under Part B add a new section D2.2 reading:

"D2.2 Cleanouts: Cleanouts the same size as the piping shall be installed at the base of all roof leaders."
In Part C, delete the last sentence of Section D3.1 and substitute the following:

"D3.1 Roof drainage rate shall be based on a rainfall of one (1) inch per hour."

19.16.010 ELECTRICAL CODE ADOPTED AMENDMENTS AND DELETIONS.
For the purpose of regulating the construction, reconstruction, addition enlargement, conversion, equipment, use and maintenance of all electrical wiring and devices within and without all buildings and structures within the city and borough, there is adopted, as the Electrical Code of the city and borough, that certain compilation of rules and regulations prepared and published by the National Fire Protection Association, a nationally recognized technical trade association, which compilation is entitled "National Electrical Code, 1981 Edition," and five copies each of which have been filed in the office of the clerk of the city and borough or in such places as designated by the clerk, for public use, inspection and examination and which compilation is made a part of this chapter as if fully set forth in this section, subject only to the following enumerated additions, changes and deletions:

(1) Add a new Section 90-9 reading as follows:

"PLANS AND SPECIFICATIONS. A set of electrical plans and specifications or a wiring schedule, giving the following information, shall be filed before the issuance of a permit for the installation of electrical wiring intended to supply an anticipated or future load in excess of 200 amperes, single phase, or 150 amperes, three phase. Every plan shall be drawn to scale upon substantial paper and shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and showing in detail that it will conform to the provisions of the Electrical Code and all other relevant laws, ordinances, rules and regulations. Specifications for such plans may be either shown thereon or provided separately. The building official may require plans, computations and specifications to be prepared and designed by an engineer licensed by the state to practice as such. The wiring plan or schedule required shall contain the following information:

(a) The type, rating and location of any new service equipment.

# POSITION STATEMENT

## CALIFORNIA PIPE SITUATION

Several items recently appearing in the trade press have referred to a ban on the use of plastic pipe to transport drinking water in California. These articles are based on a misinterpretation of the facts. No ban on plastic pipe--either temporary or permanent--exists in California at this time. Pipe made from polybutylene, polyvinyl chloride and chlorinated polyvinyl chloride has been, and continues to be, used in potable water systems in the state of California.

To date, the only action concerning this issue which has taken place is that, temporarily, the California Supreme Court has directed the International Association of Plumbing and Mechanical Officials not to distribute the 1982 Uniform Plumbing Code in California without either deleting references to PB, PVC, and CPVC, or adding a warning that an Environmental Impact Report is being prepared on these materials.

This directive is the result of action initiated early this year by the California Department of Consumer Affairs et al. In their petition, this group asked the court for insertion of a notice in the 1982 IAPMO Code stating that CPVC, PVC and PB pipe have not been approved by the state of California for use in potable water systems. The plaintiffs' contention was that plastic pipe presents health hazards which warrant such a warning.

A temporary restraining order was sought by the plaintiffs to prevent distribution of the codes before the case could be heard. Judge Dickran Tevrizian dismissed the petition, citing a lack of medical evidence concerning the alleged health hazards. He also expressed skepticism as to the plaintiffs' motives, pointing out that they had failed to address the health hazards associated with the use of lead and copper pipe. Judge Tevrizian's decision to deny the order was upheld by the state appeals court, in a one-sentence opinion.

In its review of the case, however, the state Supreme Court decided that the appeals court had given the case insufficient consideration and it directed the lower courts to review the case again. This is where the case stands now.

It should be noted that the Supreme Court's decision is a procedural one, rather than one that reflects the merits of the arguments presented by the plaintiffs. Representatives of the plastics industry are optimistic that the temporary injunction concerning the distribution of the 1982 code will be removed and that the court also will dismiss the plaintiff's petition for inclusion of a permanent warning label in the IAPMO code.

# PLASTIC PIPE FACT SHEET

- Plastic pipe has an excellent performance history extending more than 20 years.

- Under aggressive soil and water conditions, metal systems fail because of corrosion while plastic pipe remains unaffected.

  For example, in Los Angeles County, homes built between July 1973 and April 1976 began to experience leaks in the galvanized steel plumbing systems in late 1976. In Santa Clara County, newly installed copper plumbing systems began to fail immediately upon installation.

- In hospitals and laboratories, plastic pipe is used to deliver high purity water. Metal pipe could produce unwanted contamination.

- Plastic pipe is more economical in terms of lower material and installation costs.

- Plastic pipe is easier to install and can be handled by the owner-builder.

- Plastic pipe is more energy efficient because of its lighter weight and low thermal conductivity.

- Plastic pipe has been extensively tested, certified, and accepted.

  The National Sanitation Foundation administers a testing and certification program for plastic pipe to insure that these materials meet quality and performance standards. EPA is responsible for regulating the leaching of materials from water pipe. It has not recommended that any restrictions be placed on the use of plastic pipe. Plastic pipe is permitted for potable water systems by all three model codes and by numerous state codes.

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# HEALTH HAZARDS ASSOCIATED WITH PLASTIC PIPE

A STATUS REPORT

OF

THE CALIFORNIA PIPE TRADES COUNCIL

OF

THE UNITED ASSOCIATION OF JOURNEYMEN AND APPRENTICES OF THE PLUMBING AND PIPE FITTING INDUSTRY OF THE UNITED STATES AND CANADA

PREPARED BY:

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# INTRODUCTION

Thousands of pages have been written on the advantages and disadvantages associated with plastic pipe. The debate normally concerns its effectiveness and usefulness as a new product. Most recently, issues have focused on human health hazards and potential long-range environmental dangers. With this type of dispute the problems surrounding plastic pipe involve a staggering level of scientific abstraction. Public officials and policy makers (usually not scientists by training) oftentimes are faced with a morass of scientific jargon, chemical formulae and mathematical probabilities. Such scientific disputes, if taken out of context, can be an obstacle to the appropriate protection of the health and safety of the general public.

The following paper is a short summary of the main health and environmental issues in the plastic pipe dispute. It includes documents of policy makers, environmental scientists and health officials that comment upon the proper health and safety approach to the issue, all of which documents are part of the Public Record of the California Housing Commission. These documents illustrate that scientific assertions of the petrochemical industry, when analyzed by independent testing agencies, do not overcome the threat of severe safety risks, health risks and environmental contamination that may arise from the use of plastic pipe.

Lastly, this paper documents the extreme peril of relying upon media presentations and press packages of the Plastic Pipe and Fitting Association ( FA).

The reader should carefully note the serious need for policy decisions with regard to plastic pipe that reflect truly unbiased research and independent analysis.

I

## FIRE SAFETY

In early 1980, the California State Fire Marshal, at the specific request of the California Legislature, (ACR 98), analyzed and evaluated every major scientific document on "the potential flammability of plastic pipe and the fire hazards associated with its use." It concluded:

> "In multi- (3 or more) story fire-rated construction, additional in-depth fire testing is necessary to (a) ensure that plastic pipe will not contribute to unusual fire spread; (b) that the toxicity generated by the combustion of plastic pipe will not extend beyond the area of initial exposure in quantities sufficient to prove hazardous." ("Fire Hazards of Plastic Pipe" State Fire Marshal. May 1980.)

The State Fire Marshal was particularly concerned at the time with "through-penetrations" of fire-rated walls by a combustible material and by the loading of plastic pipe, i.e.,"stacking", in high-rise construction.

His concern proved to be prophetic after the tragic fire at the MGM Las Vegas in November 1980. News accounts