HB
508
#1

STATUS REPORT: PLASTIC PIPE EIR

PRELIMINARY STUDY CONFIRMS HAZARDS AND RECOMMENDS TESTING

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Plumbers' and Steamfitters' Union
Local 467
1519 Rollins Road
Burlingame, California 94010
Thomas J. Hunter, Business Manager

May, 1983

Prepared by:

Adams, Broadwell & Russell
400 South El Camino Real, Suite 370
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INTRODUCTION

SRI International has concluded that plastic pipe is a fire hazard when used for drain, waste and vent pipe and that its use should not be approved unless safe mitigation measures can be proposed, tested and approved. SRI has also recommended that CPVC and PB pipe should not be approved for drinking water until they are subject to further leaching tests. Prior leaching tests have shown carcinogenic chemicals leaching from CPVC pipe.

SRI International also concluded that use of plastic pipe does not save a significant amount of money in home construction and that metal pipe is generally safe. SRI recommends testing of the solvents which are used to glue together pieces of plastic pipe. Those solvents may be harmful to workers who install pipe and breathe the solvent fumes or get the solvents on their hands.

This Status Report reviews the key issues and provides excerpts from SRI's "Environmental Review Document" (ERD) of March, 1983. The ERD is the first stage of a three-stage process culminating in an Environmental Impact Report on plastic pipe. The California Department of Housing and Community Development is proposing to approve the expanded use of plastic pipe for drinking water and drain, waste and vent pipe. The Department has hired SRI International, as its consultant, to prepare the ERD. The second stage of the process will consist of performing the testing recommended by SRI. The third stage of the process will be preparation of an EIR based on the ERD and on the test results.

DRINKING WATER CONTAMINATION

One of the key issues is how much toxic chemicals leach from plastic pipe into drinking water. The ERD carefully analyzed the few tests that have been performed on plastic pipe. The plastics industry submitted several of its own tests for review by SRI. The industry claimed their tests proved the safety of plastic pipe. After examination of the industry tests, the ERD found that industry tests did not prove much at all. The ERD describes these tests with such phrases as: "Unfortunately, little can be inferred from the data;..." (p. IV A-37); 'These data have limited use, however because of the lack of quality assurance..." (p. IV A-48); and "This report suffers from serious limitations." (p. IV A-50).

However, the ERD does confirm leaching of carcinogens from plastic pipe into water and recommends further testing. SRI states:

> "Scores of chemicals have been reported as leaching from plastic pipe and solvent cements into drinking water, but substantial disagreement exists about both the validity of the findings and the interpretation of the concentrations found. Existing data are adequate to establish substantial leaching for only a few chemicals. Of these, carbon tetrachloride, perchloroethylene, and trichloroethylene appear to have sufficient toxicity to be of possible cumulative concern at the levels suspected. However, we recommend additional water quality testing to clarify both the levels of those substances and those of other suspected and as yet unknown ones." (p. 2)

With respect to CPVC, a type of plastic pipe, the ERD confirmed the presence of a number of cancer-causing substances:

"...chloroform, dichloromethane, carbon tetrachloride, tetrachloroethene, trichloroethene, and toluene were found to have significantly higher concentrations in the test samples than in the controls." (p. IV A-26)

With respect to carbon tetrachloride, the ERD expressed significant concerns:

"The health effect of primary concern for carbon tetrachloride is cancer. (p. IV B-41)

"...the plausible risk limit from exposure to carbon tetrachloride alone from CPVC pipe is at the commonly accepted threshold of regulatory significance." (p. IV B-43)

The ERD confirmed the presence of some toxic chemicals, and stated that the presence of other toxic chemicals could not be ruled out. <u>More testing is recommended to try to determine whether additional carcinogens might be leached into the water from CPVC</u>:

"Finally, because of the inadequacies of existing leaching data, it is unclear that these are the only carcinogens that may leach into drinking water from CPVC pipe or that the reported leachate concentrations are representative of values that would be obtained in real life situations." (p. IV B-74)

With respect to Pb, another type of plastic pipe, the existing data was so poor that more testing was needed to resolve legitimate health concerns:

"The leachability studies of Pb were generally lower in quality than those of CPVC." (p. IV A-56)

<u>Thus, the ERD demonstrates that there is real concern about the addition of toxic and carcinogenic chemicals to drinking water from plastic pipe and that further testing is needed before such pipe can be evaluated for safety</u>.

Toxic chemicals in the soil can penetrate buried plastic pipe. The ERD noted that several of the tested compounds are carcinogens and that further testing was needed. (pp. IV B-76 to B-77) Surprisingly, the ERD does not recommend specific testing to resolve these questions. Testing plastic pipe for permeation by toxic chemicals in the soil is critically important. It is a major unresolved issue at this stage of the plastic pipe EIR.

FIRE HAZARDS

Because plastic pipe burns easily, an important issue is whether the web of plastic drain, waste and vent (DWV) pipe running through the walls and ceilings of fire-rated construction is safe. The ERD concluded that plastic pipe cannot be safely substituted for metal pipe in fire-rated construction:

> "Fire safety is a very real concern with plastic DWV pipe; ABS is combustible, and PVC and CPVC will at least soften and slump in lines. If these plastics are installed as direct substitutes for metal, as they already are in non-fire-rated residences, they will degrade the fire resistance of structures. (p. V-3)

> "A fire test conducted in late 1982 (Warnock-Hersey, 1982) illustrated quite effectively that plastic DWV systems can drastically reduce the fire resistance of a wall when the penetrations are not protected. In this test, metal plumbing was replaced with plastic counterparts, including the pipes that penetrated the gypsum-board wall to support plastic traps directly exposed to the test fires. Although the report makes no mention of sealing the penetration, this detail is probably of little consequence because the large amount of exposed plastic soon caught fire and carried the flames into and through the wall. Plastic pipe cannot be installed in such a fashion without destroying the fire endurance of the wall." (p. IV D-8; emphasis added)

Measures to reduce or mitigate fire hazards are absolutely necessary. However, the ERD observes that there are no proven mitigation measures:

"Special and as yet undeveloped or unproven construction measures involving additional cost and care are needed to satisfy code performance standards [with plastic pipe]. (p. IV D-3)

"Suitable fire-stopping systems have not been demonstrated for [plastic] pipe materials, sizes, and orientations; particularly of concern are large pipes and vertical penetrations." (p. IV D-22)

Not only are these measures unproven, but they are also likely to create serious problems for building inspectors who will need to insure that plastic pipe has been safely installed:

"However, at present there do not appear to be specific observable features that would assure a fire inspector that a fire wall would retain its rating with plastic plumbing. (p. III-50)

"Code enforcement is likely to be a significant problem with plastic pipes, and the resources for enforcement must be carefully weighed in developing code provisions." (p. IV D-4)

New mitigation measures and more inspection time will almost certainly lead to increased costs:

"In view of the more stringent design and inspection requirements that are needed to achieve an equivalent level of fire safety, the difference in cost of plastic, compared to metal, systems may be less than some believe." (p. IV D-27)

SMOKE TOXICITY

Not only does plastic pipe create openings for flame spread when it burns, but it also produces toxic smoke. The ERD repeatedly notes both the potential toxic smoke hazards from plastic pipe and the need for further testing of the smoke toxicity. For example, the ERD describes the hazard from plastic pipe in just one dwelling unit:

> "However, if the plastic pipe components were about equally divided between ABS and PVC, we would expect between 10 and 15 pounds of HCl to be generated [in a fire]. This represents a serious toxicant load...10 to 15 pounds of HCl could poison the air of 1,500 rooms." (p. IV E-14)

That amount of toxic gas released into the ventilation system of a multi-unit, multi-story building would increase deaths in the event of a serious fire.

Lethal exposure to toxic gas is not the only concern from combustion effects. Long-term risks, such as cancer, are also possible:

> "There have been concerns expressed that, in addition to acute, potentially lethal effects of toxic gases, long-term irreversible effects, including cancer, may result from exposure to combustion products (Autian, 1970; PRC, 1980). Such effects might arise from exposure to one fire or to many, as in the case of fire fighters.... Some components given off during degradation of PVC plastics, such as benzene and vinyl chloride, are known carcinogens;..." (p. IV E-19)

ABS produces hydrogen cyanide (HCN) gas when it burns. (ABS is the most common plastic used for drain, waste and vent.) The ERD describes hydrogen cyanide as follows:

> "Without question, HCN is one of the most lethal substances known. The gas produces a type of anoxia referred to as histotoxic.... Other sources indicate that between 300 and 350 ppm can cause death within 10 minutes.... The short-term exposure limit for HCN is 15 ppm." (p. IV E-20)

Of course, in fires individuals may be exposed to smoke other than from plastic pipe, and it is extremely difficult to estimate the specific role of toxic gas from plastic pipe.

Nevertheless, the ERD estimates that these chemicals may contribute to 10 or 20 percent of the deaths:

> "Epidemiological data from real fires are insufficient for concluding anything other than that CO is the major cause of fire death, and that HCN or other toxic gases may contribute to death to some currently unquantifiable extent, but certainly no more than 20%--and probably on the order of 10% or less, based on currently available information." (p. IV E-26)

The ERD concludes its analysis of the fire issue by indicating that a standardized testing technique for smoke toxicity is required. Until that is accomplished, conservative countermeasures are recommended. These include closing off wall penetrations or using combined metal and plastic systems. The ERD indicates that all countermeasures need to be subjected to full-scale tests before they are adopted. (p. IV E-35)

WORKER HEALTH HAZARDS

Another important issue in the plastic pipe controversy is the exposure of workers to toxic substances used in the glues and solvents used to join plastic pipe. Workers include not only professional plumbers, but the do-it-yourself homeowners as well.

The ERD recommends further testing of the hazards to plumbers. The glues used to join plastic pipe pose a health hazard:

"The solvent of greatest concern is DMF, which though relatively nonvolatile, is readily absorbed through the intact skin. Reports available to date indicate that DMF is neither mutagenic nor carcinogenic, but human exposures have resulted in liver damage, pancreatitis, skin sensitization, and alcohol intolerance. DMF is metabolized to two compounds that have been teratogenic in animal tests: formamide and N-methyl formamide. There is also concern that these compounds might affect male fertility, although adequate testing has not yet been conducted." (p. IV C-28)

Inhaling solvents is dangerous, particularly when working in small spaces. The ERD observed that a plumber working under floors may sometimes install pipe with his nose right under the pipe joints. (p. IV C-10) Under these circumstances, inhalation of high doses can be expected. In addition to inhalation, the solvents are absorbed through the plumber's skin:

"On a site where plastic is used, the journeyman or advanced apprentice usually doing the actual installation would have relatively intimate and constant contact with the cement throughout the day. This exposure would result not only from the vapor exposure as he cemented the joints, but also from the residual cement on his hands (or gloves) and clothing." (pp. IV C-10 to 11)

The ERD also recommends further testing on the exposure of plumbers to vapor from one of the solders used with metal pipe (lead based solder). However, with plastic pipe, the plumbers are at risk not just from inhalation but also through absorption of chemical contaminates through the skin. Thus, the testing needs in the area of worker safety are substantial:

> "There can be no doubt that the widespread introduction of plastic pipe in California will affect occupational health and safety. Unfortunately, for the purposes of this environmental review, a reasonable judgment of the net impact of that introduction cannot be made at this time. Insufficient information is available to evaluate the impact on any of the occupational groups that might be affected. This is true even for the group with the greatest potential for exposure--the plumbers." (p. IV C-51)

In addition, the ERD recommended several changes in current practice in order to improve worker safety such as the elimination of n-hexane and benzene from solvents, new disclosure requirements on solvent labels and possibly ventilation requirements.

NO ECONOMIC ADVANTAGE

The industry defends itself with a single, consistent theme: the battle over plastic pipe is an economic issue, not a health or environmental issue. The ERD completely disposes of this myth. Not only does the ERD substantiate the potential health and environmental hazards of plastic pipe, but it also concludes that there will be virtually no economic benefit from approval of plastic pipe:

> "First, the reduction in the cost of housing construction that would result from use of the newly permitted plastics in place of currently approved plumbing materials is so small that it would have virtually no effect on the sales price or rent of dwelling units in the state....
>
> "Second, the plumbing material substitutions that are likely to result from the proposed code change would not significantly affect employment opportunities in the state..." (p. V-13)

SAFETY OF METAL PIPE

Numerous plastics industry public relations statements attack the safety of metal pipe. The ERD puts this issue to rest as well. Copper is the most common form of drinking pipe in use. Despite the plastics industry's scare tactics regarding copper, the ERD finds as follows:

> "...[C]opper is an essential nutrient for which people have evolved adequate homeostatic mechanisms that handle occasional excesses and deficiencies. While the metal can be toxic at high doses, SRI concurs with the assessment of the National Academy of Sciences that, 'the potential for toxicity (from copper in drinking water at observed levels) is virtually nonexistent for humans' (NAS, 1977)." (p. IV B-62 to 63)

The same finding applies to zinc which is commonly used in metal drinking water pipe:

> "While zinc does produce chronic toxic effects at high doses (e.g., several thousand ppm in the diet), it is unlikely to present a significant risk of chronic toxicity in drinking water from either copper or galvanized iron pipe. It is essential for human nutrition, and homeostatic controls have evolved to regulate absorption and excretion. Zinc levels in drinking water are a small fraction of those in food. In general, zinc deficiency is a more serious health problem than zinc toxicity. The National Academy of Sciences recently concluded that, '[t]he possibility of detrimental health effects arising from zinc consumed in food and drinking water is extremely remote' (1980)." (p. IV B-64 to 65)

The ERD does recommend further testing of lead that may be present in one type of solder which is used to join copper pipe. The ERD describes commonly available alternative solders that have no adverse health effects. The most common is tin antimony solder. With the single qualification that there should be more examination of one type of solder, the

ERD substantiates the long recognized safety of metal pipe. Thus the report states:

> "In view of the results of the leaching data and the current state of knowledge about the toxicity of leachates from both copper and galvanized steel pipes, there appears to be little likelihood of any significant health risk from either of these kinds of pipe, with the possible exception of lead leachates from lead/tin solder." (p. IV B-75)

In addition, it is clear that cast iron DWV poses no fire hazard.

CONCLUSION

Why are Californians being asked to approve plastic pipe? It is not to make housing more affordable. The ERD confirms that approval of plastic pipe will have virtually no effect on housing prices or rents. It is not because of problems with current materials. The ERD confirms the general safety and adequacy of existing materials. Approval of plastic pipe is being pursued for one reason and one reason only: the plastics industry wants to expand its market. No one opposes the introduction of new products. The industry that proposes a new product should pay for the testing to prove its safety. The plastics industry bears the burden of proof and they can afford it. According to the ERD, the plastic pipe industry had gross sales revenue in 1980 of $1.5 billion.

Despite the need for testing, despite the revenue to pay for testing, the plastics industry continues to resist testing. Instead, they have launched a multi-million dollar public relations campaign to distort the facts and avoid their responsibility. Their position is clear: a fortune for public relations and barely a dollar for testing.

It is a position which has been demonstrated as bad public policy. Asbestos was permitted in schools and homes without testing. Now that its hazards are understood, it represents a built-in danger that cannot be economically removed.

The ERD recommends additional testing before plastic pipe is approved. That testing should be fair and thorough. The industry that advocates a product's use must be prepared to pay for the tests to demonstrate its safety.

HAZARDS OF PLASTIC PIPE
FOR
WATER SERVICE AND WATER DISTRIBUTION SYSTEMS

The following is an overview of major public health questions surrounding the use of plastic pipe plumbing products for various applications. Each public health issue has received intense governmental scrutiny and decision. Various documentation of such governmental action is included here as exhibits to illustrate both the serious nature of the public health questions and the level of scientific research that is yet to be completed.

I

PLASTIC PIPE FOR WATER SERVICE

Recent tests in California have duplicated field and laboratory experiences of water utility districts and environmental health experts that PVC, PE and PB water service lines can be and are permeated (infiltrated) by gasoline, petroleum distillates and industrial solvents. (Items 1, 14)

The public health impact can be serious enough to require the removal of an entire underground network of plastic water service lines (Item 2) and cause serious health consequences for its consumers. Because of the pervasive occurrence of toxic chemical spills and soil contamination with residues of pesticides and herbicides, California is embarking on a comprehensive analysis of the problem. (Item 3) The problem is amplified by the specter of frequently used garden and household products that may permeate these plastic pipe.

Permeation of plastic pipe by toxic chemicals is all the more serious because of the existing threat to water quality by the pipes themselves and the quality of our current water supply. The California Department of Health found that the pipes themselves leach large amounts of chloroform, carbon tetrachloride, DEHP and a host of solvents used to grease and glue the pipes. If these toxic chemicals are added to the already high level of contamination of many water supplies, then a truly dangerous prospect for the quality of our potable water systems emerges. (Item 4)

One further recent accumulation of data deserves comment. Plastic water service lines are failing at an alarming rate. (Item 5) In a handful of jurisdictions, plastic pipe water service lines are cracking and breaking, causing health problems and severe economic dislocation. The combined damage estimate from just these half a dozen or so jurisdictions exceeds $100 million. One can only guess at the total economic impact should all failures come to light.

II

PLASTIC PIPE FOR WATER DISTRIBUTION WITHIN A STRUCTURE

Since 1977, the State of California has reviewed Industry requests for unlimited usage of plastic pipe for water distribution. Industry assertions of economic feasibility and product safety were thoroughly and comprehensively reviewed by California Departments of Health, Consumer Affairs, Housing and Community Development and the State Fire Marshal. The results are aptly summarized (Item 6) by the determination of the State Department of Housing and Community Development in consultation with other State agencies. Housing concluded that there was substantial evidence that unlimited use of plastic pipe may have a significant effect on the environment.

These conclusions were reached because of the presence of toxic chemicals (dimethylformamide, tetrahydrofuran, DEHP, carbon tetrachloride, chloroform and many others) in drinking water passed through the pipe. (Item 7 and 13) An equally dramatic conclusion was reached by the State Fire Marshal: plastic pipe in high rise construction may pose an unreasonable fire risk. (Item 8)

III

ENVIRONMENTAL IMPACT REPORT AND OTHER RELEVANT LEGAL ACTIONS

Since plastic pipe was found to have a potentially adverse effect on the environment because of its threat to water quality and fire safety, State agencies in California will not allow its expanded use until all scientific and public health questions have been answered. (Item 9) The State Architect has also warned all the design professions and school districts throughout California of the potential hazards of plastic pipe. (Item 10)

Because the International Association of Plumbing and Mechanical Officials (IAPMO) proceeded with the expanded use of plastic pipe in its 1982 Uniform Plumbing Code, a coalition of State public and private consumers, environmental and labor organizations sued IAPMO (Item 11) and forced a notice disclaimer at each location in the Code where plastic pipe is mentioned. (Item 12) The lawsuit is still in progress over complaints that IAPMO misrepresents its product evaluation to the general public. Depositions were taken of the National Sanitation Foundation (NSF) at which time it was documented that NSF does not test any of the plastic pipe products, which carry the NSF seal of approval, for the more dangerous organic chemicals.

IV

CONCLUSIONS

The above provides a brief overview of the hazards associated with the use of plastic pipe for various plumbing applications. While further research is clearly necessary, a fair characterization of current data leads one closer to the conclusion that plastic pipe may not only pose grave public health risks, but may well be simply too expensive to utilize.

LIST OF EXHIBITS

Item #1

Anlab

ANALYTICAL LABORATORY
A DIVISION OF DEWANTE & STOWELL

1914 S STREET, SACRAMENTO, CALIFORNIA 95814 • 916-447-2946

November 29, 1982

Leonardini and Fathy
400 Capitol Mall, Suite 221
Sacramento, CA 95814

ATTN: Mr. Raymond J. Leonardini

-- ABSTRACT --

PILOT PIPE STUDY

Three plastic water supply pipes: polyvinylchloride (PVC), polyethylene (PE), and polybutylene (PB), were exposed to selected compounds to determine permeability. Copper pipe was included as a quality control sample. The exposure chemicals were: 1,2,-Dichloropropane; 1,1,1-Trichloroethane; Chlordane (72% formulation diluted 1:100 v:v in water); Chevron Super-Unleaded Gasoline; and Tap Water as a quality control blank. Exposure time was one week.

Results indicate that PVC is permeated by 1,2-Dichloropropane and 1,1,1-Trichloroethane; PE and PB were permeated by 1,2-Dichloropropane, 1,1,1-Trichloroethane, and Gasoline. In addition, results of the control samples indicate that several compounds leach into the water from the pipe material; sealants, glues, joining compounds, flux, etc. The data indicates that as the compounds permeate the pipe they also extract and carry with them other soluble compounds in the pipe material. Comparison of small quantities of leachate compounds to exposed pipes was not always possible due to necessary dilutions of the samples because of the high concentrations of other compounds.

Roger A. Elliott

Roger A. Elliott

RAE:lk

Item #2

rijksinstituut voor drinkwatervoorziening

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telefoon 070-69 42 51
telegramadres "rijksdrinkwater"
telex 33604
postrekening 3447

postadres
postbus 150
2260 AD leidschendam

bereikbaar van station HS met bussen 44 en van de stations CS en Voorburg met de buslijnen 28 45 / 46

Dr. G.A. Koehler,
Department of Consumer Affairs,
Research and Special Projects,
1020 N Street, Room 501,
Sacramento, California 95814

datum February 11, 1983 uw brief
kenmerk. Nr. 106.275
onderwerp.

Dear Dr. Koehler,

The first problems that have been met in Lekkerkerk were leakages of the plastic drinking water pipe system, caused by attack from the organic solvents (toluene, ethylbenzene, etc.) present in the soil.
The drinking water quality in the houses had been controlled from a date several months before the decision to dig up the waste.
A few days after the observation of permeation through the piping system (polyethylene) in the houses (see annex) it has been decided to carry out the digging operation The penetration to drinking water was one of the reasons.
In some other cases in our country, in especially concerning industrial sites, penetration of organic solvents through plastic pipes has been observed.
My institute has no practical experience with studies on the permeability of plastic pipes to organic solvents, pesticides etc.
Research on permeability has been carried out by KIWA research and testing institute, Groningerhaven 7, Nieuwegein, 3433 PE, The Netherlands.
By order of the Department of Environment KIWA investigated the influence of methylbromide on plastic piping.
KIWA also investigated the influence of organic solvents on plastic piping and has experience in determining permeability coefficients.
The projectleader at KIWA is Dr. G. Veenendaal, please contact him.
For his information I have sent a copy of this letter to Dr. Veenendaal.
Apologizing that I cannot reply your letter completely.

Sincerely,

Dr. F.J.J. Brinkmann
Laboratory coordinator of the
Chemical Biological Division

RID 00027 - 10.000/80 - 0068884

4.2. Drinkwater afkomtig van en

In tabel 3 is een overzicht samengesteld van de metingen naar organische microverontreinigingen in beide drinkwatermonsters. In beide monsters werden slechts lage concentraties aan gechloreerdeverbindingen aangetroffen waarbij alleen het gehalte van 0,3 µg/l dichloorbenzeen in het water te opvalt. In beide monsters drinkwater waren benzeen en tetrachloormethaan niet aanwezig in hoeveelheden boven 0,01 µg/l.

Tabel 3

Organische verontreinigingen in het na stilstand bemonsterde leidingwater op te Lekkerkerk d.d. 21 april 1980

Kwaliteitsaspect	Concentratie (microgram/liter)	
Reukgetal (verdunning)	2	10
Vluchtig Organisch Chloor (µgCl/l)	0.2	0.3
Chloroform	0.1	0.15
Trichloormethaan	0.8	1.1
Tetrachloormethaan	< 0.01	0.01
Dichloorbenzeen	0.3	< 0.01
Bis(2-chloorisopropyl)ether	0.03	0.1
Benzeen	< 0.01	< 0.01
Cyclohexaan	< 0.01	< 0.01
Tolueen	1	100
Ethylbenzeen	0.3	25
m/p-Xyleen	1	100
o-Xyleen	0.3	10
C_3-benzenen (som 8 isomeren)	1	3
C_4-benzenen (som 13 isomeren)	0.1	0.2
Indaan of methylstyreen	< 0.01	0.05
Methylindaan of ethylstyreen	< 0.01	< 0.01

Beide monsters bleken verontreinigd met hetzelfde patroon aan aromatische koolwaterstoffen met als hoofdcomponenten tolueen en m/p-xyleen, doch de concentratie aan deze stoffen van het water te was globaal een factor 100 hoger. Dit laatste kwam ook tot uitdrukking in het voor drinkwater bijzonder hoge reukgetal van 10 bij het te Molenwerf 6 bemonsterde stagnante drinkwater.

Item #3

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

DEPARTMENT OF
Consumer Affairs
445-4465
1020 N STREET, SACRAMENTO, CALIFORNIA 95814

December 30, 1982

The Honorable David A. Roberti
President Pro Tem
State Capitol, Room 205
Sacramento, CA 95814

The Honorable Willie L. Brown, Jr.
Speaker of the Assembly
State Capitol, Room 219
Sacramento, CA 95814

Dear President Pro Tem Roberti and Speaker Brown:

This letter is to alert you to a serious and immediate health hazard confronting California consumers. The hazard involves potential contamination of portions of the vast network of underground potable water conduit systems throughout the State by toxic and carcinogenic chemicals. My staff, working with a team of experts, has found that plastic pipe used to convey potable water is readily permeated by chlorinated solvents, petroleum distillates (including gasoline), and agricultural residues. Some of these are animal carcinogens.

In the following paragraphs, I will outline (1) the nature of this previously unrecognized health risk; (2) the current inadequate regulatory protection of our water conduit systems; and (3) the legislative actions to create appropriate protection for potable water throughout the State.

As you well know, dissemination and spread of toxic substances in California water is both a growing consumer issue and a pressing public health problem of substantial importance. The Department of Consumer Affairs has attempted by regulatory means to protect consumers in the State by urging the International Association of Plumbing and Mechanical Officials (IAPMO), the promulgators of the Uniform Plumbing Code, to adopt language in their code that would prohibit the use of any plumbing "material capable of leaching known carcinogens or toxic materials into the potable water supply." On two occasions the code change was rejected. (Attachment 1.) Because the unseuspecting consumer needs notification of these potential hazards, I initiated litigation against IAPMO to warn consumers against these serious abuses. The State Supreme Court has ordered such a warning to be inserted in the code or references to plastic pipe to be deleted at least until the lawsuite is resolved. (Attachment 2.)

While the degree and extent to which plastic pipes themselves contribute to contaminants in potable water is presently being reviewed by SRI International, through an Environmental Impact Report for the State Housing and Community Development Department, I wish to alert you to a risk posed by the use of plastic pipes as conduits carrying water underground: chemicals in the soil go through intact pipes and can contaminate otherwise potable water.

A report has just reached me based on two series of tests conducted under the supervision of Dr. Marc Lappe', Adj. Assoc. Prof. of Public Health, University of California, Berkeley, and currently a consultant to the Department of Consumer Affairs (and previously a Department of Health Services toxicologist), which appears to show that gasoline, petroleum distillates, and a wide spectrum of chlorinated solvents, including those most commonly associated with ground contamination from agricultural and industrial operations, readily permeates plastic pipe. (Attachment 3.)

In carefully controlled studies designed to assess the likelihood of infiltration of otherwise intact plastic pipes carrying potable water under normal pressure, the report documents that agricultural residues from soil sterilizants, chlorinated solvents and petroleum distillates penetrate polybutylene and polyethylene pipes of standard grade and quality used in service lines to residents throughout the state. Certain of the test chemicals penetrated polyvinylchloride pipe as well.

Some of these chemicals have already been shown to be carcinogenic in one or more species of animals.

While these reports show dramatically how readily these chemicals can permeate plastic pipe water systems, they would not have warranted this urgent letter were it not for the fact that analogous studies were performed by the East Bay Municipal Utility District (EBMUD) fully four years ago on gasoline. Thse studies were of such concern that EBMUD dispatched an urgent letter to the Department of Health Services asking that they amend the Department's Waterworks Standards to prohibit the use of plastic pipes wherever "solvent, gasoline or other petroleum distillates" may be present in the ground through which the pipes could pass. (Attachment 4.) EBMUD adopted a policy of replacing plastic pipes with copper pipes when gasoline is detected in the water or the possibility of such contamination exists. Some other jurisdictions have adopted a similar policy, although we have not found a concerted policy among the water utilities for the collecting of data on infiltration of water lines.

The work conducted by the Lappe' team repeated the EBMUD's experiments as part of their work. Their findings confirmed that gasoline will indeed permeate the two pipe systems most commonly used (polyethylene and polybutylene), but not a third (polyvinylchloride). Of great concern is the follow-up analytic work which identified the components of gasoline which traversed the pipes: this data showed unequivocably that benzene, a human leukemia-causing agent passes through the pipes. (I note parenthetically that the levels detected (100/parts per million) are substantially above the permissible limit set by EPA based on human leukemia data (0.66 parts per billion)). The critical questions of how much benzene actually goes through under field conditions remain undetermined, as do the respective quantitative data on the other solvents.

The EBMUD data is all the more troubling because of EBMUD's stance toward polybutylene when this department announced in public hearings before the State Housing Commission the potential contamination with DEHP in polybutylene water pipes itself. EBMUD never publically disclosed their findings nor alluded to the field failures and 1978 experiments on polybutylene (Attachment 5.)

For reasons which have not yet become clear, the Department of Health Services determined that the language of the revised code 22 Cal. Admin. Code 64624 should only identify petroleum distillates as potential hazards to plastic pipe installation. not the solvents which are of much greater health concern. (Attachment 6.) Moreover, we have discussed these recent developments with the Department of Health Services and they agree with our assessment of the potential widespread health hazard. Additionally, the Department of Health Services is in possession of extensive case studies from Europe documenting experiences with this serious problem, in which human health has apparently been seriously adversely affected.

Thus, the Department of Health Services' present waterworks regulation leaves unclear both the public health rationale and the enforcement mechanisms for excluding other hazardous substances besides gasoline, as well as the full roster of chemicals which may now be appropriate to acknowledge as disqualifying conditions for the use of plastic pipe as conduits for underground water service lines, aqueducts, and well lines. (In many instances wells are lined with plastic casings.)

But from the admittedly pilot and preliminary studies that I have had my staff carefully review, in concert with a University of California soil scientist at Davis, these findings are cause for substantial concern: we may be creating the conditions for widespread consumer contamination through permeation of their subsoils with toxic chemicals--chemicals that find their way into homes through an unanticipated route--namely, that of their underground water conduit systems.

Since our water supplies present a chronic and unavoidable source of potential contaminants, the most stringent public health measures have traditionally been taken to ensure its purity. Now that good work is potentially jeopardized by having an unforeseen additional source of contamination enter the picture: the infiltration with hazardous chemicals of the conduit systems increasingly used throughout the state to carry potable water.

The risk that through-permeation of plastic pipe allows ingress of environmental hazards of the first order (i.e. the priority pollutants listed by EPA or the present list generated by the Department of Health Services in its carcinogen policy document), is certainly cause for dispassionate, scholarly review at the highest levels. The fact that such a review has not occurred since the uncovering of this hazard in 1978 is all the more reason for an expeditious and competent panel of experts to do so now. The potential risks are so large and affect such a broad cross-section of our public--particularly those who have bought new homes served by the pipes in question--that to ignore the problem any longer courts genuine danger.

If the Legislature and appropriate state departments do not act now, consumers may well be forced at some later time to pay millions of dollars to avoid a potent health hazard that could be prevented now. In light of the widespread ground contamination with all of these compounds (Attachment 7) and still untested pesticides and structural pest control agents, I urge you to conduct an urgent and immediate review of these findings. In particular, the Legislature should closely monitor the activities and actions taken by the Department of Health Services and Department of Consumer Affairs.

Therefore, the Department of Consumer Affairs strongly urges the following actions be taken by the Legislature:

1. The Environmental Impact Report on plastic piping now being prepared by SRI International must include an analysis of the potential for plastic pipes to absorb organic solvents, petroleum distillates, and other agricultural and industrial residues in the soil.

2. As an immediate interim measure, pending answers to the significant health issues raised in this letter, the Department of Health Service should immediately amend its regulation (22 Cal. Admin. Code 64624) which currently prohibits the use of plastic pipe in soil contaminated by petroleum distillates to:
(a) also prohibit the use of plastic pipe in soil contaminated by organic solvents or pesticides;
(b) require certification by the installers of the plastic pipe that the soil has been tested prior to installation and found to be uncontaminated;
(c) require the installers to notify the end-users of the plastic pipe, residents or businesses, that plastic pipes are part of their water delivery system and that in the event of soil contamination by absorption of the pollutants.

3. Because the Department of Health Services' Waterwork Standards apply only to water purveyers in the public right of way, the State Department of Housing and Community Development should promulgate on an emergency basis the same regulations for private property water service piping.

4. This issue must not be seen in isolation. The health questions raised by this issue and, in particular, the difficulties we face in answering them are common problems across the spectrum of toxic hazards. For the specific issue of absorption of solvents by plastic pipes, the consumers of California enjoy the participation of the responsible industry in a large ongoing study (EIR). In many cases they do not. I believe that the Legislature must give consideration to a mechanism whereby the state can <u>require</u> the participation of the responsible industry in studies

necessary to determine if a product or substance poses a health hazard to the public. Without the ability to fairly and consistently require the participation of the responsible industries in such studies, the state will be unable to adequately protect the public's health from the myriad of potential hazards being used in or introduced into the market place today.

Sincerely,

Richard B. Spohn
jne.

RICHARD B. SPOHN
Director

Attachment #1

ITEM 70 — Section 1004

(c) No water pipe or fittings manufactured of materials capable of leaching known carcinogens or toxic materials into the potable water supply shall be used anywhere in the potable water distribution system.

REASON FOR CODE REVISION:

For consumer protection. Protection of the water supply is one of the major purposes of a plumbing code.

Code Committee's Recommendation: REJECT

REASON: Impossible to enforce.

Approved . . . . Reject . . . . Refer to appropriate Committee . . . .

Attachment #2

2 CIVIL No. 64671

IN THE SUPREME COURT OF THE STATE OF CALIFORNIA

IN BANK

SUPREME COURT
FILED
SEP 1 1982
Clerk

SPOHN, AS DIRECTOR, ETC., ET AL.

v.

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

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

(Addendum I)

QUANTITATIVE ASSESSMENT OF PERMEATION OF SPECIFIC CHEMICALS FOLLOWING ONE WEEK DWELL TIMES FOR PIPE SYSTEMS*

Chemical:	1,1 Dichloro-ethylene	1,2 Dichloro-ethane	Trichloro-ethylene	1,1,1 Trichlor-oethane	1,2 Dichloro-propane	Gasoline
Pipe Composition						
Polyethylene (PE)	2.4×10^{-2}	9.4×10^{-3}	2.7×10^{-3}	4.6×10^{-5}	1.8×10^{-6}	(1.3×10^{-4})
Polybutylene (PB)	2.9×10^{-2}	1.2×10^{-2}	5.0×10^{-3}	2.5×10^{-5}	3.1×10^{-7}	(7.8×10^{-5})
Polyvinylchloride (PVC)	saturated	saturated	ND	2.2×10^{-9}	9.8×10^{-10}	ND
Copper (Cu)	ND	ND	8.0×10^{-7}	4.6×10^{-9}	ND	(5.7×10^{-7})

*Concentrations in Water (10^{-2} = %; 10^{-3} = parts per 1,000; 10^{-4} = parts per 10,000;
10^{-5} = parts per 100,000; 10^{-6} = parts per million; 10^{-7} = parts per 10 million
10^{-8} = parts per 100 million; 10^{-9} = parts per billion)

ATTACHMENT 3

ATTACHMENT 3

Anlab

ANALYTICAL LABORATORY
A DIVISION OF DEWANTE & STOWELL

1914 S STREET, SACRAMENTO, CALIFORNIA 95814 • 916-447-2946

November 29, 1982

Leonardini and Fathy
400 Capitol Mall, Suite 221
Sacramento, CA 95814

ATTN: Mr. Raymond J. Leonardini

-- ABSTRACT --

PILOT PIPE STUDY

Three plastic water supply pipes: polyvinylchloride (PVC), polyethylene (PE), and polybutylene (PB), were exposed to selected compounds to determine permeability. Copper pipe was included as a quality control sample. The exposure chemicals were: 1,2,-Dichloropropane; 1,1,1-Trichloroethane; Chlordane (72% formulation diluted 1:100 v:v in water); Chevron Super-Unleaded Gasoline; and Tap Water as a quality control blank. Exposure time was one week.

Results indicate that PVC is permeated by 1,2-Dichloropropane and 1,1,1-Trichloroethane; PE and PB were permeated by 1,2-Dichloropropane, 1,1,1-Trichloroethane, and Gasoline. In addition, results of the control samples indicate that several compounds leach into the water from the pipe material; sealants, glues, joining compounds, flux, etc. The data indicates that as the compounds permeate the pipe they also extract and carry with them other soluble compounds in the pipe material. Comparison of small quantities of leachate compounds to exposed pipes was not always possible due to necessary dilutions of the samples because of the high concentrations of other compounds.

Roger A. Elliott

Roger A. Elliott

RAE:lk

tion, ZWO will be allowed to allocate per cent of the observing time to Dutch astronomers. It has not yet been decided precisely how the Netherlands will help to solve the manpower shortage. When the observatory is fully operational, Professor Smith estimates that about 30 technical staff will be needed in La Palma at any one time. The difficulty is in persuading sufficient British scientists to uproot themselves for three years at a time.

ZWO has decided to pay its share out of its existing budget of about £40 million a year. Most of the money will come from the £6 million a year now spent on astronomy, implying a major shift in astronomy funding. Although most Dutch astronomers are expected to welcome the agreement, radioastronomers may feel hard done by.

The next step is for Professor van Lieshout, director of ZWO, to obtain the approval of the Dutch minister for science, who is reported to be enthusiastic. But the imminent Dutch election could mean that the issue will have to be decided by a new minister. All being well, however, Professor van Lieshout hopes that an agreement could be signed and sealed within the next four months.

Judy Redfearn

Toxic waste

Dutch dumps

Amsterdam

The cost to the Netherlands of dealing with chemical waste from years of heavy industrialization is mounting. So far about 3,000 dumps containing chemical waste have been found, 500 of them a recognized danger to public health. The Minister for Public Health and Environmental Protection estimated a few months ago that it would cost about £200 million to clear the 500 dangerous dumps, and this estimate is now £400 million.

In the village of Lekkerkerk, not far from the heavily concentrated chemical industries of Rotterdam, many buildings were found to have been built on a chemical waste dump. About 1,700 drums were recovered from the site, containing materials such as toluene and xylene from the dye industry and metals such as cadmium, zinc and lead. Some 300 houses were evacuated and 150,000 tons of polluted soil have had to be removed, while medical examinations may yet be carried out on the population. Several more chemical waste dumps have since been found in the same area.

After cases of cattle infertility and the discovery of dead birds, an investigation by the municipal environmental laboratory of Amsterdam has revealed that the Volgermeerpolder, a marshy area 5 miles from the centre of Amsterdam, contains about 10,000 drums of chemical waste from a 2,4,5-T factory previously owned by Philips-Duphar. The factory ceased production in 1969 and was completely dismantled and dumped in the Atlantic, but its waste remained.

According to Dr H. Heida, director of the Amsterdam environmental laboratory, the drums contain a wide range of chemicals, including chlorobenzene and chlorophenol. However, some of the drums are known to contain 2,4,5-T and possibly the dioxin 2,3,7,8-tetrachloro-cyclodibenzo-*p*-dioxin (2,3,7,8-TCDD), and it is this latter compound which it is feared may form the real danger.

Analysis of soil, water and livestock and of produce from gardens in the area has revealed the presence of chemicals from the dump in concentrations of tenths to hundredths of milligrammes per kilogramme weight.

However, the future of the dump rests on the problem of clearly identifying 2,3,7,8-TCDD. Samples from the drums have been analysed by Professor O. Hutzinger's team at Amsterdam University

The clearing of Lekkerkerk

and have also been sent to Milan for analysis by the laboratory involved in investigating the Seveso incident. A definite solution to the problem is not expected before the summer.

These pollution scandals prompted a national inventory of chemical waste in the Netherlands due to be completed by the end of 1980. So far, however, only two of the eleven Dutch provinces have reported their findings.

The problems of the Netherlands have also attracted international interest. Dr David Costle, administrator of the US Environmental Protection Agency, visited the Lekkerkerk dump while he was in the Netherlands to sign a memorandum on cooperation between the two countries. Dr Tolba of the United Nations Environmental Programme, a regular visitor to the country, is particularly interested in the chemical pollution problems.

The latest revelation was in December of last year, when small amounts of the toxic substance methyl bromide were found in drinking water in the horticultural area [illegible] chemical is used by market gardeners to disinfect the soil, and an estimated 2,000 tons a year are used in this area — 30 per cent of the total consumption in the European Community. The poison had apparently seeped through the PVC tubes used for private water distribution. As a result, the Minister for Public Health has made public water supply companies responsible also for private supply pipes. However, it now turns out that PVC tubes are widely used in the Netherlands for transporting water which has been tested for pollutants such as methyl bromide.

Casper Schuuring

Genetic engineering

Planning bugs

Washington

Echoes of the fierce public debates of four years ago are being heard once again in and around Cambridge, Massachusetts, as local city councils discuss the conditions they will place on the genetic engineering companies springing up in their midst.

The tones of the debate are more muted than before. And in each of the four communities — Cambridge, Waltham, Somerville and Newton — the talk this time is of negotiation rather than confrontation. Nevertheless, there is sufficient concern among the companies for the head of at least one to suggest the need for a "more coherent policy" towards local regulation, possible at the state level.

The most significantly affected so far seems to have been Genetics Institute. This is the company which has been set up by Dr Mark Ptashne, professor of molecular biology at Harvard University, and a local management consultant, Mr Tom Hexner, on privately-raised venture capital, after the Harvard faculty voted against university participation (see *Nature* 27 November 1980). Its backers include Venrock, a venture capital firm owned by the Rockefeller family, and Mr William Paley of Columbia Broadcasting.

Now the company faces a new hurdle — gaining acceptance in the local community. Last November, it applied to build a laboratory in Somerville, just inside the city's border with Cambridge and a few blocks from the university biology laboratories. The application has kindled a fierce public debate. At one point, for example, local citizens had suggested that research should be limited to P1 and P2 physical containment facilities, even stricter than restrictions in Cambridge, which allow work up to the P3 level.

City council members who were originally in favour of granting permission for the new laboratories with few strings attached have backed off in the face of the public controversy; many are preoccupied with severe budget cuts that have resulted from a recent reduction in property taxes.

At a public meeting last Thursday, the

EAST BAY MUNICIPAL UTILITY DISTRICT

Attachment #4

November 28, 1978

RECEIVED

NOV 29 1978

DEPT. OF HEALTH SERVICES
LEGAL SERVICES

Mr. Richard H. Koppes
State Department of Health Services
Office of Regulations
714 "P" Street, Room 840
Sacramento, CA 95814

Dear Mr. Koppes:

Thank you for your invitation to comment on proposed changes in the regulations of the State Department of Health Services, Title 22, Division 4, Waterworks Standards (R-1-78). The draft is satisfactory from my viewpoint except for one addition I recommend:

Based on our field experience and laboratory tests with plastic pipe materials, the following addition to the standards is proposed:

Section 64624

"(g) Copper service installations shall be used where the service lateral or distribution pipe may be exposed to gasoline, solvents or other petroleum distillates."

Laboratory tests studying gasoline diffusion through polybutylene (PB), polyethylene (PE), and polyvinyl chloride (PVC) service lateral tubing showed that PE and PB pipe under 40 psi water pressure and embedded in gasoline-soaked vermiculite were penetrated by gasoline in one to three weeks. PVC pipe was not permeable to gasoline during a six-week exposure. At least three instances of petroleum distillate penetration of polybutylene pipe have been encountered in the field by District Water System Inspectors. There is some indication that PVC is softened by some solvents and petroleum distillates, thereby reducing pipe strength.

Please contact Mr. Keith Carns, Manager of our Water Quality Division, if you have any questions regarding this addition to the regulations.

Very truly yours,

D G Larkin

D. G. LARKIN

cc: Steve Nelson, DHS
2151 Berkeley Way
Berkeley, CA 94704

RECEIVED

DEC 1 1978

REGULATIONS

For Distribution to
the Commissioners
4-3-81

EBMUD

Attachment #5

EAST BAY MUNICIPAL UTILITY DISTRICT

March 23, 1981

Department of Housing & Community Development
Division of Codes and Standards
6007 Folsom Blvd., 2nd Floor
Sacramento, CA 95819

Attention: Ms. Grace Sung

Dear Ms. Sung:

I have recently been informed of the action by the Department of Housing and Community Development which effectively excludes the use of polybutylene plastic piping in plumbing systems. This has occurred because polybutylene is normally joined by flare fittings and the Department's action in excluding flare connections effectively excludes the use of polybutylene.

You may be interested to know that this District, which has been a pioneer for more than twenty years in the use of plastic piping for water systems, has used polybutylene for its smaller residence type services for more than ten years. During these past ten years, we have installed approximately 35,000 services thru-out the District's distribution system ranging from Crockett to Hayward, and Oakland to Walnut Creek. The majority of these services are polybutylene utilizing a flare connection at the main and at the meter. During this period, our experience with this system has been excellent. The very few problems we have had were primarily due to workmanship or an off-size fitting.

From our experience, it appears that the action to exclude the use of flare connections on polybutylene piping was taken without due regard for the excellent service history this material with flare fittings has earned thru-out the United States.

Very truly yours,

Donald E. Crum

D. E. CRUM, Manager
Distribution Maintenance Division

DEC/pcs

Table II

Steel Pipe Coatings and Linings

Type of Coating or Lining	*Standard*
Cement Mortar Coating or Lining	AWWA C205-71 or Federal Specification SS-P-385a
Coal Tar Coating, Lining or Wrapping	AWWA C203-73
Asphalt Mastic Coating	Asphalt Institute M-2 CS-96
Extruded Plastic Coating	Federal Specification L-C-530B (1972)
Rubber-Alkyd Paint Coating	AWWA C204-75
Cold Applied Tape Coating	AWWA C209-76
Coal Tar-Epoxy Coating	AWWA C210-78
Asphalt Coating and Wrapping	Standard Specifications for Public Works Construction (1973), Section 207-10.4.4

NOTE: Authority cited: Sections 208 and 4010.1 (h), Health and Safety Code. Reference: Sections 4010.1 (h), 4012, 4013 and 4018, Health and Safety Code.

64624. Water Main Selection and Installation.

(a) Steel pipe shall be selected and installed in accordance with American Water Works Association (AWWA) Manual M-11 (1964), "Steel Pipe—Design and Installation". The design shall comply with Sections 6.1 and 6.2 of the manual, except that the minimum design pressure shall be at least the maximum anticipated system pressure, but in no case less than 150 psig (1,030 kPag).

(b) Asbestos-cement, cast iron and ductile iron pipe shall be selected and installed in accordance with the standards listed in Table III.

(c) Polyvinyl chloride pipe shall be selected and installed in accordance with Appendix A of AWWA Standard C900-75 as published in the *American Water Works Association Journal, 67(12)*: 701–704 (December 1975).

(d) Polybutylene pipe shall be selected and installed in accordance with Appendix A of AWWA Standard C902-78 as published by the American Water Works Association (Denver, Colorado, 1978).

(e) Polyethylene pipe shall be selected and installed in accordance with Appendix A of AWWA Standard C901-78 as published in the *American Water Works Association Journal, 70(4)*:233–236 (April 1978).

(f) Plastic pipe shall not be used in areas subject to contamination by petroleum distillates.

Attachment #7

(Addendum #2)

LISTS OF COMPOUNDS FOUND IN WATER SAMPLES

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.

---

* 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.

1500 - 5TH STREET, SACRAMENTO 95814 - DEPARTMENT OF GENERAL SERVICES - STATE OF CALIFORNIA

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, 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

Item #5

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 [illegible] 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.

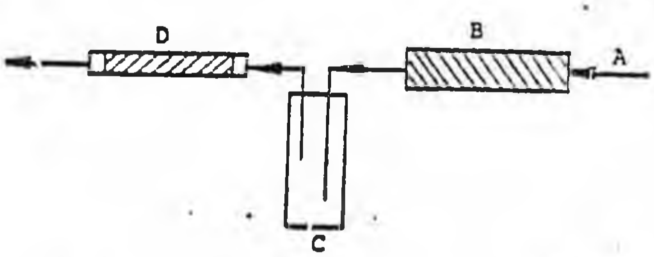

Figure 1. Sample Collection Scheme

ALSO SUBMITTED 12-7-?? 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).

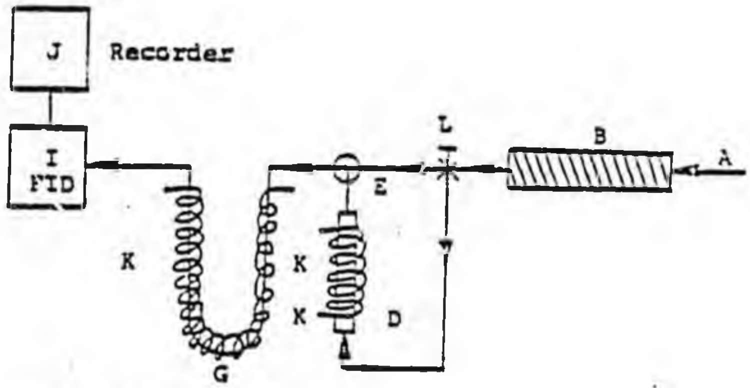

Figure 2. Sample Analysis.

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® (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

STATE OF CALIFORNIA EDMUND G. BROWN JR., Governor

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 N. Wasserman

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

DKJ:dw

Item #11

RICHARD A. ELBRECHT, A. PAUL GRIEBEL,
ROGER DICKINSON, KATHLEEN E. DOYLE,
LAURA W. KAPLAN
DEPARTMENT OF CONSUMER AFFAIRS
DIVISION OF CONSUMER SERVICES
1020 "N" Street, Room A-602
Sacramento, California 95814
Telephone: (916) 445-5126
Attorneys for Plaintiff RICHARD B. SPOHN,
Director of the California Department of
Consumer Affairs

GEOFFREY COWAN, Attorney at Law
10951 W. Pico Boulevard
Los Angeles, California 90064
Telephone: (213) 470-3000
Attorney for Plaintiffs FRIENDS OF THE EARTH,
CONSUMER FEDERATION OF CALIFORNIA, AND
AILEEN ADAMS

RAYMOND J. LEONARDINI
LEONARDINI & FATHY
A Professional Corporation
400 Capitol Mall, Suite 221
Sacramento, California 95814
Telephone: (916) 441-4405
Attorney for Plaintiff STATE BUILDING &
CONSTRUCTION TRADES COUNCIL OF CALIFORNIA,
AFL-CIO

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF LOS ANGELES

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,

v.

INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAN OFFICIALS, a California corporation, and DOES I through XX,

Defendants.

No. C395294

FIRST AMENDED COMPLAINT FOR INJUNCTION AND OTHER APPROPRIATE RELIEF

ordered filed
10/20/82

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

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.

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STATE OF CALIFORNIA
STD 113 (REV 8-72)

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

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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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, PB, 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.

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

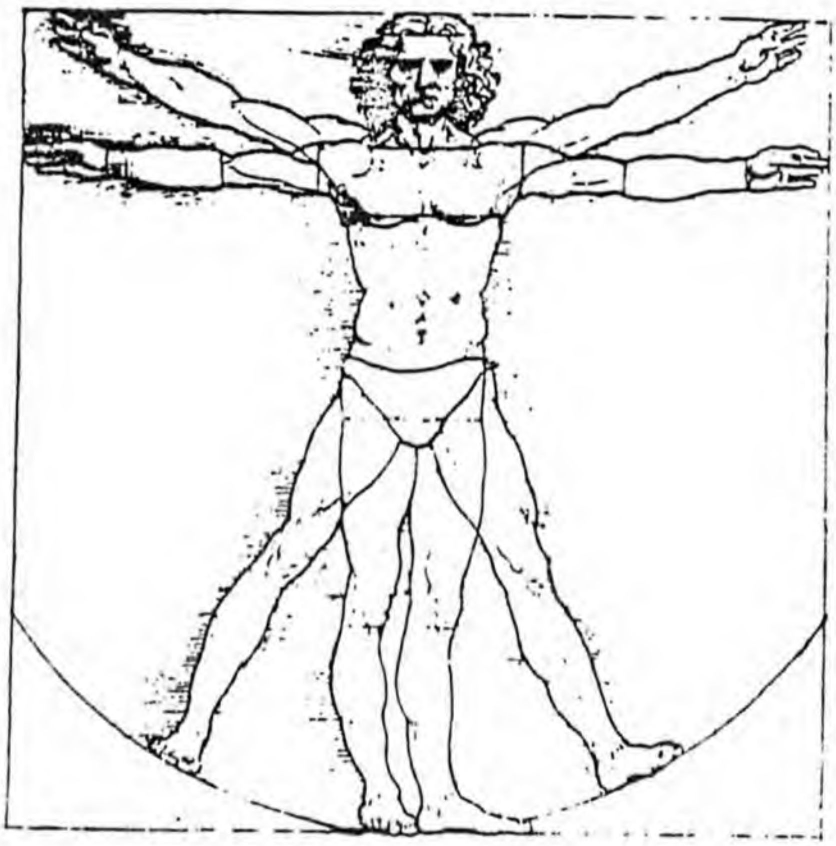
Justice

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

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* 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.

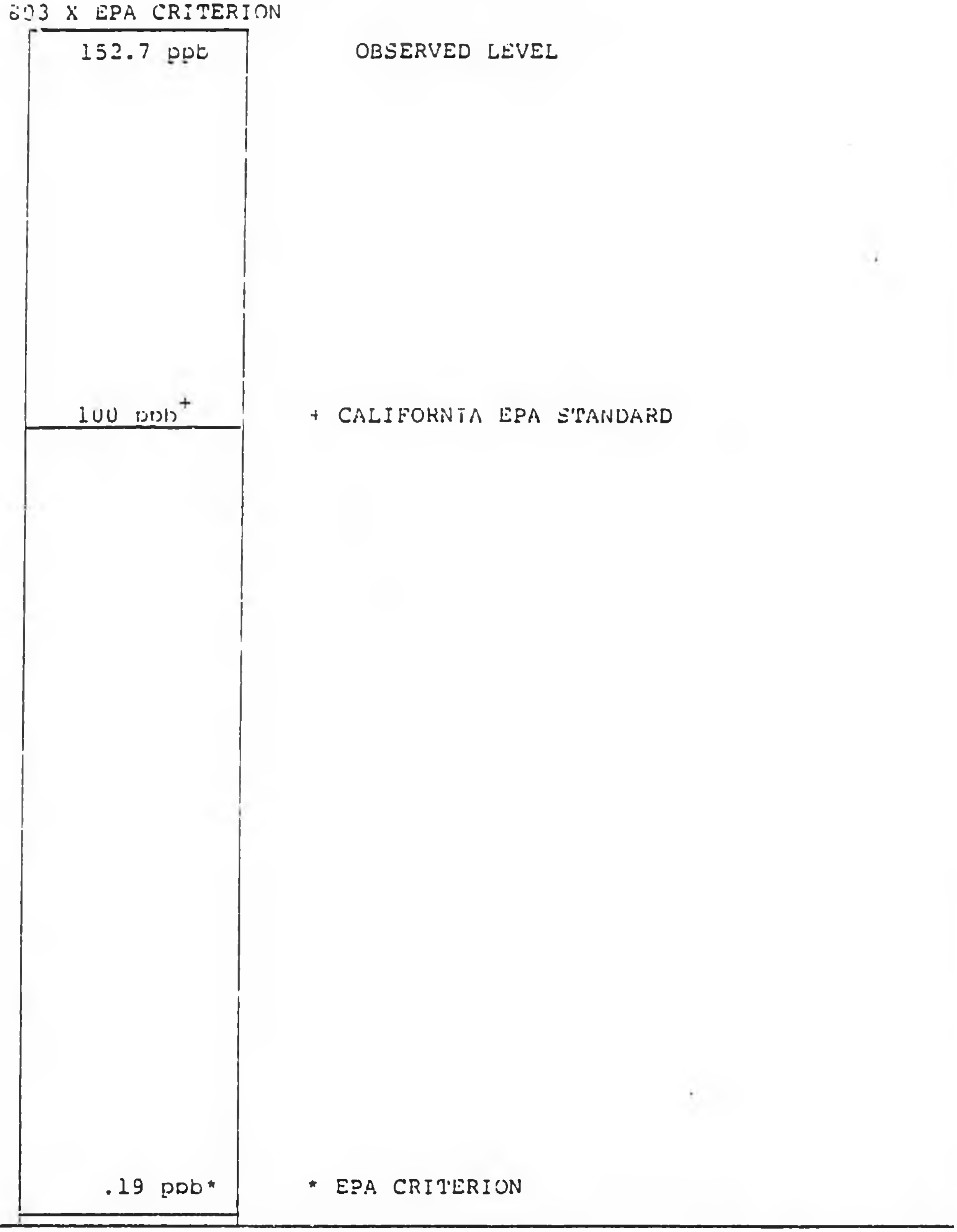
+++ The average total trihalomethanes (77.83) represents a 409-fold increase over the EPA Suggested Water Quality Criterion.

(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 I

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

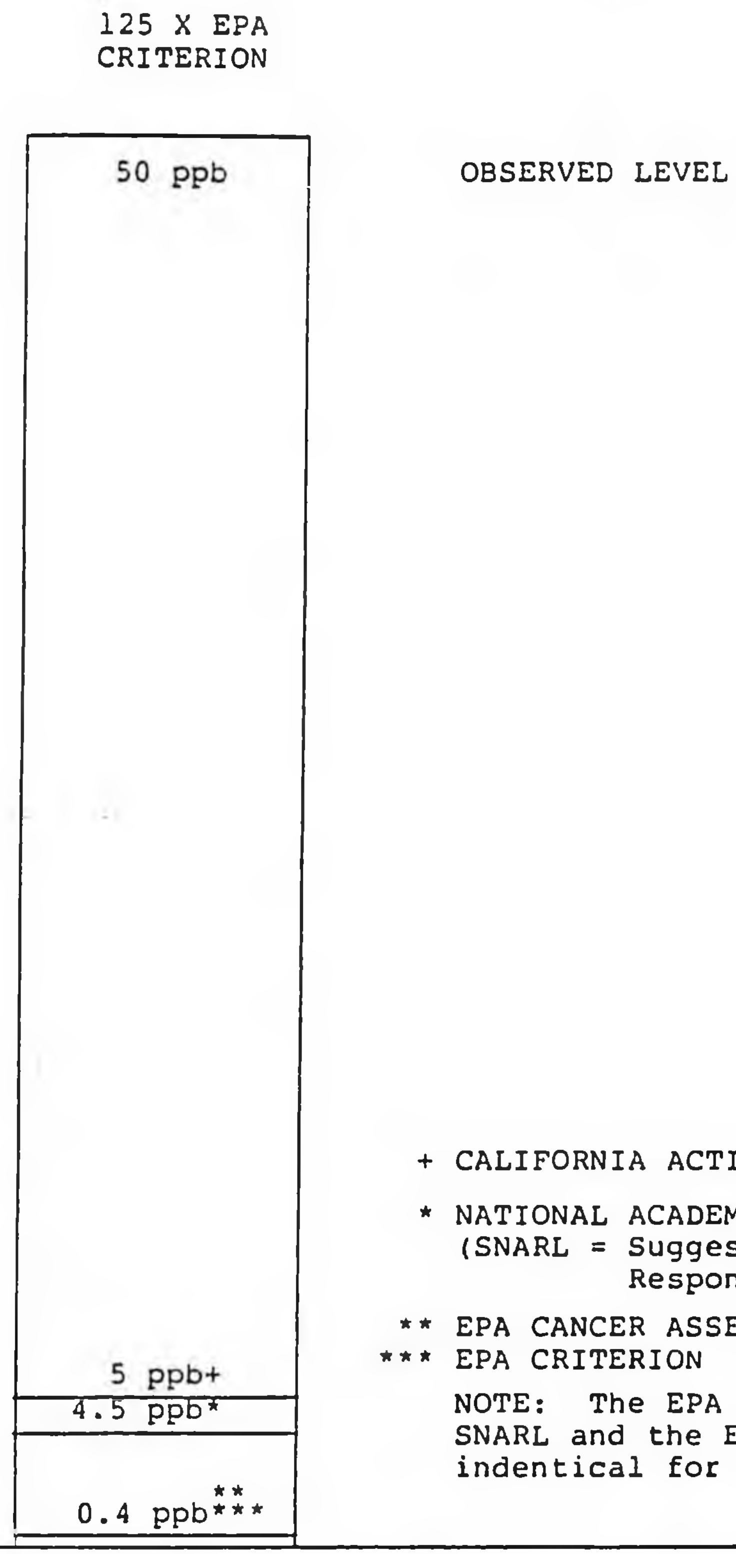


0 = EPA PREFERRED LEVEL

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

FIGURE II. Test 4 Result

CARBON TETRACHLORIDE



+ CALIFORNIA ACTION LEVEL

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

** EPA CANCER ASSESSMENT GROUP SNARL

*** EPA CRITERION

NOTE: The EPA Cancer Assessment Group SNARL and the EPA Criterion are indentical for this compound.

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

* 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

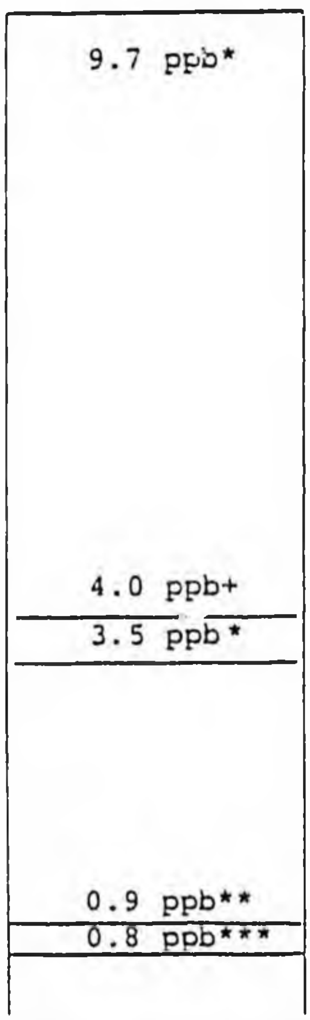
\+ Value represents a ten-fold increase over the California Action Level and 125-fold increase over the EPA Suggested Water Quality Criterion.

++ 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

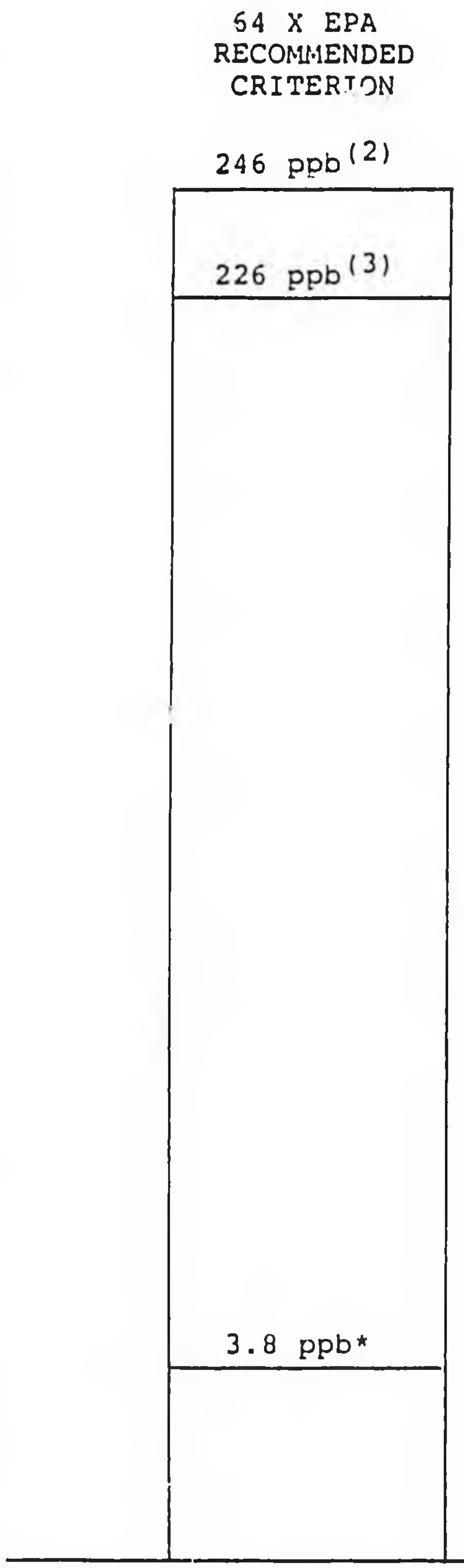
EPA SUGGESTED AMBIENT WATER CONCENTRATION SHOULD BE 0 FOR MAXIMUM PROTECTIO
OF HUMAN HEALTH

FIGURE IV

Di-(2-ethylhexyl)phthalate (DEHP)

VOLATILE COMPOUND LEVELS FOUND IN TWO STATIC SAMPLES

CONCENTRATION ($\mu g/l$) (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).

Item #14

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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 back-fill 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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YALE, ROBERT A. Water Utilities' Use of Plastic Pipe - Skagit County Jour. AWWA 63:124 (Feb. 1971)

ALASKA STATE LEGISLATURE
HOUSE OF REPRESENTATIVES
RESEARCH AGENCY

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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:

LEONARDINI AND FATHY, ATTORNEYS AT LAW
GENERAL COUNSEL
CALIFORNIA PIPE TRADES COUNCIL
SACRAMENTO, CALIFORNIA

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 and independent investigations on the Nevada fire led the State Fire Marshal to conclude: "... plastic pipe may have played a contributing role in...(the) tragic fire...in Las Vegas, and many news accounts describe the precise problems I alluded to in my reports to the (State Housing) Commission." (See Exhibit 1.) The Fire Marshal went on to "strongly recommend" specific research and standards evaluation prior to any approval of plastic pipe for high-rise construction.

II

HEALTH HAZARDS FOR WORKERS

In May 1980, the California Department of Health Services did the first compilation of medical literature and research data on the potential hazards to workers when exposed to the wide variety of toxic chemicals found in plastic pipe and glues. As with the State Fire Marshal, the Health Department's effort was the first major push by an independent governmental agency to fully evaluate heretofore disparate and complex chemical data. Their conclusions (see Exhibit 2) are wide-sweeping and "suggest the possibility of serious and previously unrecognized health effects among workers who install plastic pipe....Consequently, it is not clear that such pipe can be used safely under present conditions."

Unfortunately, but not unexpectedly, the petrochemical industry deliberately misrepresented the major findings of the Health Department, specifically Cal/OSHA. The Plastic Pipe and Fitting Association (PPFA) went to such an extreme in twisting and contorting the facts on plastic pipe that on March 5, 1981, the Deputy Chief for Health of the California State Occupational Safety and Health Administration wrote to the California Housing Commission to correct the false information. "...The PPFA has inappropriately extracted parts of our overall study, developed misleading statements and made these available to the press." (Exhibit 3.) Dr. Wade continued, "...we carefully identified what is known of the real and potential toxicity of these materials as well as the areas where we have inadequate information." He re-emphasized the importance for "all interested parties" to look at the evidence collected "in total" as presented in the May 1980 report.

The California Health Department in November 1980, publicly testified on the relevance of its May 1980 "Interim Report":

> "We think further study is urgently needed about the possibility that some events in and around the construction of pipes, particularly, and the pipes that we have been studying may be associated with increases of cancer in workers, particularly lymphomas.... We also have a long list of adverse effects." (Reporter's Transcript, Commission on Housing and Community Development Hearing, November 24, 1980, p. 70.)

The health survey of plumbers in California reported, among other things, 54 lymphomas out of approximately 10,000 respondents. This staggeringly high rate of lymphoma drew the specific attention of the USC Medical School where the country's foremost research in lymphoma is being conducted.

In late 1980, Alexandra Levine, M.D., after an analysis of the biological slides and medical records of the first five cases submitted to the medical school, mmented: "It is noteworthy to me that all five of these patients with documented diagnosis of lymphoma have had quite extensive exposure to plastic materials which were used during the course of their work." (Exhibit 4.)

In sum, the medical research conducted by the California Health Department, the Occupational Safety and Health Administration, USC Medical School and others, clearly documents the potential for serious, long-range health problems from worker exposure to plastic pipe and its glues.

III

ENVIRONMENTAL CONTAMINATION

Perhaps the most frightening aspect of the multi-faceted issues with plastic pipe concerns general environmental contamination. The toxic chemicals in plastic pipe and its cement solvents appear to be capable of leaching into the environment and thereby causing unalterable damage to our plants, our aquatic life, and our food chain.

For example, a study done by the California Analytical Laboratories and reviewed by the State Department of Health Services, documents the previously unknown presence of "impurities" in plastic pipe. The impurities include known carcinogens such as chloroform, benzene, DEHP, acrylonitrile, and styrene, as well as other toxic chemicals on the EPA list of priority pollutants. (Exhibit 5.) This poses not simply a human health risk to workers who install plastic pipe, but as discussed in more detail below, to consumers who drink water from plastic pipe. Furthermore, it points to a definite risk to the environment generally from the waste discharge of water flowing through plastic pipes. The subject chemicals will add to the existing load of pollutants known to have serious environmental effects because they display all of the characteristics of such chemicals: they can be accumulated in living organisms and food chains, and may be widely dispersed in the environment.

Policy makers may find it helpful to reflect on the numerous requests from public interest groups -- consumer groups, environmental coalitions, womens groups, public interest lawyers -- who have called for comprehensive analysis and evaluation of these potential long-range contamination factors before plastic pipe use is allowed to expand. (Exhibit 6.)

IV

PLASTIC PIPE FOR POTABLE WATER

(Poly Vinyl Chloride [PVC]
and Chlorinated Poly Vinyl Chloride [CPVC])

In the course of its exhaustive research of the scientific literature on plastic pipe, the California Department of Health Services found a previously unheralded article indicating that plastic pipe leaches its solvents into the drinking water. To confirm the potentially incalculable health consequences of this article, the Department of Health Services commissioned the Montgomery Testing Laboratory to conduct the first government sanctioned study to measure the amount of solvents that leached into drinking water from plastic pipe.

The landmark Montgomery test is highly controversial because it simply provides raw test data. Moreover, because the simulated pipe configuration test incorporated an arguably improperly designed pipe "fitting density," experts in the State Department of Health Services estimate the possibility of a 50 percent sampling error. That is, the results of the Montgomery tests may be understated by as much as 50 percent ("Final Report on Potential Health Hazards Associated with the Use of Plastic Pipe in Potable Water System," Department of Health Services, p. 16).

Yet, even with a conservative evaluation of the data, alarming interpretations result. The Department of Health Services stated in their final report:

"With the possible exception of the leaching of the phthalates (DEHP), the principal public health finding of this study is the possibility of excessive amounts of solvents and carbon tetrachloride, chloroform and tetrachlorethene accumulating during the stagnant period between initial installation of plastic pipe and occupation of the dwelling." (Exhibit 7.)

The other conclusions in the final report of the Department of Health Services are tremendously complex and must be viewed in their proper context. For example, extensive "flushing" of the system "may" decrease the risk of abuse from the solvents leaching into the water. However, some of the so-called "volatile organic" chemicals in plastic pipe itself "can accumulate in chlorinated water" notwithstanding the flushing requirement. (See Exhibit 7, p. 35.) One of these chemicals (carbon tetrachloride) was present in the water at 10 times the EPA action level. Other equally dangerous chemicals (chloroform, tetrachloroethylene, DEHP) found at equally high and dramatic levels may not be reduced by flushing. For example, the Department stated:

"Because the possibility exists that some of these elements (carbon tetrachloride, chloroform, and tetrachloroethylene, DEHP) may be coming from the pipes themselves, particularly plasticizers, there is every possibility that they could build up on a longer interim after the initial flushing." (Reporter's Transcript, Commission on Housing and Community Development Public Hearing, November 24, 1980, p. 76.)

So damaging were the findings of the Montgomery tests and the Department of Health Services' evaluation, that the Plastic Pipe and Fitting Association (PPFA) proceeded to initiate a nationwide media strategy to "explain" the results.

In a January 19, 1981, letter from the National Association of Plumbing, Heating, Cooling Contractors (PHCC) to Dr. Marc Lappe', California Department of Health Services, the PHCC Technical Director complained to the California Health Department as to the reliability of the PPFA's explanation that the Health-commissioned tests showed plastic pipe and its glues were safe. The Contractors had received a number of inquiries from their members concerning the trustworthiness of the Plastic Pipe and Fitting Association's news accounts. The Technical Director of the Contractors requested back-up support information from the Plastic Pipe and Fitting Association. The information provided by the plastic pipe industry apparently was so poorly drafted, with unsigned reports, and missing data, that the Contractors decided to request review from the California Department of Health Services. In asking for Health Department reviews, the Contractors commented: "It is interesting to note how your report is reworded (by PPFA) or interpreted to mean something rather different from what was generated by your organization."

The California Health Department response (Exhibit 8) to the Contractors' request was directly to the point. According to Health, the Plastic Pipe Association's reports were "flawed," "incomplete" and "do not reflect accurately our own interpretation of the findings." The California Health Department reached "totally different conclusions regarding potential risks than did this (unidentified industry group of toxicologists) review committee." The PPFA press release was "factually in error and seriously misleading regarding our findings."

In particular,

1. "PPFA did <u>not</u> submit Table 19 of the Montgomery Study to PHCC which "contained the highest readings on chemicals of concern to us, and substantially changed our analysis of the final results. (Table 19 attached for comparison.)"
2. PPFA's characterization that "solvent levels did not exceed safety values "severely distort(s)

the actual findings of the (Montgomery) Report." Specifically, the Health Department found that "solvent levels did exceed recommended (safety) values..."

3. Contrary to PPFA assertions that some chemicals found in the Montgomery tests were not found in the pipe but were induced from sloppy laboratory procedures, the Health Department stated "we resolved (that) issue...by repeat testing and concluded that the evidence pointed to the pipes or a combination of pipes and solvents as the source of DEHP and not laboratory artifact."

In a nutshell, the California Health Department found that the Plastic Pipe and Fitting Association had seriously misrepresented the real health and safety dangers with drinking water coming from plastic pipe.

As with the worker safety question, the plastic pipe industry again distorted, misrepresented, and inaccurately quoted California governmental reports on health and safety to the extent that each of these governmental agencies had to specifically correct the record. It is no wonder that the Director of the California Department of Consumer Affairs recommended:

> "It would be unwise to decide now to expose Californians in their homes to what may be an extremely serious health hazard." (Exhibit 9.)

V

POLYBUTYLENE PIPE FOR POTABLE WATER

Since the Montgomery test for plastic pipe drinking water safety was based on the hypothesis that solvents used to cement these plastic pipes leached toxic chemicals into the drinking water, the Department of Health Services did not request a study of polybutylene (PB) as this pipe does not require solvents for installation.

Yet because polybutylene is part of the generic plastic pipe grouping, it may have many of the same additives, stabilizers and plasticizers as PVC, CPVC and ABS.

In early 1981, the California Department of Consumer Affairs petitioned the State Housing Commission requesting the same stringent testing for PB as the Commission mandated for CPVC and PVC. In this context, the California Health Services Department analyzed the first research conducted on PB pipe itself. The results were alarming. (See Exhibit 10.)

In particular, the tests conducted by the California Analytical Laboratories found 50-500 ppm (parts per million) of DEHP (a known animal carcinogen) in the pipe itself. The United States Environmental Protection Agency (EPA), in a document published at the end of 1980 entitled "Priority Review Level 1 - Di-(2-ethylhexyl) Phthalate (DEHP)," recommends "appropriate action(s) under the Toxic Substance

Control Act, section 6 to prevent or reduce the carcinogenic risks from exposures to DEHP." (page 129).* Subsequent tests on other polybutylene pipe used for flexible connections to plumbing fixtures also found DEHP. (Exhibit 12.)

The results were all the more disturbing because the representative of Shell Chemical Company had testified on the public record that polybutylene pipe did not contain DEHP. The combination of Shell's apparent discrepancy in testimony and the data developed by California Analytical Laboratories finding DEHP, led the Department of Health Services to state:

> "It is disturbing that the (State Housing) Commission was given such apparently misleading testimony (by Shell), since the potential leaching of this compound (DEHP) if present in the type of polybutylene used for potable water poses a potential health hazard to consumers." (Exhibit 13.)

The Department of Health Services went on to conclude that "obviously this situation deserves immediate at-

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* The same EPA document reviewed the DEHP data from the Montgomery Tests on PVC and CPVC. (The test on PB had not been completed.) This document commented: "These data represent the most reliable data on levels or potential levels in drinking water from DEHP containing plastic pipe." (Exhibit 11.)

tention because of the health risks at stake."

To counter this substantive finding, Shell Chemical Company commissioned a first test to be conducted by Radian Labs of Austin, Texas. (Exhibit 14.) While purporting to show the absence of DEHP or any other toxic chemicals, the company's first test was so flawed as to be of little value. (Exhibit 15.)

At the April 20, 1981 public hearing before the California Housing Commission, the representative from the State Department of Health Services stated unequivocably that the chemical found by the California Analytical Labs was "without question" DEHP. Furthermore, the Health Department spokesperson specifically identified a three-member panel within the Health Department which had reviewed the California Analytical Laboratories Test. This impartial panel found the test to comply with strict EPA testing protocols and to be scientifically valid. The Health Department went on to assert that DEHP was also found, in smaller amounts, in Shell's own tests of the PB pipe conducted by Radian Labs.

Presumably embarrassed by the results of its first test, Shell Chemical Company conducted a second test on its product through the Radian Lab. Unfortunately for the industry, the second test revealed "unknown" chemicals that "have to be evaluated," according to the April 20, 1981 testimony of the Department of Health Services.

In a June 15, 1981 letter, the Department of Health Services expressed "cause for concern" to Shell with the chemicals BHT and alkylbenzene sulphonate, both of which were found in the Radian Lab tests.

> "Recent studies have shown that chronic, relatively low level ingestion of BHT can lead to reduced weight gain, increased liver size and raised serum cholesterol in a number of separate animal tests. Other studies have shown reduced litter size following exposure during embryonic development." (Exhibit 16.)

As of this writing, no additional information has been supplied on these chemicals for the Housing Commission's public record.

In conclusion, the Housing Commission agreed with the Department of Health Services, their own Director of the State Department of Housing and Community Development (Exhibit 17), and the Director of the State Department of Consumer Affairs (Exhibit 18) that polybutylene should not be authorized for use until the plastic pipe is thoroughly and impartially studied. (Exhibit 19.)

VI

CONCLUSION

It is now clear that every major California state governmental agency that has an interest in construction, including the State Department of Consumer Affairs, the State Department of Health Services, the State Department of Housing, the State Occupational Safety and Health Administration and the State Commission on Housing and Community Development, all advocate comprehensive analysis and evaluation of plastic pipe through the rigorously scientific and public procedures of the California Environmental Quality Act (CEQA) before any expansion of use is permitted. To do otherwise violates California law:

> "An adopting agency cannot avoid compliance with CEQA by adopting a 'model' code by reference where the code contains material that was previously found to be subject to CEQA. To do otherwise would violate both the State Building Standards Law and the California Environmental Quality Act." (Exhibit 20.)

Furthermore, major health, consumer and environmental interest groups, specifically the Sierra Club, the

Consumer Advisory Council, Women For, the Center for Law in the Public Interest, have unanimously called for plastic pipe to be scrutinized for long-range health and environmental contamination before plastic pipe is permitted for widespread use.

California Analytical Laboratories, Inc.

401 NORTH 16th STREET
SACRAMENTO, CALIFORNIA 95814
(916) 444-9602

December 31, 1980
Lab No. 12343
Received: 11/17/80

Mr. Raymond Leonardini
Attorney at Law
717 "K" St., Suite 510
Sacramento, CA 95814

Dear Mr. Leonardini:

Attached are the results of our GC/MS analysis of two polybutylene pipe samples received at CAL from a representative of the City of Sacramento Public Works Department and logged under CAL I.D. 12343.

The method of sample preparation and the GC/MS techniques were essentially the same as those employed for the previous analyses of PVC, ABS and CPVC pipe (refer to CAL report of 12 November, 1980, CAL I.D. 12295 and 12298).

Over fifteen components were identified and their levels in the pipe samples estimated. It must be emphasized that the levels are rough estimates only.

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

Sincerely,

Charles

Charles J. Soderquist, PhD
Vice President
Agricultural and Environmental Chemist

CJS/slh

TABLE I

Sample	Compound	GC/MS reference scan no. [a]	Estimated level, ppm (mg/kg)
2343-1	butene	V72	0.1-1.0
	acetone	V92	0.5-5.0
	diethyl ether	V160	0.01-0.1
	methyl cyclopentane	V226	0.1-1.0
	methyl cyclohexane	V324	1-10
	3-methyl hexane	V373	1-10
	3-ethyl-3-methyl pentane	V386	1-10
	heptane	V437	1-10
	5 alkanes ($>C_{16}$)	B407, B421, B479 B496, B647	100-1000 total
	butylated hydroxy toluene (BHT)	B533	50-500
	bis (2-ethylhexyl)phathalate (BEHP)	B633	50-500
	a C_{18}-C_{19} alkene	B681	5000-50,000
2343-2	acetone	V93	0.5-5.0
	diethyl ether	V161	0.05-0.5
	methyl cyclohexane	V325	0.5-5.0
	2,3,3-trimethyl hexane	V388	0.5-5.0
	10 alkanes ($>C_{16}$)	B38[illegible], B407, B420, B478, B488, B507, B540, B549, B596, B646	100-1,000 total

NOTES: a V = Volatile Organic fraction, B = Base/Neutral (hexane-extracted) fraction.

OFFICE OF PESTICIDES AND TOXIC SUBSTANCES, U.S. ENVIRONMENTAL PROTECTION AGENCY

(November 28, 1980)

Addendum

Priority Review Level 1 - Di-(2-ethylhexyl) Phthalate DEHP

After this assessment was completed, Assessment Division received information from the California Department of Health Services, and from representatives of the Plumbers Union concerning actual and projected levels of DEHP in drinking water resulting from the migration of DEHP from plastic water pipe.

Water pipe made from polyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC) and plasticized with DEHP is in common usage and is rapidly replacing copper pipe in new home construction. While the California studies were primarily concerned with solvents used to join the pipe together, data were developed from conditions simulating use situations that indicated that DEHP may be present at up to 246 ppb in drinking water. Limited evaluations of measured levels in drinking water supplies of new homes were up to 110 ppb. These levels are considerably higher than previously recorded for drinking water and represent a risk of 9.4×10^{-5} and 2.9×10^{-5} respectively.

The DEHP levels reported in these studies varied considerably. Factors such as the physical and chemical properties of the water, dwell time, and analytical methodology frequently lead to discrepencies in reported levels for DEHP. However, these data represent the most reliable data on levels or potentials levels in drinking water from DEHP containing plastic pipe.

PAUL A. TAYLOR, Ph.D.
PRESIDENT

CHARLES J. SODERQUIST, Ph.D.
VICE PRESIDENT

ANTHONY S. WONG, Ph.D.
VICE PRESIDENT

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SECRETARY/TREASURER

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March 18, 1981
Lab Nos. 12752/12754
Received: 3/3/81

Ray Leonardini
717 "K" St., Suite 510
Sacramento, CA 95814

Four pipe and fixture connector samples were received from Mr. John Gorman to be analyzed for organic constituents.

CAL I.D.	Sample Description
12752-1	gray fixture connector, PB2110--QEST-H-PB2100-NSF-PW FDR 11-180°F 100 psi ASTM-D-3309 PAS CERT- (unreadable)-B137.80 1/4 CTS-062 080279
12752-2	gray fixture connector, PB2110-IAPMO UPC PB2110-SDR11-1 BSF-pw 1/4 X 3/8-180°-100 psi-D3309-CSA-CERT
12754-1	gray pipe, PB2110--QEST-H-IAPMO-UOC-PB2110-SDR11-NSF-pw 3/8 X 1/2 180°-100 psi-D-3309-CSA-CERT-B137.8 1/23/77
12754-2	black pipe, PB2110--NSF pw ASTM-D3309 100 psi-(unreadable)-180°F-122 1106C-(unreadable)-1,2" CTS SDR-11 P

Sample Preparation: Samples 12752 and 2-foot lengths of samples 12754 were cleaned with detergent, rinsed with copious amounts of water and air dried. Representative subsamples were obtained by filing with a coarse rasp. Each subsample was rinsed with hexane and portions then placed in clean sample tubes with 5 mL of hexane (-a series) and with benzene)-b series). Identical tubes were filled with the same solvents (both were Nanograde quality) to serve as controls. The samples were held under ambient conditions for five days (for GC/MS) and for an additional five days until selective detector GC analysis was made.

Analysis I--GC/MS. Just prior to analysis by gas-chromatography mass-spectrometry (GC/MS), a 1.0 mL aliquot of the extract was removed and spiked with D-10 anthracene as an internal standard. A 5 μL portion was then injected and processed per the EPA Priority Pollutant (B/N fraction) protocol. Compounds were identified by computer searches of an EPA library, and quantities were estimated by comparison to the known amount of D-10 anthracene added.

Only the hexane extracts (-a series) were analyzed by GC/MS. The hexane blank was clean.

Ray Leonardini
Lab Nos. 12752/12754
March 18, 1981
page 2

II. Specific-detector GC. Sample extracts were examined by electron-capture gas chromatography (ECD-GC) and thermionic-specific gas chromatography (TSD-GC); these detectors are generally selective for halogenated and nitrogen and/or phosphorus organics, respectively, although ECD-GC is suitable for the determination of phthalate ester plasticizers.

Results: The GC/MS analyses indicated that all four samples were qualitatively similar in that a series of C_{21}-C_{31} hydrocarbons was present in each; their total concentation was estimated to be in the 500-2,500 ppm (mg/Kg) range. Butylated hydroxytoluene (BHT) was present in each sample at the 10-50 ppm level. Bis (ethylhexyl) phthalate (DEHP) was also found at varying levels in each sample as indicated in Table I.

The TSD-GC analyses indicated that no nitrogen or phosphorus containing organic compounds, which were amenable to GC analysis, were present above 10 ppm.

The ECD-GC analyses indicated that DEHP was present in all samples. Identification and quantitation was based on co-chromatography with an authentic DEHP reference standard. Results are summarized in Table I.

Results of Table I should be considered as minimum values since the efficiency of extraction with either solvent is not known and is probably less than 100%.

Charles J. Soderquist, PhD
Vice President
Agricultural and Environmental Chemistry

Michael J. Miille, PhD
Director of GC/MS Services

CJS/slh

Ray Leonardini
Lab Nos. 12752/12754
March 18, 1981
page 3

TABLE I

Sample	Extractant	ppm DEHP found (mg/Kg)	
		by ECD-GC	by GC/MS
12752-1a	Hexane	4.0	4.5
-1b	Benzene	5.0	n.m.
-2a	Hexane	0.8	0.6
-2b	Benzene	0.7	n.m.
12754-1a	Hexane	≥20	32
-1b	Benzene	≥20	n.m.
-2a	Hexane	1.8	2.1
-2b	Benzene	1.4	n.m.

n.m. = not measured

United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry

LOCAL NO. 375 STREET ADDRESS 3568 Geraghty Street

CITY STATE ZIP Fairbanks, Alaska 99701

SUBJECT MATTER Proposed Substitute for HB 508 DATE January 26, 1984

The Honorable Niilo Koponen
House of Representatives
State Capitol
Pouch V
Juneau, Alaska 99811 (Mail Stop 3100)

Dwight Perkins
245 Marine Way #7
Juneau, Alaska 99801

Dear Niilo and Dwight:

I am enclosing the proposed substitute for HB 508 which has been drafted in legislative form by Art Robson, our house counsel. I am sending a copy of this letter to our legislative friends so that they will know what is occurring.

After Senator Vic Fischer advised us of the pendency of this bill, Art got together with Dwight Perkins to see what had been done elsewhere. They extracted the modifications which were made by the Municipality of Anchorage and those are the modifications made in the proposed substitute bill. This may not be exactly the way we would have done it, but with Anchorage already having thoroughly debated the matter and adopted the new Uniform Plumbing Code in this form, we feel the interests of uniformity require that we all go together so that the State adopts it in the same form. Adoption in this form will take care of all our concerns and fears.

I understand there is a possibility that Rick Eliason will introduce this form in the senate so that it can proceed in both houses simultaneously.

We back this substitute one hundred percent and we hope that our legislative friends will do likewise. I hope to be in Juneau personally later on in the session to get together with everyone on this, the natural gas pipeline proposals, and other matters that effect the work life of our members.

My thanks for all your help.

Sincerely yours,

J. L. ARSENAULT, Business Manager
Financial Secretary - Treasurer
U.A. Local 375

CLM

Enclosure

c.c. The Honorable Don Bennett
The Honorable Richard Eliason
The Honorable Bettye Fahrenkamp
The Honorable Vic Fischer
The Honorable Joe Josephson
The Honorable Jay Kerttula
The Honorable H. Pappy Moss
The Honorable Pat Rodey
The Honorable Bob Bettisworth
The Honorable Don Clocksin
The Honorable Mike Davis
The Honorable Jim Duncan
The Honorable Walt Furnace
The Honorable Ronald L. Larson
The Honorable Hugh Malone
The Honorable Mike M. Miller
The Honorable Mike W. Miller
The Honorable John Ringstad
The Honorable Richard Shultz
The Honorable Mike Szymanski

IN THE HOUSE BY COWDERY AND LISKA

SUBSTITUTE FOR

HOUSE BILL NO. 508

IN THE LEGISLATURE OF THE STATE OF ALASKA

THIRTEENTH LEGISLATURE - SECOND SESSION

A BILL

For an Act entitled: "An Act relating to the plumbing code."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* Section 1. AS 18.60.705 is amended to read:

Sec. 18.60.705. PLUMBING CODE. The Department of Labor shall adopt, as the official minimum plumbing code for the state, the Uniform Plumbing Code, 1982 [1979] edition, adopted at the 52nd [49TH] Annual Conference, October 1981 [SEPTEMBER, 1978], International Association of Plumbing and Mechanical Officials, chs. 1 - 13 and appendices, useful tables, and installation standards, but excluding Part I, Administration, pages 1a - 6a, all of Subsection (e) and its exception, as well as the second and third sentences of Part (a) of Section 1004, Chapter 10, Page 75, and subject to AS 18.60.710 - 18.60.740. The following amendments to said code shall be adopted:

- In Chapter 4, Page 37, Section 401(a) and (b), shall be amended by deletion of the words "extra strength vitrified clay pipe" and "vitrified clay".

- In Chapter 4, Page 37, Section 401(a), subparagraphs number (1),(2) and (3), shall be deleted and will be replaced by the following words:

"1. No galvanized wrought iron or galvanized steel pipe or ABS or PBC shall be used under ground, but all such pipe shall be kept at least six inches above ground.

2. ABS or PBC installations shall be limited to residential construction not over 25 feet in stack height. ABS and PBC shall be no less than Schedule 40 iron pipe size standard steel pipe thickness. ABS or PBC shall not penetrate any one hour wall unless it is sleeved with a minimum of 20 gauge metal for a distance of six inches beyond the wall or changed to Schedule 40 galvanized DWV copper or cast iron pipe to a metal trap connection."

- In Chapter 5, Page 45, Section 503(a), subsection number (2), shall be deleted and replaced with the following words:

"2. ABS or PBC installations shall be limited to residential construction not over 25 feet in stack height. ABS and PBC shall be no less than Schedule 40 iron pipe size standard steel pipe thickness. ABS or PBC shall not penetrate and one hour wall unless it is sleeved with a minimum of 20 gauge metal for a distance of six inches beyond the wall or changed to Schedule 40 galvanized DWV copper or cast iron pipe to a metal trap connection."

* Sec. 2. AS 18.60.740(1) is amended to read:

(1) "code" means the Uniform Plumbing Code, 1982 [1979] edition, adopted at the 52nd [49TH] Annual Conference, October 1981 [SEPTEMBER 1978], International Association of Plumbing and Mechanical Officials as modified by AS 18.60.705;

Bill No. Senate Bill 214

Title "An Act relating to the Plumbing Code."

Date April 12, 1983

Contact: Judy Knight
465-2700
Bob Bacolas

Every three years, the International Association of Plumbing and Mechanical Officials revises its minimum standards for the installation of plumbing to incorporate technological advances. The 1982 code described in this bill is the most recent effort in this regard. The 1979 code presently in effect for the State of Alaska is therefore outdated and will not be reprinted by the International Association of Plumbing and Mechanical Officials.

Adoption of the 1982 Uniform Plumbing Code would bring Alaska's minimum standards into conformity with those commonly accepted and used by industry across the nation. The latest edition of the Uniform Plumbing Code is also commonly adopted by political subdivisions in the state as the minimum standards enforced under their building inspection programs.

The Department of Labor support passage of this bill. It would not have any fiscal impact.

APPROVED:

Don Robson

POSITION PAPER/Department of Labor

1982 Uniform Plumbing Code
Significant Changes

Section 108 allows for a larger grease interception to serve one or more fixtures. Section 203(d) states that copper tubing used for water service shall have a weight of not less than Type L.

Table 4-3, footnote #4. Evidence indicates that a three-inch horizontal waste will effectively handle discharge from three water closets; thus the code change, so that only four water closets or six unit traps are allowed on any vertical stack, and not to exceed three water closets or six unit traps on any horizontal branch or drain.

Section 601 changes will not allow cold storage rooms, refrigerators, cooling counters, etc. designed to hold food or drink, or sinks for washing or preparation of food, to be directly connected to a waste or vent pipe. All drains shall discharge through an air gap into a open drain or approved receptor.

Section 1004 is one of the major changes, and allows Poly Butylene (PB) water pipes to be used for hot and cold water distribution tubing systems, using inserts for connectors. It also inserts language to assure that when metal pipe is used as a building ground, it will be replaced by metal pipe when repairs are made to these pipes.

Also adopted were insulation standards for cold water service and yard piping. These standards were for Poly Vinyl Chloride (PVC), asbestos cement pressure piping and Poly Butylene (PB).

Those groups most affected by this change will be plumbers, contractors, local governments and state agencies.

S. L&C
P. Fischer

APR 27 1983

FAIRBANKS CENTRAL LABOR COUNCIL

A. F. of L. - C. I. O.

FAIRBANKS, ALASKA

(907) 479-6281

April 22, 1983

Senator Don Bennett
Pouch V
Juneau, Alaska 99811
(Mail Stop 3100)

Re: Senate Bill 214

Dear Don :

The Fairbanks Central Labor Council has unanimously adopted the resolution opposing Senate Bill 214. The gravamen of the bill is to delete the 1975 Uniform Plumbing Code as the official minimum plumbing code for the state. The bill replaces the 1979 edition with a 1982 edition. The 1982 edition was the product of a tremendous amount of lobbying and as a result, it is totally permissive. This means there are almost no standards. Plumbing work done by union plumbing contractors and union men has always been a guarantee of a good functional job. If we reduce to the standards of the 1982 version of the code, every kind of get rich quick short cut will be codified and everyone will have to drop to those standards to meet the competition. The result will be non-thawable pipes, leaks, and tremendous dissatisfaction with the plumbing industry.

For the benefit of the public, who needs the protection, and the plumbing industry, that must maintain its reputation, please vote against SB 214.

Sincerely,

ARTHUR LYLE ROBSON, Secretary-Treasurer
Fairbanks Central Labor Council

ALR:CLM

ORIGINAL FILED

JAN 24 1984

COUNTY CLERK

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

MARIE SHIBUYA-SNELL, DIRECTOR OF THE CALIFORNIA DEPARTMENT OF CONSUMER AFFAIRS, FRIENDS OF THE EARTH, CONSUMER FEDERATION OF CALIFORNIA, STATE BUILDING AND CONSTRUCTION TRADES COUNCIL OF CALIFORNIA, AND AILEEN ADAMS, Plaintiffs, vs. INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS, a California corporation, and DOES I through XX, Defendants.	CASE NO. C 395 294 JUDGMENT EXTENDING AND MODIFYING INJUNCTION

The above-captioned matter was duly and regularly called for trial on December 12, 1983, in Department 32 of the Superior Court, the Honorable Jack A. Crickard, Judge Presiding. Roger Dickinson, Esq., appeared on behalf of plaintiff Marie Shibuya-Snell, Director of the California Department of Consumer Affairs ("Director"); Michael H. Remy, Esq., and Tina A. Thomas, Esq., appeared on behalf of plaintiff California State Building and Construction Trades Council, AFL-CIO ("Union Council"); and Geoffrey Cowan, Esq., entered an appearance on December 12, 1983, behalf of plaintiffs Consumer Federation of California, Friends of the Earth and Aileen Adams.

John F. McKenna, Jr., Esq., appeared on behalf of defendant International Association of Plumbing and Mechanical Officials ("IAPMO").

The matter was heard on December 12, 13, 14, 15, 16, 20 and 21, 1983. Evidence, both oral and written, was submitted by all parties, and the matter was duly submitted.

IT IS NOW ORDERED, ADJUDGED AND DECREED:

1. Upon the authority of Code of Civil Procedure Section 526 Subdivision (1), the existing preliminary injunction, granted upon the application of plaintiff Director's predecessor in office, is partially modified and continued in force as the permanent order of this Court.

2. Pursuant thereto, Defendant IAPMO, its agents, officers, employees, and representatives, and all persons acting in concert or participating with IAPMO are hereby permanently enjoined from disseminating, directly or indirectly, to any individual or organization in California, the 1982 Edition of the Uniform Plumbing Code ("UPC") or the IAPMO Directory of Plumbing Research Recommendations ("Research Directory"), without including a warning notice. The warning notice required to be included shall appear in no less than 10-point bold type and shall state as follows:

> NOTICE: An Environmental Impact Report is now being prepared in California to determine whether the use of CPVC, PVC, or PB plastic pipe for transing potable water poses a danger to public health or the environment. At the time of this printing of the 1982 Edition of the Uniform Plumbing Code,

and this update of IAPMO's Directory of Plumbing Research Recommendations, the State of California does not permit any expansion of the use of such pipe, in applications permitted by the Uniform Plumbing Code, beyond those applications permitted in the 1979 Edition of the Uniform Plumbing Code.

For information on California restrictions, contact the State Housing Law Section of the California Housing and Community Development Department.

Immediately below the notice, in the same size or smaller type, the following statement may appear, at the option of IAPMO:

(This notice is inserted herein pursuant to a court Order in the case of CALIFORNIA DEPARTMENT OF CONSUMER AFFAIRS v. INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS, Los Angeles Superior Court No. C-395294.)

The notice shall not contain, include, or be accompanied by any other information or materials.

3. The notice shall be affixed

(a) To the inside cover of each copy of the UPC affected by this Order, and

(b) Upon the reverse side of the division page entitled "Water Systems and Related Items" (No. 5) of each copy the Research Directory,

(c) By suitable adhesive material along the notice's top and bottom borders, in a manner calculated to ensure that the accidental removal of the notice does not occur.

4. The foregoing orders shall take effect 30 days after entry of this Judgment, and the foregoing orders shall automatically terminate, both as to the UPC and the Research Directory, upon the date the 1982 Edition of the UPC is superceded by the publication of the 1985 Edition of the UPC.

5. All relief sought by plaintiffs, other than the relief granted to plaintiff Director by the foregoing orders, is denied.

6. Each party shall bear their own court costs.

DATED: ____________________.

____
JACK A. CRICKARD
JUDGE OF THE SUPERIOR COURT

re - Plumbing Code for Rep Kopanen

from April 1984 "Technology Review" (pub by Mass. Institute of Technology -

SMOKE TOXICOLOGY
A SPECIAL REPORT

Where There's Smoke, There's Ire

As synthetics increasingly replace natural materials in buildings, angry debate swirls around whether this heightens the danger of fires and whether anything can—or should—be done.

BY LINDA GARMON

IN the early morning of March 6, 1982, fire broke out in room 404 of the Westchase Hilton Hotel in Houston. The presumed culprit: a carelessly placed cigarette. Local fire officials described it as a "simple room fire," and the deputy fire chief reported that extinguishing the blaze was a "fairly straightforward" operation. The room's occupants escaped unharmed. But ten other guests on the same floor died in their rooms from smoke inhalation.

Smoke—not flames—has for many years been recognized as the primary killer in fires. Of the roughly 7,500 fire fatalities in the United States each year, smoke fells more than 80 percent. Traditionally, nearly all smoke-inhalation deaths have been summarily attributed to carbon monoxide, a toxic gas produced during the combustion of essentially everything that burns. However, researchers from the Foundation for Fire Safety pieced together a different picture of the Westchase fire.

According to Merritt Birky, director of research at the foundation during the investigation, blood samples taken from the victims did show elevated levels of carbon monoxide, but they were not high enough to be the direct or sole cause of death. On the other hand, all the victims had elevated levels of hydrogen cyanide in their blood, and two had levels high enough to be lethal. The victims also had sustained severe respiratory damage, suggesting exposure to hydrogen-chloride gas.

These poisonous gases were generated by the combustion of synthetic materials in the room, says Birky. The foundation's tests indicated that the hydrogen cyanide came from polyurethane carpet padding, nylon carpet and blankets, and a polyurethane cushion on an upholstered chair.

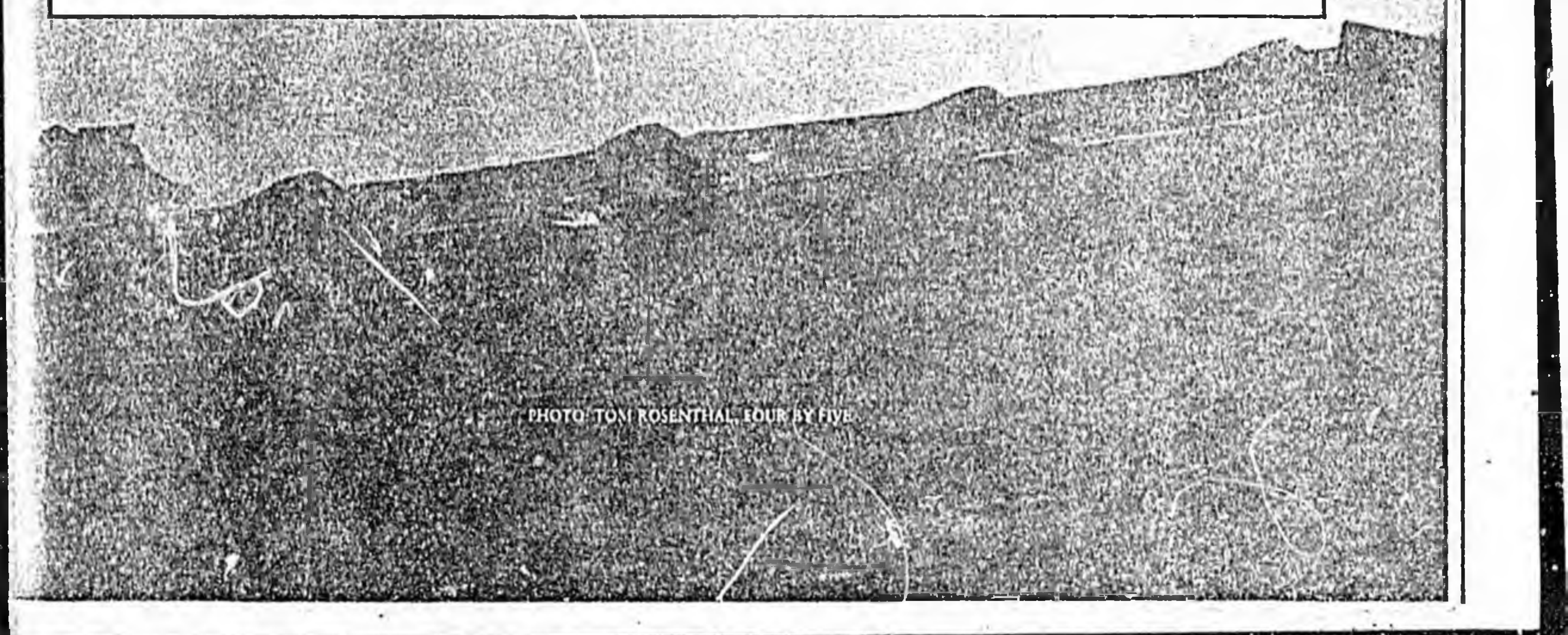


PHOTO: TOM ROSENTHAL, FOUR BY FIVE

*Smoke—
not flames—is the primary
killer in fires, and toxic gases generated
when synthetic materials burn
may be making smoke
even more deadly.*

The hydrogen chloride came from a polyvinyl-chloride wall covering. Birky says the study concluded that deadly gases from the burning synthetics "contributed to most, if not all," of the deaths.

Representatives of synthetics manufacturers have assailed Birky's conclusions. For example, John Lawrence of the Society of the Plastics Industry says, "There were a lot of synthetic materials in the room where the fire occurred, but there were a lot of burnable nonplastics, too." He notes that the Houston medical examiner listed inhalation of carbon monoxide and soot as the cause of death of every victim except for the people in one room, who had lethal levels of hydrogen cyanide in their blood. Even then, Lawrence says that blood-cyanide measurements are often suspect because the body itself produces some hydrogen cyanide. "We feel that plastics, where properly used, do not present any increased hazard," he concludes.

Clash of Interests

The dispute over the Westchase Hilton tragedy is part of a larger, long-standing, and heated controversy in fire safety. There is no question that use of synthetics in buildings is rapidly increasing. "We live in a synthetic world," says Birky, where plastics and other synthetic materials have become commonplace in furnishings. Perhaps less visible is the growing role of synthetics in construction. In the mid-1960s, plastics represented only 2 percent of total building materials. By 1981, they had captured 10 percent of that market, according to Predicasts, a Cleveland market-research firm. And trends suggest that use of plastics may grow even more during the rest of the decade.

Has this shift heightened the danger of fires? Should the use of plastics and other synthetics somehow be regulated based on the toxicity of the smoke generated when they burn? Are laboratory tests well-enough developed to compare the smoke toxicities of various products, and to become the basis for selecting—and perhaps restricting—the use of furnishing and construction materials?

Answers to these questions have proved elusive, partly because combustion toxicology is a complex science, but also because huge economic stakes are involved and the issues have been clouded by corporate maneuverings and rhetoric. The most vociferous charges have been exchanged between the Society of the Plastics Industry (SPI), a trade association, and Allied Tube & Conduit Corp., which produces steel conduits used to contain and protect electrical wiring. Such conduits, along with pipes used in plumbing and to carry gas, have been one of the fastest growth areas for plastics in the U.S. construction industry.

Against this backdrop, an increasing number of toxicologists, legislators, and fire-safety officials has begun to sort through the tough regulatory and scientific issues. Indeed, the smoke-toxicity debate—which really gained steam during the widely publicized string of hotel fires starting with the Las Vegas MGM Grand Hotel disaster in 1980—has reached white-hot intensity.

Spurring the latest round is a report urging New York State to require manufacturers of building and furnishing materials to use a standard laboratory test to identify the poisonous gases generated when their products burn. The report, prepared by Arthur D. Little, a consulting firm based in Cambridge, Mass., recommends that such information on toxicity be filed in a central data bank. The New York Legislature, following the 1980 fire at Stouffer's Inn in Harrison, N.Y., which claimed 26 lives, had asked ADL to examine the feasibility of regulating smoke toxicity.

The fate of this proposal is still uncertain. New York Secretary of State Gail S. Shaffer is expected to recommend that the state establish a pilot program requiring manufacturers of mattresses, furniture, and interior finishings such as wall covering to test their products and submit the results to a data bank. However, she is expected to exclude construction materials.

Should New York adopt even this limited program—which is considered likely—it would be a landmark in fire-safety regulation. Of course, construction methods and materials are already subject to numerous other fire-safety-related regulations. A multitude of building-code provisions calls for fire alarm systems, fire doors, fire escapes, fire extinguishers, and exit corridors. And the Consumer Product Safety Commission has set mandatory flammability standards for mattresses and carpets and voluntary standards for upholstered furniture. But precious few codes, standards, or laws specifically address smoke toxicity.

One emerging code involves plastic conduit—a tube, composed mostly of polyvinyl chloride, or PVC, that is used to enclose electrical wiring. Because it is more flexible and easier to install, plastic conduit offers an attractive alternative to its metal counterpart in certain construction situations. But concern over the risk of smoke toxicity prompted the National Fire Protection Association to take action. The 1984 National Electric Code—a model code published every three years by the association, which local jurisdictions can choose to adopt—recommends that PVC conduits be permitted only in structures no taller than three stories. Some cities have already taken other steps. For example, New York City spent $2 million in 1982 to replace with metal some of the PVC conduits in the subway system.

Other regulations related to smoke toxicity include general proscriptions in several states and local jurisdictions to the effect that building materials cannot release combustion products more toxic than those of wood. But these laws, written years before scientists began developing standard laboratory tests of smoke toxicity, go largely unenforced. However, about a half-dozen states are now taking a hard look at just how toxicity testing might be used to regulate a broad spectrum of products. What New York decides to do with the ADL report could set the stage for these other states to act.

Report Gets Mixed Reviews

The ADL study evaluated the dozen or so published methods for testing the toxicity of combustion products, including one that Birky helped develop when he was at the National Bureau of Standards (NBS). The study, led by Rosalind C. Anderson, concluded that the most useful test is one developed by Yves Alarie and Anderson when she was at the University of Pittsburgh. Anderson said she sees no conflict of interest in recommending a test that she helped design; she also helped design the NBS toxicity test that was rejected.

In the Pittsburgh test, mice in a special chamber are exposed to smoke from burning materials. This method determines what's called an LC_{50}—the amount of material that produces a "lethal concentration" of smoke noxious enough to kill 50 percent of the animals exposed for 30 minutes. (Anderson says a shorter period wouldn't address most fire situations [illegible] people are waiting to be rescued, U.S. fire deaths are declining (graph, opposite page). Plastics industry officials say this means synthetics can't be making fires more dangerous. But others claim that improved firefighting methods and greater use of sprinklers and smoke detectors have masked the increased hazard posed by synthetics. They also cite firefighter reports that today's fires burn hotter and smoke develops faster and is more irritating.

In the Westchase Hilton fire (opposite, right) researchers found that the victims were exposed to toxic hydrogen chloride and hydrogen cyanide given off by synthetic room furnishings. Building materials such as plastic pipes (opposite, lower left) can also generate deadly gases.

and a longer period would probably kill all the mice.) The lower the LC_{50} value, the more toxic the material. According to the Pittsburgh test, the LC_{50} of Douglas fir, for example, is 31 grams, while that of wire coated with polytetrafluoroethylene (Teflon) is 3 grams.

The ADL report recommends that manufacturers submit LC_{50} data on their products to a state agency, where the information would be accessible to architects, engineers, and the public. Anderson says the ADL study ruled out, for the time being, other regulatory uses of the data, such as bans on specific materials and requirements for product labeling.

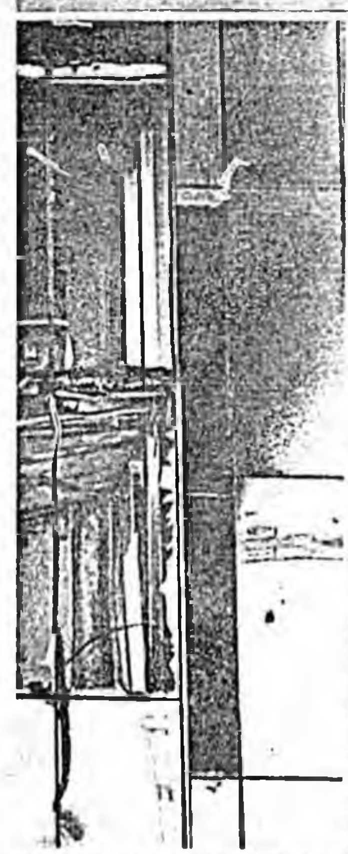
Reviews of the report have been mixed. Firefighters and fire-safety officials have generally approved, though some say they would have preferred ADL to voice stronger recommendations, such as the use of LC_{50} data to ban specific products. Critics, on the other hand, have charged that a smoke-toxicity data bank would be worthless. "The problem here is that the kind of data collected will be of no value in saving lives," said G.R. Munger, president of the Society of the Plastics Industry, in his comments to the New York Legislature. Simple, small-scale toxicity tests are not representative of the complex hazards of real fires, he said.

In fact, Munger and others claim that such tests could sometimes lead builders to select products that ignite more easily or whose flames spread faster as a tradeoff against their lower combustion toxicity. For example, PVC has largely replaced cotton as an insulating material for electrical wires, in part because its higher ignition temperature makes it less likely to burn. "We think that's an example of increased fire safety from using plastics," says SPI's Lawrence. He also points out that many fires are caused by electrical short circuits, which often result from improperly grounded metal conduits. And while burning PVC plumbing has been implicated—controversially—in some of the 83 deaths in the MGM Grand fire, he points out that a short in a metal conduit started the fire. Thus, even if tests show gross differences in smoke toxicity, the results should be interpreted with caution since other flammability properties are involved in assessing hazard.

Barbara C. Levin of the NBS Center for Fire Research agrees that an LC_{50} data bank is unnecessary. In her comments to the New York State Legislature, she stated that "a toxicity test alone does not constitute toxic hazard assessment." She noted that NBS is now developing a computerized method for assesing the hazards of combustion that takes into account a product's rate of heat release, ignitability, and other fire-related characteristics as well as smoke toxicity. The method is expected to be ready in about five years.

ADL's Anderson counters that, while more research will undoubtedly improve assessment techniques, the fact that most fire victims are being killed by smoke means we shouldn't sit idly by until a hazard index is developed. And there is another pressing issue. "As melodramatic as it sounds, firefighters are out there watching their colleagues being hurt and even die," she says. She cites a study by the National Fire Protection Association that found that firefighters say that fires are getting harder to fight. Fires burn faster and hotter, and smoke develops more rapidly and is thicker and more irritating to the respiratory tract. "There appears to be an increase in firefighter casualties from smoke inhalation," the association concluded. "The smoke in today's fires . . . may be producing increased risk of inhalation injury to firefighters as well as to building occupants."

SPI officials maintain that there is only anecdotal evidence to support the contention that fires are now more threatening because of smoke from burning plastics. They point to two SPI-supported studies—one reported in March 1979 by the Harvard School of Public Health and the other in May 1981 by the Southwest Research Institute—that show high levels of carbon monoxide to be the most hazardous air contaminant detected by gas-sampling



equipment worn by firefighters.

However, Birky says the SPI-supported studies are not only limited; they also do not explain why postfire investigations have turned up sublethal doses of carbon monoxide in victims' blood. Such doses were found not only in the Westchase fire, he says, but also in the MGM Grand disaster, where half of the 83 people who died at the scene were found to have sublethal carbon-monoxide levels. He acknowledges that such an effect has been uncovered in only a few instances, "not because it doesn't occur, but because the follow-up toxicological studies on the victims have not been thorough enough to demonstrate this factor." (Birky has left the Foundation for Fire Safety, located in Rosslyn, Va., to start a fire-toxicology consulting service in Boonsboro, Md.)

Charges and Countercharges

Calling this the most important question in fire safety, the foundation last year embarked on a national study to pinpoint which toxic gases are causing deaths by smoke inhalation. "We have developed a post-mortem protocol," says Thomas Casey, former executive director and now a consultant to the foundation, "and we are working with paramedics, medical examiners, and fire services to ensure that more complete autopsies are performed on fire victims. For example, we specify that blood samples be drawn within three hours of the fire and that they be properly stored and handled." Thirteen cities, including Seattle, Miami, Denver, and Dallas, are already participating in the study. Thus far, the foundation has collected data on 60 fire victims, but plans to gather data on 250 before drawing conclusions.

SPI officials are already skeptical of the study. They point out that the foundation is largely funded by the Allied Tube & Conduit Corp. and other members of the metal industry. These firms, according to an SPI statement, have "embarked on a 'fear and smear' campaign against plastic products in order to win back [their] position in the marketplace." John Lison, vice-president and general counsel for Allied, counters such charges: "Instead of developing safe products, the giant plastics industry has used its extensive public-relations apparatus to attempt to turn what is a very vital question of public safety . . . into a seemingly commercial battle between two industries."

"There's no doubt that this is a commercial fight," says Gordon Vickery, president of the foundation and former head of the U.S. Fire Administration. "I do not offer one ounce of apology for the funding of the foundation by the Allied Tube & Conduit Corp. We invite, as we have in the past, the plastics industry to support us in like manner."

The impact of commercial interests can also be seen in recent actions of the National Institute of Building Sciences (NIBS), created by Congress in 1974 to unify and improve the heterogeneous network of U.S. building codes. When the rash of hotel fires brought burning plastics under close scrutiny, NIBS officials felt pressured to address this issue. In June 1982, they formed a 12-member task force to consider whether the results of laboratory tests of combustion toxicity, such as the NBS and Pittsburgh methods, should be incorporated into building codes. For example, a code could forbid the use of products judged by one of those tests to be more toxic than wood, unless those products are accompanied by early-detection fire-protection systems such as smoke detectors and sprinklers. Wayne Ellis, manager of industry standards for the H.B. Fuller Co., which makes synthetic adhesives, sealants, and coatings used in building construction, was named chairman. The task force also included SPI's Munger, two DuPont officials, and representatives from Dow Chemical, Rohm & Haas, and Armstrong World Industries. Only one member—James R. Bell of the National Fire Protection Association—was not affiliated with a corporation, trade association, or the government.

Later that summer, the task force hosted

PHOTOS: UPI; HOUSTON CHRONICLE; FOUNDATION FOR FIRE SAFETY

a meeting and invited people holding points of view at odds with those of the synthetics industry, but the group did not include these people on the agenda of speakers. "The only speaker designated to explain the 'state-of-the-art' in toxicity testing methodology," says an Allied spokesperson, "was Gordon Hartzell of the Southwest Research Institute. Significantly, the SRI study that formed the basis of Hartzell's remarks and conclusions was commissioned and paid for by none other than the Society of the Plastics Industry." Thus, it came as no surprise, says the Allied representative, that Hartzell described available tests as "primitive" and insufficiently developed for regular use.

Ultimately, in an official report released last May, NIBS recommended against setting building codes based on smoke toxicity. Part of its reasoning was that such codes would not include interior furnishings. But Anderson counters that while it is tempting to think of furnishings as the more significant hazard, "fires do start in the basement, attic, or storage area and travel between the walls, burning only structural elements." She also says the distinction between structural and furnishing fires "has never been addressed on a percentage basis; nobody has measured it."

More importantly, however, the NIBS report concluded that laboratory tests of combustion products are inadequate and should not yet be used to compare the smoke toxicities of any materials. But this is "ridiculous," says Eugene Rider of the United States Testing Co., in Hoboken, N.J.. "Take the NBS protocol: years of research and millions of dollars went into it," he says, adding that the quality of research behind that test exceeds that upon which most flammability tests are based.

Money—and Lawsuits—May Talk

Still, a group of state legislators is concerned with the cost of *not* taking action. This group, called the National Task Force on Firegas Toxicity, is composed of lawmakers from California, Illinois, Indiana, Ohio, Maryland, and Michigan. While the group believes the benefit of regulating smoke toxicity could ultimately be measured in lives saved, it recently focused on a "cost of not regulating" that is infinitely easier to gauge: lawsuits. Injuries and deaths from smoke inhalation are posing "a whole new series of product-liability questions," says Ohio Sen. Charles Butts. "This seems to be happening with the lawsuits stemming from the MGM fire; plastics companies have been brought into the lawsuits and may bear a liability even though they weren't responsible for how the fire started."

The task force, which has conducted several hearings on the smoke-toxicity issue, will issue a final report this year that "may very well have recommendations for legislation," Butts says. Like the ADL report to New York State, this one will probably call for establishing a data-gathering agency for combustion toxicity. "We need to have some kind of data bank; we need to use some kind of testing mechanism," Butts says. "Now, 'specifiers' [architects, engineers, buildings owners, and so on] have no information on which to base their decisions. They are making decisions that may be allowing buildings to become more dangerous, and that may be leaving themselves vulnerable to lawsuits." Butts also says that insurance companies, fearing "their clients will find themselves in a toxicity lawsuit," may soon become involved in the smoke-toxicity debate. This, he envisions, would provide a powerful impetus to the movement to establish procedures for testing the combustion toxicity of building and furnishing materials.

That's the best-case scenario, ADL's Anderson says. For a worst-case scenario, she draws parallels to the asbestos story. Information on the health effects of asbestos "had been there for years," she says. "Unfortunately, some of the people who were in positions to make decisions and change policy had only fragments of that information. That's the type of situation some people are saying is developing as we bring new products into buildings. There is the fear that we are stacking the indoor environment with materials that, if we could only see all the combustion-toxicity data available, would be deemed unacceptable in terms of fire safety."

Says Anderson: "I'm not suggesting we ban products—we don't have enough data yet to take this regulatory route. And product labeling is good for only about 30 seconds; once you have the wallpaper up, you've forgotten what's on the label. But if we had a centrally located combustion-toxicity data bank, we could start drawing useful conclusions."

LINDA GARMON is chemistry editor of Science News. She is now a fellow in the Vannevar Bush Fellowships in the Public Understanding of Technology and Science at M.I.T.

International Association of
Plumbing and Mechanical Officials

UNIFORM
PLUMBING
CODE

1982
EDITION

Adopted at the Fifty-Second Annual Conference

OCTOBER, 1981

INTERNATIONAL ASSOCIATION OF PLUMBING
AND MECHANICAL OFFICIALS
(A Non-Profit Organization)

of the Administrative Authority no
ply system is evident, special ap-
ıe vacuum breakers.

tly connected to a sewer connected
l to the inlet side of a trap and shall
cuum breaker installed at least six
aspirator unit. The discharge pipe
designed for free flow and shall
airgap.

Water Over 160°F (71°C) shall be of
ate at temperatures of one hundred
ore without rendering any portion of

onnections shall be protected by an
evice as set forth in subsection (o) of

. In cases where it is impractical to
ions on the domestic water line, the
l be considered a non-potable water
iter outlets shall be connected to the
w or back-siphonage from the non-
estic water line shall be prevented by
nk or by a tank having a pump for
domestic water inlets to the non-
e an approved airgap as required
e it is impractical to install tanks, as
l pressure type backflow or back-
hall be installed as follows:

nly to gravity or a vacuum within the
pressure type vacuum breaker unit or
vention device shall be installed in the

m breaker unit shall be installed at a
inches (.3 m) above the highest tank,
e of the non-potable water. Other ap-
devices shall be installed in a manner
trative Authority, but in no case less
above the surrounding ground or floor.

ur due to steam boilers, pumps, etc.,
in the non-potable water line, an ap-
device shall be installed in the supply
tion device shall be installed at least
ove the surrounding ground or floor.

ortions of the non-potable water line
posed portions shall be properly iden-
tory to the Administrative Authority.
able water line which may be used for
poses shall be posted: DANGER —

(p) Vacuum breakers shall be located outside any enclosure or hooded area containing fumes that are toxic or poisonous.

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, PB, PE, or PVC water pipe manufactured to recognized standards may be used for cold water distribution systems outside a building. PB water pipe and tubing may be used for hot and cold water distribution systems within 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.

(b) Cast iron fittings up to and including two (2) inches (50.8 mm) in size, when used in connection with potable water piping shall be galvanized.

(c) All malleable iron water fittings shall be galvanized.

(d) Piping and tubing which has previously been used for any purpose other than for potable water systems shall not be used.

(e) Approved plastic materials may be used in water service piping, provided that where metal water service piping is used for electrical grounding purposes, replacement piping therefore shall be of like materials.

Exception: Where a grounding system, acceptable to the Administrative Authority is installed, inspected and approved, metallic pipe may be replaced with non-metallic pipe.

Section 1005—Valves

(a) Valves up to and including two (2) inches (50.8 mm) in size shall be brass or other approved material. Sizes over two (2) inches (50.8 mm) may have cast iron or brass bodies. Each gate valve shall be a full-way type with working parts of non-corrosive material.

(b) A fullway valve controlling all outlets shall be installed on the discharge side of each water meter and on each unmetered water supply. Water piping supplying more than one building on any one premises shall be equipped with a separate fullway valve to each building, so arranged that the water supply can be turned on or off to any individual or separate building; provided however, that supply piping to a single family residence and building accessory thereto, may be controlled on one valve. Such shut-off valves shall be readily accessible at all times. A fullway valve shall be installed on the discharge piping from water supply tanks at or near the tank. A fullway valve shall be installed on the cold water supply pipe to each water heater at or near the water heater. A fullway valve shall be installed for each apartment or dwelling of more than one (1) family. In lieu of the main supply shut-off in each apartment, individual shut-off valves may be provided at each fixture.

(c) All valves used to control two (2) or more openings shall be fullway gate valves or other approved valves designed and approved for the service intended.

OWEN MARINE CORP.
BOX 2586
HOMER, AK 99603
HOMER 235-7691
SEWARD 224-3542

March 27, 1984

Senator Richard I. Eliason
Chairman
Senate Labor & Commerce Committee
Pouch V
Juneau, Ak. 99811

Dear Senator Eliason,

This letter will hopefully enlist your timely assistance in the solution of a problem that has arisen during the construction of our new building. We are faced with a dilemma that could cost us needless economic hardship and serve no usefull purpose in the process.

Last December 15, we began construction of a new facility to house our business, Owen Marine Corp. All the below grade work had been done prior to freeze-up, so we could take advantage of the slow winter mor as to build. The building permit was applied for and granted through the City of Homer, with our proposed project meeting all the city requirements. The project was designed, and has been built, in accordance with all the latest national building codes.

On February 15, we were visited by a State Plumbing Inspector from the Anchorage office of the Department of Labor. The inspector stated that he was responding to a telephone complaint of illegal plumbing installations being made in some commercial building projects in Homer. We are quite sure of the origin of the complaint, and the motivation for it. Let it suffice to say that it was not the result of a concerned citizen acting in behalf of the public's best interest. If serving the public interest was the inspector's mission, it seems strange that we have no verification of an inspection being performed on the construction of one very public facility here: the expansion of the South Peninsula hospital, which also qualifies as the largest construction project currently underway in Homer. The inspector did, however, manage to visit three small commercial building sites in the area and issue at least two citations for 1979 Plumbing Code violations.

We were cited for being in violation of section 401 of the Uniform Plumbing Code. As you can see on the enclosed copy of the citation, the single violation is " Sec 401, ABS plastic pipe not allowed in commercial building. Remove and replace with Code material."

Apparently, this is a legitimate violation of the 1979 edition of the Uniform Plumbing Code, the edition which the State of Alaska is currently enforcing. It is however, in direct conflict with the new 1982 Code, which is the standard we used in plumbing the building. The out-dated 1979 Code is still being enforced simply because the State Legislature has not adopted the 1982 edition of the Code. House Bill # 509, dealing with the replacement of the '79 edition with that of 1982, is presently sitting in your committee awaiting action.

The City of Homer adopted this 1982 edition of the Uniform Plumbing Code over a year ago. The plumbing in our building was done in full compliance with this edition, not realizing we were in violation of State statutes as described above. Had we been aware of this fact, we could have very easily conformed to the 1979 edition when the plumbing was roughed in.

Since the inception of this project, we have extended every effort to insure that the materials and workmanship in our building would meet or exceed the latest standards set by the National Uniform Building Code, National Electrical Code, and Uniform Plumbing Code. After all, with the substantial investment we are making in this project, it would be "penny wise and pound foolish" to do anything less.

It seems absolutely ludicrous to us that we should be required now, to forego the tremendous cost and time loss that would be necessary to abrogate this violation, when adoption of the new Code is so near. I ask you, what possible needs would be served by this action?

Several other commercial buildings in our area have been completed using ABS plumbing materials. They were completed without any inspection at all, and are apparently perfectly legal now because they simply were not inspected before completion. Is this the way our State statutes are intended to be enforced? As I understand them, both the State and Federal Constitutions guarantee, if not demand, equal and uniform enforcement of all statutes with regard to the citizenry they serve. Random inspections that can be prompted by nothing more than perhaps a vindictive telephone call, hardly qualify as "equal and uniform enforcement".

The scheduled completion date for this project is April 15. However, as long as this situation remains unresolved, we face the very real possibility of loosing the long term financing that has already been secured, which is subject to the construction complying with all current building codes. At the very least, we could incur tremendous expense in interim interest costs alone, should any delay occur due to this situation. Either set of circumstances would seriously jeopardize not only this project, but the future of our business and the financial security of the people involved in it.

As stated previously, we are not the only business here that stands to suffer as a result of this misguided action. Kachemak Bowl, a lon[illegible]tanding local bowling alley, was also cited for using ABS [illegible] their new building. They were instructed, as we were, [illegible] all ABS pipe had to be removed and replaced with code material. In both of our cases, walls, floors, and ceilings would have to be torn out just to get to the subject plumbing. The ABS piping would then have to be removed and new "1979 Code material" would have to be installed in its place. All of this would then be followed by the reconstruction of the torn out walls, floors, and ceilings. This would be a monumental task that would be very, very costly in both time and money.

Immediate action by your committee regarding the adoption of the 1982 Uniform Plumbing Code would render these violations moot. It is imperative the current Legislature address this problem during this session, as any delay in passage of this statute could very possibly cause extreme and unnecessary financial hardship for two businesses and their owners.

Trusting this request will be honored, I remain,

Sincerely,

Daniel C. Owen
President

cc: Senator Don [illegible]
Senator Paul Fischer
Representative Milo Fritz
Representative Hugh Malone
Mayor Erle Cooper
Homer City Council
Mitch Gravel

STATE OF ALASKA

EC/PL INSPECTION REPORT

PAGE 1 / 1

DEPARTMENT OF LABOR - MECHANICAL INSPECTION
Pouch 7-020 3301 Eagle Street, Suite 301
Anchorage, Alaska 99510 (907) 264-2447

INSPECTION DATE
2/16/84

CONTRACTOR NAME CONTRACTOR MAILING ADDRESS CONTRACTOR CITY STATE ZIP	JOB/LOCATION ADDRESS OR LEGAL DESCRIPTION CITY
Owen Marine	
P.O. Box 2586	
Homer, Alaska 99603	Owen Marina

construction		electrical		plumbing	
new	✓	temporary		underground	
alteration		service		rough-in	X
residential		rough-in		final	
commercial	✓	final		gas	
other		partial			

E Jrny ___ E Resid ___ E Lrnr ___ E Line ___ E Mnt ___
P Jrny ___ J Restr ___ P Lrnr ___

item #	code reference	VIOLATIONS	abatement date	acty code
1	Sec 401	ABS Plastic not allowed		
		in commercial Building		
		Remove and Replace with		
		[illegible] material		

NAME and TITLE TO WHOM REQUIREMENTS WERE EXPLAINED

NAME OF PERSON REQUESTING INSPECTION

SIGNATURE OF INSPECTOR
[signature]

Alaska law requires that satisfatory arrangements be made to correct the above violation(s) prior to the applicable abatement date(s).

Direct inquiries to:

07-6053 R 12/83

Shell Chemical Company

A Division of Shell Oil Company

P.O. Box 7637
Stockton, CA 95207

June 6, 1983

Senator Paul Fisher
Pouch V
Juneau, Alaska 99811

ATTENTION: Elieen Glenn
Administrative Assistant

Dear Ms. Glenn:

I am writing this letter at the suggestion of C. Chuck Dummann of du Alaska Company, Inc. Chuck has informed me that Senator Fisher has introduced Bill #SB-214 that is of great interest to Shell Chemical Company.

The Bill would adopt the 1982 Uniform Plumbing Code as the required Code for the State. Currently the State operates under the 1979 version. While there are several minor changes between 1979 and 1982, there is a major change of importance to us. This change appears in Section 1004. It incorporates the use of polybutylene as an approved plumbing pipe along with the more traditional materials such as copper and galvanized pipe.

For your general information I am enclosing a selection of literature on the subject of polybutylene. As you can see, it is a versatile material capable of performing in many severe conditions.

In addition to these proven performance characteristics there are several reasons particular to the State of Alaska that make the passing of Bill #SB-214 important:

1. The mobile home industry has for years used polybutylene. We estimate over 80 percent of all mobile homes are plumbed with polybutylene. The manufactured housing industry outside of Alaska has a distinct cost advantage over the Alaska based manufacturer. The Alaska builder does not have the advantage of polybutylene's low cost.

2. The low installed cost of polybutylene puts the Alaska builder at a disadvantage to a major portion of the remainder of the United States. Mobile home and manufactured housing builders in other states have the advantage of using polybutylene. This puts the Alaska builder in an uncompetitive situation.

3. In addition to polybutylene's advantages in plumbing application, its use is rapidly growing in fire sprinklers. Polybutylene is now listed by Factory Mutual. Approval of polybutylene in plumbing application would greatly assist its development in the fire sprinkler installation.

4. Given the Alaska climate, polybutylene has a special feature of being freeze resistant. Simply put, properly installed polybutylene will not rupture as will conventional material when frozen.

Thank you for your effort thus far. Polybutylene is a proven material around the United States and around the world and belongs as a material available to the people of Alaska.

I am ready to come to Juneau to testify or speak to anyone on the subject if it would be helpful.

I hope that Senator Fisher will make every effort possible to move this Bill forward.

Very truly yours,

M. J. O'Brien/jg.

M. J. O'Brien
Regional Sales Manager
Polybutylene Department

MJO/ja

Enclosures

cc: Chuck Dummann
Gordon Evans
Ely, Guess and Rudd
Juneau, Alaska

999 EAST TUDOR ROAD
ANCHORAGE, ALASKA 99503
(907)563-3004 TELEX: 090-25-297

P.O. BOX 128 NORTHGATE STATION
SEATTLE, WASHINGTON 98125
(206) 284-5531 TELEX: 32-1041

du Alaska Company

Manufacturers
Representatives

May 12, 1983

Senator Richard Eliason
Pouch V
Juneau, Alaska 99811

Dear Senator,

I had the pleasure today of talking to Sheila Peterson in your office in behalf of Senator Paul Fischer's Bill #214 to upgrade the Alaskan State plumbing code to agree with the 1982 edition of the IATMO Code.

I hope you can see your way clear to schedule hearings on this bill. One of the products which would be allowed would be Polybutylene Pipe for water service.

This pipe is not new to Alaska. Every trailer or modular home shipped into Alaska is plumbed with this product because it stands vibration extremely well and because if the unit freezes, no damage will occur from bursting pipe, yet because of our outdated code, local Trailer Manufacturers like Husky must use older and more expensive pipe. Owners who remodel or work on their units, must to be legal, use a different material. In actual fact they ignore the law.

In Fairbanks, Sitka, Palmer and Bethel, wide use is being made of this pipe wither under local code or illegally. It is just too good a product to ignore if there is any chance the building will freeze up. Imagine how much money is spent replacing water damaged walls from freeze burst copper pipe.

I have personally appeared before the Anchorage Borough Plumbing Board and have heard members of plumbing associations object to this product. My personal feeling is that the professional plumber tends to move slowly on any new product but since the Anchorage market is covered by the Greater Anchorage Borough Mechanical Board, their area will not be effected by the state code anyway.

There have been some people who have objected to any plastic on the basis that its use may cause cancer. I have never personally seen any laboratory test or medical opinion that bears this out. I know I eat off a plastic covered table, brush my teeth with a plastic toothbrush and drink Coke out of a plastic bottle poured into a plastic glass. I can't see how in the face of this, anyone can be concerned if the water for my scotch mixer comes out of a plastic pipe!

The other health problem has been told to me by the Anchorage Health Department personnel who say that galvanized pipe that is installed a long time rusts so bad inside that even repeated chlorination does not always kill the bacterial contamination. Polybutylene never corrodes, is always smooth and like new. I'd certainly perfer to get my water from it than some of these rusty iron pipes.

Our state achieves considerable revenue from the sale of petroleum, there has even been talk of a state supported Petro Chemical Plant. In view of this fact, is it now in the states interest to enchourage the products of those Petro Chemical Plants instead of banning their use?

I'd like to come to Juneau for a hearing on this and I know others in Alaska who would also. If you would like people who are using this product in Alaska to contact you, I'll be delighted to ask them.

Best Regards,

C. Dummann

CD/bjs

WITNESS:
C. Chuck Dummann
Manufactures Representative
Dualaska Company, Inc.
999 E. Tudor Road
Anchorage, Alaska 99504

563-3004
Position Statement: In favor of HB 508

WITNESS:
Martin J. O!Brien
Marketing Specialist
Shell Chemical
Stockton, California
Position Statement: In favor of HB 508

WITNESS:
Tom Higham
Executive Director
International Association of Plumbers and Mechanical Officials
Los Angeles, California
Position Statement: In favor of HB 508

PREVIOUS ACTION

HB 239	First Reading - 3/4/84 Committee Referrals - L&C, Resources, Finance and Rules See HLC Committee report on page 2412 of 1984 House Journal

	HB 239 was referred to the Resources Committee
HB 508	First Reading - 1/12/84 Committee Referrals - L&C and Rules No previous action in L&C
HB 220	First Reading 1/10/84 Committee Referrals - L&C, Finance and Rules No previous action in L&C

ACTION NARRATIVE

TAPE# 89, Side 1
Recording

Number 0000	Chairman Cowdery called the meeting to order. The Committee took up discussion on HB 239.
Number 0013	Rep. Wendte moved to pass HB 239 out of the committee. Being there was no objective the bill was passed out of the committee.
Number 0024	The committee took up discussion on HB 508.
Number 0062	Rep. Liska, co-sponsor, stated that the pre-wired housing (pre-wired in plastic) now has to be replumbed with copper.
Number 0106	Dwight Perkins, representing the Plumbers & Pipe

	Fitters Union spoke in opposition of HB 508; he sited the following problems with plastic pipe: durability, thaw ability in Arctic regions, fire hazards (both combustibility and gases released upon combustion), use of the water system as the electrical "ground", permeability, and worker safety.
Number 0185	Rep. Koponen arrived.
Number 0216	Mr. Perkins concluded his testimony with questions and answers from the committee.
Number 0229	Vernon Akins, as an observer, stated that plastic pipe outside a building does have advantages.

(not monoxide) when it burns.

Tape #89, Side B
Recording
Number 0041 Rep. Wendte asked about the controversy relating to the fire hazard and the MGM fire which the jury has not ruled on yet. Mr. O'Brien said the

building code may have been violated.

The committee continues discussion on HB 508.

Number 0182 Rep. Wendte asked if the 82 Code addressed fire wall protection. It was stated that the fire wall protection is up to the local build'ng code.

Number 0200 Rep. Furnace asked Mr. O'Brien how plastic pipe is thawed. Mr. O'Brien said that either a probe is placed in the line or a probe with a hot water source would work. He also noted that metal pipe would burst if frozen and plastic would not.

Committee continued discussion on HB 508.

Number 0299 Tim Higham comes before the committee to testify on behalf of the 82 Plumbing Code. Mr Higham explained the code that he wrote.

Number 0388 Chairman Cowdery asked Mr. Higham if this is as much a political issue as it is a workers safety issue. Mr. Higham answered that yes it is.

Number 0400 Chairman Cowdery stated that the code should be

adopted and noted that Sitka has adopted the code, Ketchikan is waiting for the state code to be adopted before acting, Bethel has adopted the code, Juneau and Anchorage have adopted with amendments and Fairbanks is considering amendments. Chairman Cowdery feels that it should be up the individual areas to make their appropriate amendments.

Number 0425 Bob Landan Comes before the committee to testify on behalf of Commissioner Robinson in support of HB 508. He stated that the 82 Code is minimal and it is needed to bring the standards up to date. The national codes are updated every three years by the International Association of Plumbers and Mechanical Officials.

Number 0493 Chuck Dummann comes before the committee in support of HB 508. He stated that Polybutalyene is not new to the state and is a big safety factor especially relating to freezing.

Number 0542 Rep. Cowdery asked Mr. Dummann what the savings

would be if Polybutalyene was used instead of metal. The answer was approximately a 50% savings.

Number 0558 Rep. Ringstad moved to hold the bill until the next mornings meeting.

Number 0571 Rep. Furnace moved to pass out of committee.

Number 0587 The committee decided to hold the bill until the next morning's meeting.

Number 0590 Chairman Cowdery adjourned the meeting at 9:55 a.m.

END OF DOCUMENT

OWEN MARINE CORP.
BOX 2586
HOMER, AK 99603
HOMER 235-7691
SEWARD 224-3542

March 27, 1984

Senator Richard I. Eliason
Chairman
Senate Labor & Commerce Committee
Pouch V
Juneau, Ak. 99811

Dear Senator Eliason,

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The City of Homer adopted this 1982 edition of the Uniform Plumbing Code over a year ago. The plumbing in our building was done in full compliance with this edition, not realizing we were in violation of State statutes as described above. Had we been aware of this fact, we could have very easily conformed to the 1979 edition when the plumbing was roughed in.

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The scheduled completion date for this project is April 15. However, as long as this situation remains unresolved, we face the very real possibility of loosing the long term financing that has already been secured, which is subject to the construction complying with all current building codes. At the very least, we could incur tremendous expense in interim interest costs alone, should any delay occur due to this situation. Either set of circumstances would seriously jeopardize not only this project, but the future of our business and the financial security of the people involved in it.

As stated previously, we are not the only business here that stands to suffer as a result of this misguided action. Kachemak Bowl, a long standing local bowling alley, was also sited for using ABS pipe in their new building. They were instructed, as we were, that " all ABS pipe had to be removed and replaced with code material". In both of our cases, walls, floors, and ceilings would have to be torn out just to get to the subject plumbing. The ABS piping would then have to be removed and new "1979 Code material" would have to be installed in its place. All of this would then be followed by the reconstruction of the torn out walls, floors, and ceilings. This would be a monumental task that would be very, very costly in both time and money.

Immediate action by your committee regarding the adoption of the 1982 Uniform Plumbing Code would render these violations mute. It is imperative the current Legislature address this problem during this session, as any delay in passage of this statute could very possibly cause extreme and unnecessary financial hardship for two businesses and their owners.

Trusting this request will be honored, I remain,

Sincerely,

Daniel C. Owen
President

cc: Senator Don Gilman
Senator Paul Fischer
Representative Milo Fritz
Representative Hugh Malone
Mayor [illegible]
Homer City Council
Mitch Gravel

STATE OF ALASKA

EC/PL INSPECTION REPORT

PAGE 1 / 1

DEPARTMENT OF LABOR - MECHANICAL INSPECTION
Pouch 7-020 3301 Eagle Street, Suite 301
Anchorage, Alaska 99510 (907) 264-2447

INSPECTION DATE
2/16/84

CONTRACTOR NAME CONTRACTOR MAILING ADDRESS CONTRACTOR CITY STATE ZIP	JOB/LOCATION ADDRESS OR LEGAL DESCRIPTION CITY
Owen Marine	
P.O. Box 2586	
Homer, Alaska 99603	Owen Marina

construction		electrical		plumbing	
new	V	temporary		underground	
alteration		service		rough-in	X
residential		rough-in		final	
commercial	x	final		gas	
other		partial			

E Jrny ___ E Resid ___ E Lrnr ___ E Line ___ E Mnt ___
P Jrny ___ J Restr ___ P Lrnr ___

item #	code reference	VIOLATIONS	abatement date	acty code
1	Sec 401	ABS Plastic not allowed		
		in commercial Building		
		Remove and Replace with		
		std. material		

NAME and TITLE TO WHOM REQUIREMENTS WERE EXPLAINED

NAME OF PERSON REQUESTING INSPECTION

SIGNATURE OF INSPECTOR
[signature]

Alaska law requires that satisfactory arrangements be made to correct the above violation(s) prior to the applicable abatement date(s).

Direct inquiries to:

07-6053 R 12/83

P M

MAR 31 1983

V CEQA SUMMARY

This chapter covers various information not presented earlier but required by the California Environmental Quality Act (CEQA) for Environmental Impact Reports. As this document is a preliminary environmental review, this section has not been fully developed. When the draft and final versions of the EIR are proposed, it is likely to expand and some of the findings will undoubtedly change or at least be stated more confidently.

A. Significant Unavoidable Environmental Impacts

For this preliminary environmental review of a very subtle and complex proposal, SRI chose to describe our current overall conclusions about the proposed plumbing code changes and our reasons for them, without making definitive findings of significance except where they were clearcut.

First, we discovered nothing to suggest that the issues discussed earlier as the prime ones are insignificant or that other issues are dominant. The only new issue of potential significance that surfaced was the permeation of buried plastic pipe by contaminants in soil and the resulting possible public health impacts. Although the possibility that such effects could occur from permeation of water supply lines from the meter to the house is plausible, any potential problem would also occur--probably in much greater proportion--from the public water distribution system. This problem should be re-examined when better understood and if found significant should influence state policies with respect to plastic use in both public and residential systems. With adequate education of building inspectors on the permeation issue, improper installation of plastic water service in contaminated soils should be rare.

As to public health impacts from chemicals leaching from water pipe into potable water, we find that significant impacts are possible but unproven, both for plastic pipes--especially the chlorinated varieties--and for metal ones, specifically copper systems. If the upper ranges of possible concentrations of leachates are regularly reached, the cumulative risks to public health may be high enough to be of concern by typical standards of acceptable risk, for example, a lifetime cancer risk of one in a million. The chemicals of concern are lead from the solder in copper pipes, possibly leading to neurologic disorders, and carbon tetrachloride, perchloroethylene, and trichloroethylene from plastic (especially PVC and CPVC) pipes, possibly resulting in cancer.

Two major considerations limit the significance of the findings. First, the status of information about long-term levels of leachates is exceedingly flimsy. Reasonable further testing could resolve at least part of the uncertainty (see Section VI). Second, the risk assessment procedure is moderately conservative. If risks still appear to be of concern after concentrations are better known, more attention would need to be devoted to assuring that the assessment procedure took into account detailed properties of the chemical. Finally, thorough initial flushing would effectively mitigate the effects of the rapidly leaching materials, especially the solvents used with plastic pipe. Overall, current information does not establish an environmental preference between copper and plastic pipe, with neither clearly likely to cause a great number of deaths or serious illnesses.

For worker safety and health, a similar situation exists. Both lead from solder fumes in installing copper pipe and solvents from installing ABS, PVC, and CPVC pipe could be hazardous if plumbers have high exposures by inhalation; dermal absorption could also be significant in the case of solvents. The diseases of concern for solder fumes are related to the lead exposure and are neurologic. The solvents may also cause nerve damage, and they may be involved in liver damage or reproductive problems as well. However, they are not implicated in cancer unless benzene is more common than thought. Unless the NIOSH report about to be released resolves the range of exposures satisfactorily, further testing would be useful before completing the EIR. Safety issues generally favor plastic over metal, which appears to lead to more burns (hot solder and especially flux) and strains and contusions (from heavier metal pipes). PB (like PE, although its uses are not proposed for change) poses little if any worker safety and health concern. Use of gloves, other protective equipment, ventilation, and simple care will significantly reduce any potential hazards from either plastic or metal pipe, but these practices have not achieved widespread acceptance among plumbers.

Fire safety is a very real concern with plastic DWV pipe; ABS is combustible, and PVC and CPVC will at least soften and slump in lines. If these plastics are installed as direct substitutes for metal, as they already are in non-fire-rated residences, they will degrade the fire resistance of structures. The gaskets in no-hub cast iron will also fail in fires and cause the pipe to fall, leaving fire passages. But the proposed code changes apply to fire-rated, fire-resistive construction that could retain its fire rating if appropriate installation procedures are developed and enforced. In such conditions, no degradation of fire resistance would occur. This issue thus turns on enforcement, not science. The potable water pipes, kept cooler by the water inside and of much lower mass, are not a significant fire safety issue.

As with fire safety, smoke toxicity is an issue in which plastic can only be less environmentally acceptable than metal. However, whether the difference is significant is less certain. Both ABS, which seems likely to contribute the majority of pipe mass in California, and the polyolefins PB and PE produce combustion products that are not highly toxic; few if any additional fatalities or serious injuries would be likely from their combustion. PVC and CPVC both produce significant quantities of hydrogen chloride vapor in fire environments, and this corrosive material could, under certain circumstances, make a difference in the probability of human survival in lines. The frequency of such occurrences is clouded by lack of a generally accepted test for smoke toxicity. This problem is currently being addressed both by the State of California Department of Industrial Relations and by the State of New York. We believe DHCD should pay close attention to results from those studies, but does not need to delay a decision solely on those grounds.

No other significant adverse impacts are likely to result from the expanded use of plastic plumbing pipe if relatively simple mitigation measures are taken. Plastic drain pipes may be slightly noisier than cast iron pipe. See the following section (V-B) for further elaboration.

Overall, the SRI study team sees little evidence that expanded use of plastic plumbing pipe would cause significantly greater environmental problems than the materials it would replace. Unfortunately, lack of evidence is not the same as lack of hazard. We believe it is especially important to gather more information on leaching of chemicals from both plastic and metal pipe systems into potable water and on the exposures of plumbers to material from plastic (ABS, PVC, CPVC) and metal (copper) plumbing systems.

Table V-1 summarizes our present assessment of our relative environmental concern about pipe systems. There we show our relative degrees of concern for different materials for each of the major areas of impacts. A high rating does not necessarily mean an impact that is significant in the sense of CEQA, but does mean that the material rated seems to us more likely to be environmentally harmful then other materials on that dimension. For example, the chlorinated plastics clearly are of highest concern for smoke toxicity, but may not pose any significantly higher impacts in the proposed new DWV uses (fire-resistive construction).

Table V-1

RELATIVE DEGREE OF CONCERN REGARDING
POTENTIAL ENVIRONMENTAL IMPACTS*

Impact Area	Potable Water: Plastic PB/PE	Potable Water: Plastic PVC/CPVC	Potable Water: Metal Copper	Potable Water: Metal Galv. Steel	Drain, Waste, and Vent: Plastic ABS	Drain, Waste, and Vent: Plastic PVC/CPVC	Drain, Waste, and Vent: Metal Copper/ Gal.Steel	Drain, Waste, and Vent: Metal Ca Ir
Public Health	3	4	3	3	0	0	0	[illegible]
Worker Safety	1	2	4	2	2	2	3+	[illegible]
Worker Health	0	3	4	2	4	4	3+	[illegible]
Fire Safety	3	2	0	0	5	4	0	[illegible]
Smoke Toxicity	1	3	0	0	3	5	0	[illegible]
Other Impacts	0	0	0	0	1	1	0	[illegible]

*Key: 0 - No concern
1 - Considerably less concern than average
2 - Less concern than average
3 - About average concern
4 - More concern than average
5 - Considerably more concern than average

Note: High relative concern does not necessarily imply high absolute concern; significance of ratings depends on mitigation measures taken.

+More for copper, less for galvanized.

B. Insignificant Effects

The following environmental effects of expanded uses for plastic plumbing pipe may occur but are probably insignificant by any reasonable interpretation of CEQA:

- Plastic pipe systems may fail slightly more frequently than metal systems until a body of experience with installation errors has accumulated.
- Plastic pipe will consume slightly more petroleum than metal pipe, but slightly less energy overall.
- Plastic pipe will contribute a slightly different load of pollutants to public waste water treatment systems, but the direction of impact, let alone its magnitude, is uncertain.
- Plastic DWV pipe will be slightly noisier than metal systems if installed so as to contact wall surfaces; this may be more significant than otherwise in the multifamily, fire-rated construction that is affected in the DWV code changes.
- Plastic DWV pipe could be damaged by pipe cleaning equipment, but because of its resistance to corrosion, the frequency of such cleaning should be low.
- Plastic pipe will slightly decrease the life-cycle cost of plumbing and therefore of housing, but not enough to change demand patterns or growth.
- Small shifts in employment from metal pipe manufacturing to plastic pipe manufacturing will occur.
- A small reduction in the work of plumbers will occur, mostly as a result of repair and renovation work by do-it-yourselfers.

C. Effects of Alternative Actions

In addition to the proposed project, e.g., the proposed change to the 1982 Uniform Plumbing Code (UPC) allowing certain new uses of plastic plumbing pipe as described in the Project Description, this environmental review has examined the potential effects of alternatives to the proposed project on the quality of the natural and human environment. The eventual EIR will consider alternatives as well as the project itself to provide a baseline for evaluating the significance of the impacts and to provide possible alternative courses of action should the proposed project create significant adverse impacts that cannot be successfully mitigated. With this goal in mind, the alternatives we have selected for analysis are no changes to the state code, partial approval of plastic pipe use, and complete rejection of all plastic pipe (that is, reversal of earlier provisions allowing certain uses of plastic pipe).

Under the no-action alternative, there would be no changes in the state code regarding the use of plastic plumbing pipe. All currently approved uses for plastic pipe would continue to be permitted and no new uses of plastic pipe would be allowed. None of the impacts attributable to the use of plastic pipe in expanded applications would be observed; any public health and worker safety and health effects of currently allowed plastic and metal piping systems would persist.

The partial approval alternative would amend the state code to permit certain new uses of plastic pipe, but not all of the new uses proposed under the project. Counting cold and hot water supply in a given application as one new use, the proposed project would change the code to permit 11 new uses of plastic pipe (i.e., 1 new use for ABS pipe, 3 for PB pipe, 1 for PVC pipe, and 6 for CPVC pipe). Considering all the possible combinations of these uses, over 2,000 partial approval alternatives are possible.

Our analyses of the environmental consequences of the proposed project have guided our selection of the subset of the partial approval alternatives to be considered in the EIR. That is, we define the partial approval alternative(s) to permit those new uses of plastic plumbing pipe that are least likely to have significant adverse effects on the quality of the natural and human environment. At present, the only partial alternative that seems reasonably certain to meet this requirement is to allow PB for hot and cold water supply both outside buildings and inside buildings that are not fire-rated or within the fire-resistive construction of fire-rated buildings. No other new uses of plastic pipe would be allowed. Parenthetically, there seems little reason to prohibit PB in exposed locations of fire-rated buildings so long as the penetrations of fire-resistant construction are designed to maintain the rating of that construction. The state of information on the impacts of this alternative is generally the same as on those of the metal water pipe currently allowed for these two uses. Although PB will certainly burn and metal will not, the additional risk of fire spread appears minimal, as does that of smoke toxicity. Leachates from PB have not been shown to be risk-free, but neither have those from copper or galvanized steel. Of the two plastic alternatives, PB is somewhat less likely to be a public health hazard than CPVC, although the relative ratings of PB, CPVC, copper, and galvanized steel will not be clear without further testing (see Section VI). PB is clearly a preferred material, from the worker safety and health viewpoint, compared both with metal systems and with plastics that require cementing.

Under the option of disallowing currently allowed uses of plastic pipe, any impacts of these materials would disappear and those of metal systems reappear. The possibility of permeation of water supply piping by organic contaminants would decrease to the extent that PVC and PE supply lines would be replaced by metal with impermeable joints (but even metal pipe joints can be permeable). Leachates from PVC and PB would be replaced by those from copper, with no clear impact, positive or negative, on public health. The metal pipes would be somewhat more likely to corrode in soil than plastic (galvanized steel is not recommended for buried supply lines). Only small changes in worker safety and health would result from the changes in water supply piping.

Any major impacts of disallowing current uses of plastic pipe would be associated with the widespread use of ABS (and less widespread use of PVC) in DWV applications. Fire load and fire spread would be reduced in nonfire-rated construction. It is probable that few fatalities or little property damage would be avoided by this action, but both are possible benefits. Smoke toxins would also decrease somewhat, especially if PVC were replaced. The decrease in plumbers' exposures to solvent cements would be offset by increased work-related injuries from working with cast iron and, to some extent, with soldered joints in copper DWV. Whether the net effect on worker safety and health would be positive or negative is difficult to predict, given the current lack of information on plumbers' exposures.

Finally, the alternative that would disallow current uses of plastic would transfer some profits and jobs from the plastics to the metal pipe industries. Since large quantities of DWV are involved, these impacts would probably be greater than those for the prime project alternative of allowing expanded uses of plastic pipe. Houses could become more expensive, depending on the prices of cast iron and copper, but probably not enough to significantly affect the demand for housing.

In summary, the alternative of approving only the expanded uses of PB appears to pose fewer environmental risks than does the full proposed project given the state of current information. Because metal systems also pose some unique risks and may be comparable to plastic systems in other risk areas, we are not prepared to say that the no-project alternative or the alternative that would disallow current uses of plastic are environmentally preferable to the partial approval alternative, or even to the full proposed project.

D. Cumulative and Long-Term Implications

Increased use of plastic plumbing pipe can contribute to cumulative environmental impacts in two ways.

First, the sum of the environmental impacts of plastic pipe could be significant even when no one individual impact is deemed significant. In the case of plastic pipe, the most plausible example is for the various leachates that could each contribute to public health impacts. For example, no one leachate might reach the level of 10^{-6} lifetime risk for cancer, but the cumulative risk of all leachates acting together might exceed that level. Given the current uncertainties about the public health impacts, especially those concerning the long-term levels of leachates in drinking water, we are unable to determine whether the cumulative impact is significant. A similar situation is found with worker health impacts, where the risk of one solvent might be insignificant, but that of two or more could be significant. For fire safety, the cumulative impact of all the proposed new uses for plastic pipe are likely to be dominated by the new DWV uses; the contribution of PW pipe is likely to be negligible. The same is true of smoke toxicity, except that the combined affect of HCl, CO, and other toxicants could be significant even when the effects of any one alone were not.

A second issue of cumulative impact is the question of whether the expanded use of plastic water pipe would add to the impacts of other similar actions and in total create a significant effect even though the use of plastic water pipe is not itself significant. We can consider two levels of cumulative impacts:

- Cumulative impact of expanded and existing use of plastic plumbing pipe.
- Contribution of plastic plumbing pipe to total use of plastic products.

As has been made clear earlier, the expanded uses of plastic pipe are in many ways rather small in comparison to existing approved use of plastic pipe. Most new California houses are already being plumbed with ABS DWV if they are not fire-rated; the addition of 10% (by weight) more plastic pipe as PB or (less likely) CPVC water pipe will be of little consequence for fire safety, especially as water piping is less sensitive. The increase for plastic pipe in fire-rated construction, of course, is total since no plastic is being used now; however, if ways of maintaining the rating are developed as required by code, little fire safety impact would be expected. Similarly, the cementing of plastic potable water pipe is probably much less of a problem for workers than the cementing of already approved ABS DWV. Thus, the greatest issue of cumulative impact involves public health impacts, in which plastic in residences can add to plastic in public utility distribution systems. We have no way of estimating the relative contribution of each to the total hazard, as the source of contaminants found in the water supply (control) during leaching tests is not known. We doubt that the combined effects of distribution and residential piping would be significant if neither one alone were, but we cannot rule out that possibility. Similarly, permeation of plastic distribution pipes by toxic substances is more likely than it is for residential piping systems, but the significance of either, in terms of an overall risk assessment, will not be clear for a long time.

With regard to plastics in total, the expanded uses of plastic pipe will be a relatively small contribution in most respects. Plastics are by now endemic in our society. Most of the contaminants of PVC and CPVC that could be public health hazards will be ingested in much greater quantities from other PVC products such as food containers or, in the case of some of the chlorinated methanes, simply from waste products reaching the raw water supply. Those from PB and PE are similar to those from PE food contact materials. If plasticizers do contaminate plastic pipe, they will still do so at much lower levels than they do in any number of plasticized products to which people are regularly exposed, such as flexible vinyl upholstery (where they would yield inhalation rather than ingestion exposures). But equally clearly, plastic pipe does contribute to the total load of plastic-related hazards in California--for example, to the total of all combustible plastics in residences. The hazards from the total use of plastics are undoubtedly appreciable, even though nearly impossible to estimate. Whether or not they are greater or less than the hazards of the materials they replace is perhaps even more difficult to state. About all that can be said is that plastic pipe is not an unusually prominent or special case among plastics in general.

CEQA also requires an assessment of whether long-term environmental costs will be incurred as a result of short-term economic or other benefits. Certainly, any public health impacts of plastic pipe that do occur will probably be delayed for decades, as will some of the worker health or smoke toxicity impacts. However, for the purpose of determining the environmental consequences of the expanded uses of plastic pipe, those should be counted as current impacts, and not discounted in comparison with current benefits. We believe that, when it is viewed from this perspective, this CEQA issue is irrelevant to the decision at hand.

E. Significant Irreversible Changes

CEQA also requires an assessment of environmental changes or consumption of resources that would be permanent and irreversible. For example, the mining of a mountain is an essentially irreversible impact, whereas most air pollutants and their impacts would disappear once the source of pollution is removed.

In the case of the expanded use of plastic plumbing pipe, there would be a small permanent commitment of petroleum resources (but not other energy sources) to the manufacture of the pipe constituents. Total energy resources would be conserved to a slight degree. If any deaths occurred as a result of diseases caused by leachates or occupational exposures, or from fire or smoke toxicity, they would also be irreversible. If plastic pipe were later disapproved, the occurrence of new fatalities would gradually disappear. Some of the leachates from plastic pipe are mutagens and some mutations can be heritable. Thus, it is possible that a heritable--and more likely than not adverse--mutation could persist in the population as a result of drinking from plastic water pipes. Neither the specifics of the leachates in water from plastic pipe nor the overall state of the art of genetic risk assessment allows an evaluation of this possibility at present. If the impacts of plastic pipe eventually were judged unacceptable, it is possible that the metal pipe industry would have declined by that time to the point at which it would prove difficult to revive, but that possibility is also extremely speculative. Overall, we believe that the reversibility of the impacts is not as important an issue to resolve as the magnitude and significance of current impacts.

F. Growth-Inducing Impacts

California's population is projected to increase from the 1980 total of 23.8 million people to 25.9 million by 1985 and to 27.9 million by 1990 (California Department of Finance, 1981). The proposed code change is not likely to significantly affect this forecast population growth for the following reasons. First, the reduction in the cost of housing construction that would result from use of the newly permitted plastics in place of currently approved plumbing materials is so small that it would have virtually no effect on the sales price or rent of dwelling units in the state. Therefore, there will be no change in the demand for housing and consequently no additional in-migration of residents who would be attracted by a drop in the price of housing. Second, the plumbing material substitutions that are likely to result from the proposed code change would not significantly affect employment opportunities in the state and so would not affect the in-migration and out-migration forecasts. Nor would either housing prices or employment opportunities significantly affect shifts in population from one part of California to another.

LEGISLATIVE PROPOSAL ANALYSIS

Subject of Proposed Bill:

"Adoption of 1982 Uniform Plumbing Code"

Background Information:

Every third year, the International Association of Plumbing and Mechanical Officials adopts a revised plumbing code incorporating advances and improvements in technology. During the Twelfth Legislature, the department did not propose legislation to adopt the 1982 version of the Uniform Plumbing Code because there were conflicts between the Uniform Plumbing Code and the Uniform Building Code. The Department of Public Safety (Fire Marshall's Office) will propose legislation to adopt the most recent edition of the Uniform Building Code which is consistent with the 1982 Uniform Plumbing Code.

Summary:

The most noticeable changes in the plumbing code are as follows:

Section 108 allows for a larger grease interception to serve one or more fixtures. Section 203(d) states that copper tubing used for water service shall have a weight of not less than Type L.

Table 4-3, footnote #4. Evidence indicates that a three-inch horizontal waste will effectively handle discharge from three water closets; thus the code change, so that only four water closets or six unit traps are allowed on any vertical stack, and not to exceed three water closets or six unit traps on any horizontal branch or drain.

Section 601 changes will not allow cold storage rooms, refrigerators, cooling counters, etc. designed to hold food or drink, or sinks for washing or preparation of food, to be directly connected to a waste or vent pipe. All drains shall discharge through an air gap into a open drain or approved receptor.

Section 1004 is one of the major changes, and allows Poly Butylene (PB) water pipes to be used for hot and cold water distribution tubing systems, using inserts for connectors. It also inserts language to assure that when metal pipe is used as a building ground, it will be replaced by metal pipe when repairs are made to these pipes.

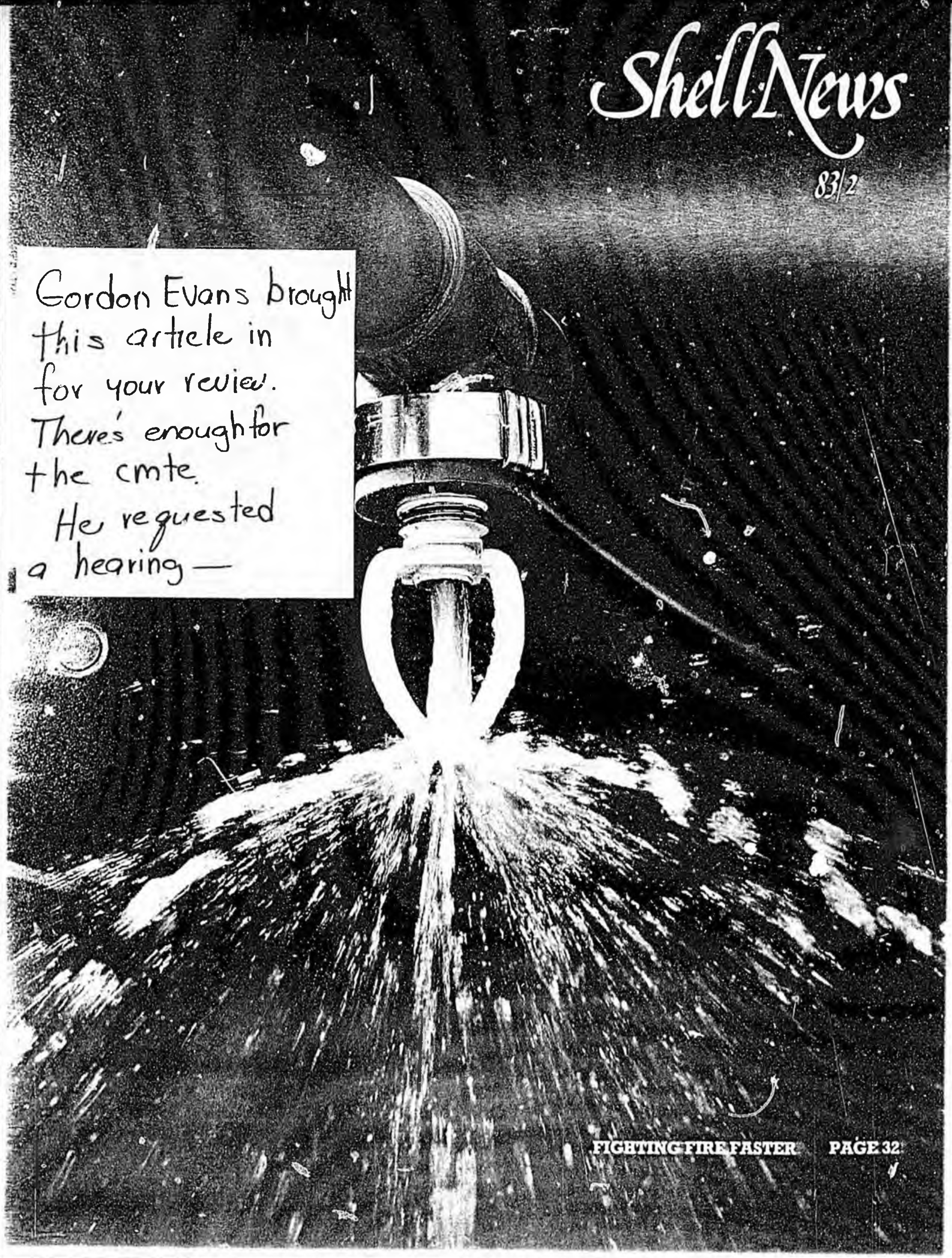
Also adopted were insulation standards for cold water service and yard piping. These standards were for Poly Vinyl Chloride (PVC), asbestos cement pressure piping and Poly Butylene (PB).

Those groups most affected by this change will be plumbers, contractors, local governments and state agencies issuing building permits.

Estimated Fiscal Impact: (FY '83 - FY '87)

To the state: -0-

To others: -0-



Gordon Evans brought this article in for your review. There's enough for the cmte.

He requested a hearing —

QUENCH, DOUSE, STIFLE AND KNOCK DOWN!

Recent disastrous hotel fires are slowly awakening Americans to the fact that the United States has the highest fire death rate of any industrialized country. But a "new generation" fire fighting tool — a quick response sprinkler head together with a piping system made of economical Shell polybutylene — has shown that it can knock down most common fires in minutes, and virtually eliminate fire hazards in the places where we live and work

Story by JAMES A. COX

Some 200 fire officials from all over the United States — "a who's who of fire service in the country," according to one newspaper account — gathered at the Holiday Hotel in Fort Lauderdale, Florida, for a three-day session last fall. The get-together was neither a fun-filled miniconvention nor a traditional firemen's ball, yet it did contain elements of a hot time in the old town tonight. For the fire fighters had congregated in Florida for the sole purpose of putting the torch to the old hotel to see just how fast a "new generation" of fire safety equipment could douse the flames. And what they saw holds the promise of fantastic gains in fire safety in the near future, not only for hotels, condominiums and other high-rise buildings, but for private homes, as well.

The concept behind these latest anti-fire tools — automatic fire sprinklers — is not new. Sprinklers have been used for years with varying degrees of success. They have not been widely used, however, because of the high cost of the equipment and installation. And this explains the smiles that creased the faces of the country's top-rung firemen during the Fort Lauderdale tests as they watched flames sizzle and die under the attack of the new system — sprinkler heads that react to fire at least five times faster than currently available models, and a flexible piping system made of Shell Chemical's DURAFLEX™ polybutylene resins that can cut installation costs by up to 40 percent.

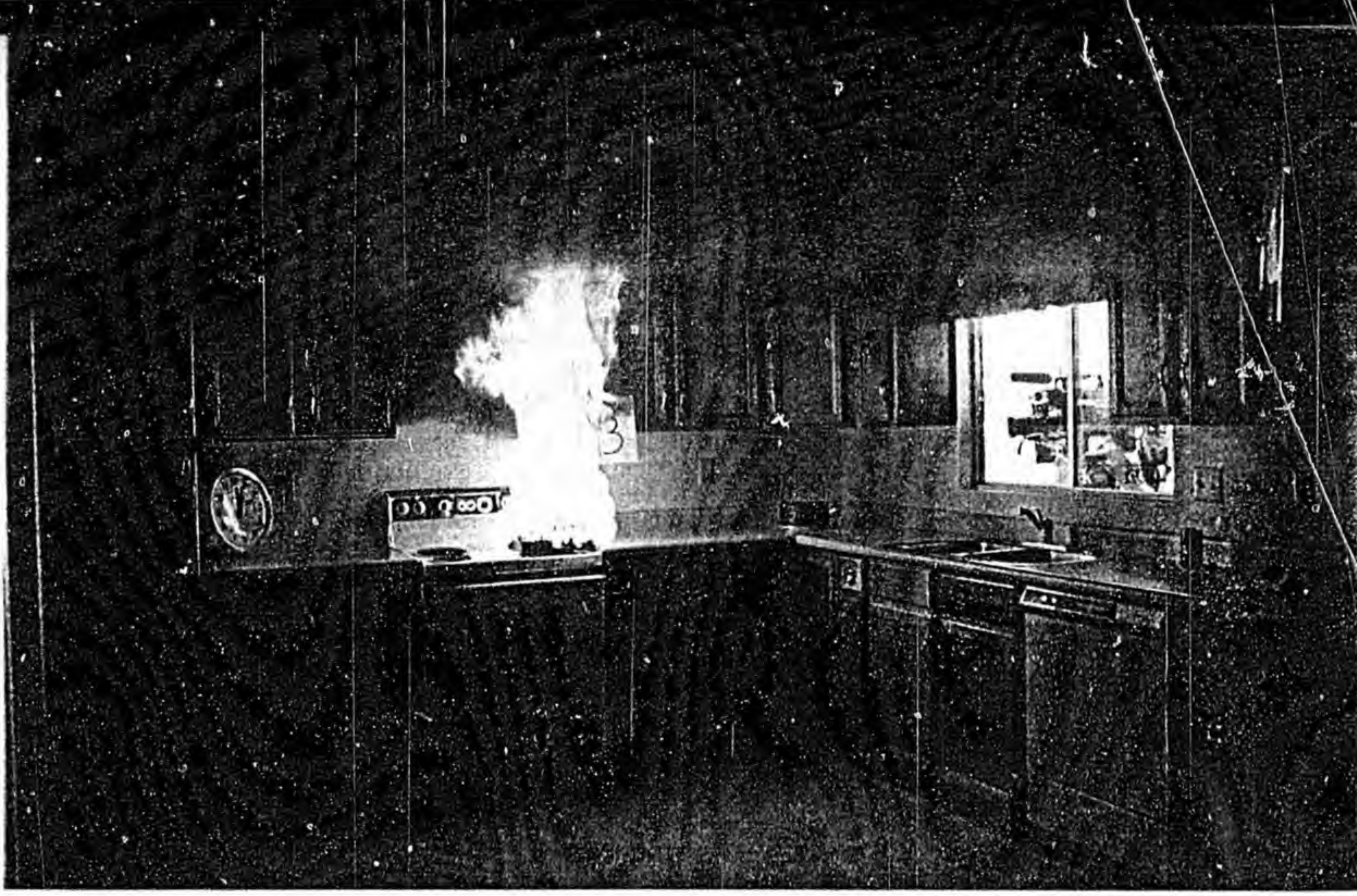
"Only people in the fire community are in a position to fully appreciate the significance of this breakthrough," says Tony Schroer, Shell Chemical Polybutylene Sales Development manager.

"Unfortunately, fire safety has a relatively low profile in the United States — it just doesn't get much play. You can see the effects of that in the fact that we have the highest fire death rate of any of the industrialized countries." He goes on to cite some additional shocking statistics:

- There are 2.7 million fires across the nation each year, snuffing out more than 8,000 lives and causing property losses in excess of $5 billion.
- In the time it takes to read this article, one American will die and 22 others will be seriously injured as a result of fires in private residences and hotels/motels.
- According to statistics gathered by the Federal Emergency Management Agency, hotel/motel fires are much more common than most of us realize, since only the spectacular ones rate widespread news coverage. But the odds are that one out of every four hotel/motel properties will have a fire each year, which adds up to at least 1,000 fires a month. In 1981, for example, hotels and motels reported 12,200 fires (many go unreported), which resulted in death for 165 people, injury for 550 others and $77 million in property damage.

"These grim statistics are going to change for the better," says Schroer, "because our perceptions about fire protection are beginning to change. There are very few structures in which fire sprinkler systems are required today. But in many areas of the country, the fire protection community is working to implement sprinklers as widely and as quickly as possible. In fact, some towns and cities are now mandating fire sprinkler systems in all new construction, both residential and industrial. San Clemente was

Ft. Lauderdale tests including sampling for toxic gases and checks of temperatures at varying heights in hotel room.



Electric range was turned to maximum heat which ignited cooking oil in pan during the sprinkler system tests in Scottsdale, Arizona.

among the first to go this way. Because of California's Proposition 13, there was a drastic cutback in the amount of funds available for building new fire stations. But the city was growing, and so was the demand for fire protection services. So city and fire department officials worked out a compromise — with mandated sprinkling, the firemen didn't have to respond to a fire within two or three minutes, because water already was being put on the blaze. And thus the city didn't have to build new stations and buy a lot of expensive new equipment."

Government and fire officials in a number of other municipalities are considering or fostering similar ordinances. But in California wider use has been delayed by legal complications resulting from attempts by various plumber's groups to get all plastic plumbing thrown out of the state code.

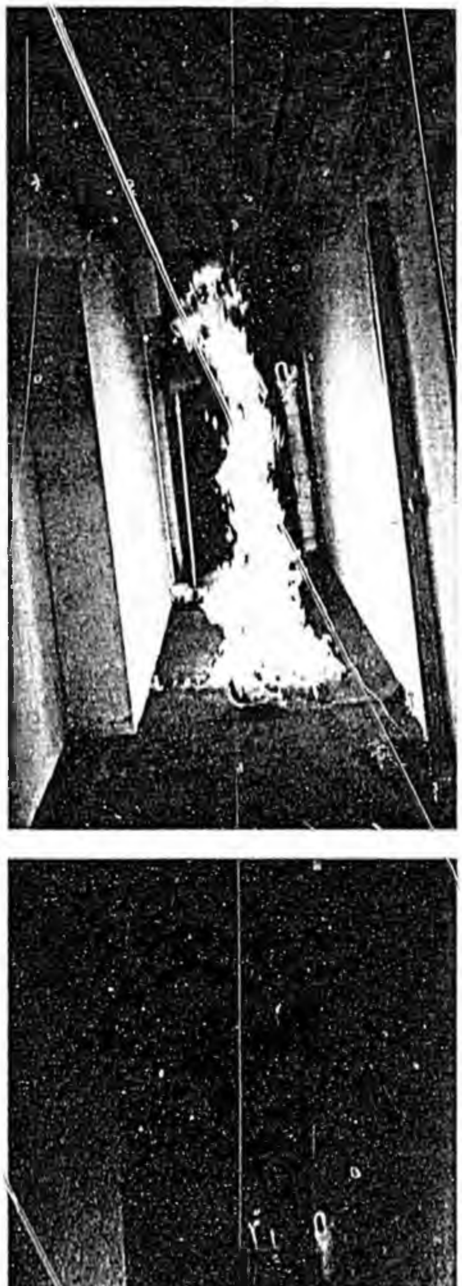
"It's really a labor problem," says Schroer. "Because of its flexibility, polybutylene pipe goes in quickly and easily. It's used in 80 percent of the mobile homes and virtually 100 percent of the recreational vehicles produced here because of that flexibility. Its use in hot-and-cold water systems goes back more than a decade, it serves a huge underfloor heating market in Europe, and it is now being integrated into solar applications. All this pleases consumers, of course, because it cuts costs. But the groups that are selling labor on the market, like the plumbers' union, are against it. They're using every tactic they can — they're suing in the courts, they're calling in political favors, they're making unfounded claims about toxicity and smoke hazards. It's basically an irresponsible attack, aimed at frightening the public. It's part of the battle going on all over the country — a classical economic confrontation between new products and methods, like plastic pipe and fittings, and the old and entrenched — the metal pipe manufacturers and the plumbers in alliance."

Schroer has no doubts about the eventual winner of the plastics-metals face-off in California, although he deplores the misinformation and "scare tactics" being used by the opposition. In the meantime, elsewhere in the country, the application of pipe made from Duraflex polybutylene to fire sprinkler systems is generating great interest and excitement. "The subject is still brand new," he says. "It really started when the U.S. Fire Administration was set up as a section of the Federal Emergency Management Agency to address the problem of fire in this country — especially the very high number of deaths by fire. It began a program to design a residential sprinkler system, and in its studies, quickly learned that the available sprinkler heads went off so slowly that an unsurvivable atmosphere developed in a burning room before the sprinkler came on. Although those sprinkler systems would save the house, the people would die."

As a result of research sponsored by the Fire Administration, a new sprinkler head was developed (first by Grinnell Fire Protection Systems and then by Central Sprinklers Corporation) that responds at least five times as fast as existing commercial heads. Moreover, it has resolved a longstanding too-much/too-little snag, being sensitive enough to extinguish flames before lethal toxic fumes build up, yet not so sensitive as to be triggered by heat or smoke from stoves or cigarettes.

The Fire Administration then turned its attention to economics. "For the system to be used," Schroer points out, "they also had to get its total installed cost down. The traditional method, using black iron pipe and threaded joints and fittings, was just too expensive — people wouldn't be able to afford to put it in. That's when they started looking at plastic pipe and discovered Duraflex polybutylene. Our forte is being able to reduce installation costs, because polybutylene pipe, being flexible, is particularly easy to work with. Even in one-inch tubing, which is what you'd use in most residential sprinkler systems, you can snake it through walls and tight spaces like a wire; you don't have to use fittings every time you turn a corner; you don't have to do any threading — just crimp rings or heat seals that fuse pipe and fitting; and you can prefab sections outside the house and snake them in, quickly and inexpensively. So that's how we got involved with the Fire Administration and began working with them on test programs around the country."

Some of the first tests were conducted at San Clemente, where a primary goal, according to Fire Chief Ron Coleman, was to limit and control fires before they reach the flashover point. Flashover occurs when an area becomes superheated (800°-1000°F.) and the oxygen in the air suddenly explodes in a fireball. Flashover is lethal to anyone in the vicinity and can involve an entire building in a matter of minutes. Controlling this dangerous condition was particularly important in developing a sprinkler system for residential use because homes and apartments have smaller rooms and lower ceilings than industrial and commercial structures, conditions that enable temperatures and toxic gases to soar to lethal levels more quickly. And the critical moment can arrive in a hurry, for studies show that temperatures usually double between the fourth and fifth minutes of a fire.



Mineral spirits were torched in Florida hotel hall to see how sprinkler would react to arson. It doused fire quickly.

In the San Clemente tests, fire officials installed a polybutylene sprinkler system in an abandoned house that was scheduled for demolition, then set three fires inside and in the garage, using common household furnishings and materials. In each case, the sprinkler system responded rapidly, and proved that sprinklers will control most household fires in less than three minutes. Additional studies showed that the sprinklers prevented eye-height temperatures and carbon monoxide gas from reaching lethal levels, providing adequate amounts of oxygen to remain to keep the air breathable. In fact, the sprinklers knocked down a bedroom fire fast enough to save the life of a person sleeping right next to the flames.

Says Schroer: "The fire community recognizes that, if they are able to get sprinkler systems into the places where people live, they're going to reduce the number of fire deaths dramatically and do the public a significant service. They're also going to reduce the demand for fire equipment, and make their own lives a great deal safer. So they have been trying to promote the use of sprinklers, and in many areas have established a series of tradeoffs. In multihousing building construction, for example, a lot of

Iron pipe, l, requires much machine work. Plastic pipe, r, is easily cut, heat-fused together. Inset: How nicely the plastic pipe bends.

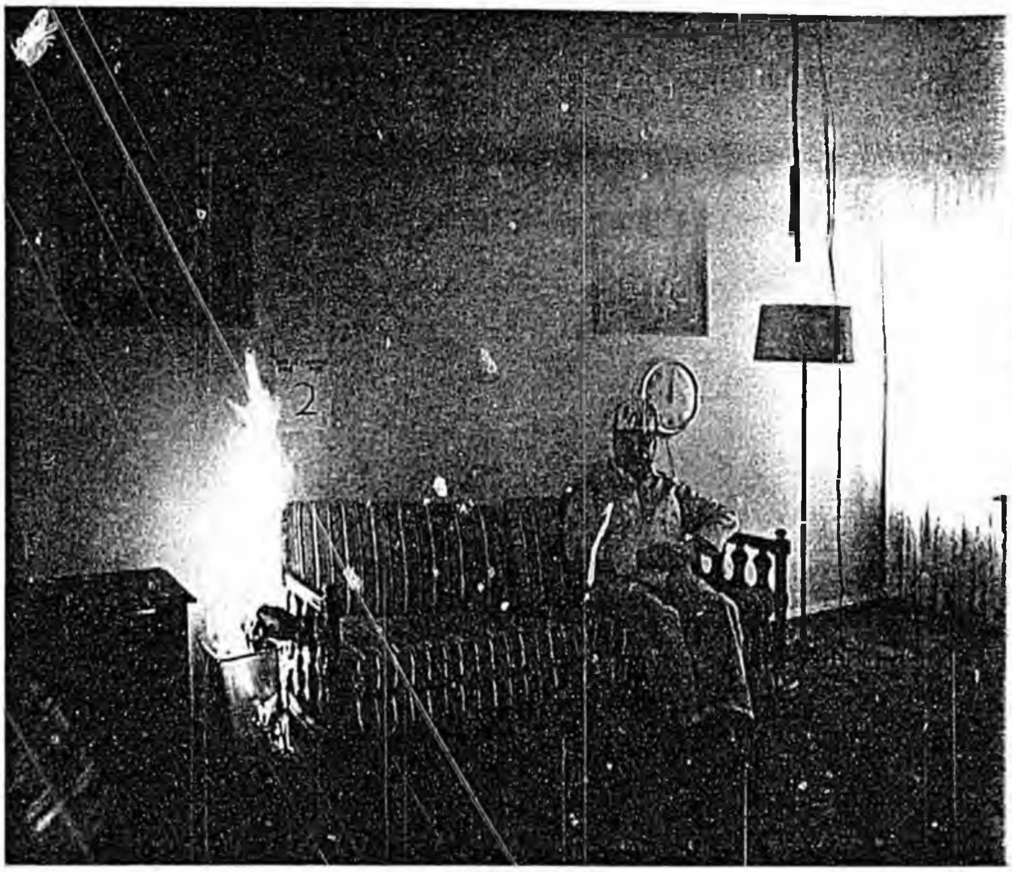
the expense goes into fire-containment procedures. Fire-rated structures are compartmentalized, for instance, with doors and walls and ceilings that will resist a fire breakthrough for a given period of time. All this adds considerably to the cost of building an apartment house or condo. So in places like Cobb County in Georgia, fire officials are saying to builders, 'Look, if you'll put in a fire-sprinkling system, we'll allow you to reduce the fire rating on the walls, ceilings and doors, because you're not going to need it.' The reasoning there, of course, is that the system will be putting water on any fire that starts, and the room won't have to hold the blaze for an hour before it breaks through. The fire will be out in a matter of minutes."

Such trade-offs are beneficial to everyone, Schroer maintains. For residents, a sprinklered apartment is much safer than one that is merely fire-rated. And if a builder uses the new heads and polybutylene pipe, the trade-offs could mean that installation will cost him little or nothing. "In fact," says Schroer, "he might even save himself a little money — and that's the magic message for builders. We're giving him a good selling point for his product, too, without any cost to him — and that's like a free lunch."

The response in Cobb County has been enthusiastic — more than 750 units committed to be "sprinklered" through September 1982, and more to come. "I would say that in the next six to eight years, 75 percent of new residences of all types in Cobb County will have sprinklers," says David Hilton, the county fire chief.

By and large, however, according to Schroer, the biggest market for the new generation of fast response sprinkler systems in the near future will be in the multihousing and hotel/motel field. This is due to the trade-off factor — in single-family housing there just isn't that much to trade. But if Congress would enact tax credits and if insurance companies would give premium discounts for sprinklering, there would be a financial incentive for homeowners to invest in the system, not only in new home construction but also in retrofitting older homes, a task for which flexible Duraflex pipe is ideally suited.

"The insurance industry is proceeding slowly," Schroer says, "but in Scottsdale, Arizona, they're talking about a 20 percent overall premium deduction if you have a sprinkler system in your home. That makes it very attractive, because that's out of the total premium, not just the fire protection portion. If the total premium goes down by that much, you end up with the fire protection component being cut by 80 to 90 percent. And what does that say? That sprinklers virtually eliminate the fire hazard."



Sprinkler extinguishes fire before smoke drives man out of room in Scottsdale testing.

The big retrofit market that is already here is in the hotel/motel field, if the Fort Lauderdale tests mean anything. Fire officials at that demonstration sat in a command post equipped with television monitors and sophisticated devides for measuring the heat and toxic gases produced by the fires. Over the three days they watched 10 test fires that were designed to duplicate the most common hotel and resort conflagrations, from a cigarette butt smoldering in a trash bag on a maid's cart . . . to a lighted match dropped in a paper-filled wastebasket in a guest room . . . to arson fires fueled by flammable liquids in both guest rooms and corridors. Response times for the sprinkler heads ranged from *six seconds* in a guest room arson fire (with the fire extinguished in five minutes) to 14 minutes for a wastebasket fire across the room from the sprinkler head (with the fire again knocked down in five minutes).

Schroer brings up an interesting fact that explains why controlling arson fires is of great interest to hotel managements and fire marshals. "It's commonly believed," he says, "that most hotel fires are caused by someone smoking in bed. That's erroneous. We've worked closely with the Marriott Hotel staff in these tests, and their experience is that 75 percent of their fires are caused by arson. Who sets them? Everyone from pyromaniacs to angry former employees, as happened at the Las Vegas Hilton."

A surprising fact, according to Schroer, is that arson fires are usually the easiest to control with a sprinkler system: Somebody torches gasoline or mineral spirits and *wham!* You've got a lot of fire! And then that sprinkler head comes right on and *zap!* There goes your fire.

The Marriott Corporation, one of the sponsors of the Fort Lauderdale tests, has assumed a leadership role in hotel fire protection by at least partially sprinklering all their hotels. "About two-thirds of their hotels are completely sprinklered now," says Schroer, "and their goal is 100 percent in another 18 months. They've just started retrofitting a hotel in Miami with polybutylene, and on the basis of what's been done, their installation costs are expected to be about 30 to 40 percent below what they would have been with black iron pipe. With that kind of savings, we expect to see a momentum build up. Sheraton has inquired, as have Hilton, Holiday Inn and Hyatt, so it's starting. And when you realize that there are some 55,000 hotels in the United States and fewer than two percent of them are sprinklered, you get a feel for the great opportunity that exists." SN

Shell Chemical Company

A Division of Shell Oil Company

One Shell Plaza
P.O. Box 2463
Houston, Texas 77001

May 16, 1984

EXPRESS MAIL

Chairmen and Members
Senate Labor and Commerce Committee
State of Alaska
Juneau, Alaska

Dear Sir:

REFERENCE: HOUSE BILL NO. 508, AN ACT RELATING TO THE PLUMBING CODE

I appreciate the opportunity to give testimony to the state Senate of Alaska on house bill No. 508. I was disappointed, however, that testimony extended well beyond the scheduled committee meeting time, so that it became necessary for me to leave before I could address the numerous allegations about the performance of polybutylene piping. This letter is written to address those allegations and show that there are facts that clearly refute the arguments that were made. We would like to see this letter and the substantiating information that is attached entered into the official transcript of the hearing.

In his testimony, Dwight Perkins of the Pipe Trades Council of Alaska raised several general issues in protesting the potential approval of polybutylene pipe. The issues raised by Mr. Perkins and the true facts on those matters are as follows:

Durability of polybutylene pipe - Polybutylene pipe resists virtually all of the actions that destroy metal piping. Polybutylene piping does not rust, rot, or corrode. It resists scale buildup that can plug metal pipes. It is not subject to electrolysis. It resists breakage due to freezing water far better than any metal pipe. It has a wet abrasion resistance superior to metal plumbing pipe (see attached performance report on the use of large diameter polybutylene pipe to replace steel piping in the transport of highly abrasive bottom ash slurries from coal fired power plants). Because of its flexibility, polybutylene pipe should be able to accommodate any movement due to earthquakes much better than metal piping. Indeed, the ability to accommodate movement was one of the primary reasons that polybutylene pipe relaced metal pipe in the mobile home industry. Far from being less durable, the facts clearly show that polybutylene pipe is far superior to metal pipe.

HRA413702

Brought by
Gordon Evans
4:55 Mon

He wants to talk
to you -

Thawability - There are proven methods that can be used to thaw plastic water lines. Because of its excellent high temperature properties, polybutylene pipe can be thawed by either hot water or low pressure steam, applied from either the outside of the pipe or by a flexible probe inside the pipe. As verification of the pipe's ability to tolerate temperatures in excess of 180°F during thawing, I am enclosing test data that shows that, at close to the condensation temperature of steam (210°F rather than 212°F), polybutylene pipe will carry an internal pressure of 150 psi for well over a year - certainly long enough to thaw the pipe.

I believe that it should be pointed out that, once the polybutylene pipe is thawed, the consumer's problems are over. By comparison, the thawing of a frozen metal pipe frequently presents the consumer with the very serious problem of broken, leaking water lines. I have enclosed an article attesting to the substantial benefit realized this past winter by users of polybutylene plumbing pipe.

Fire hazard - In spite of Mr. Perkin's allegations, SRI International, in an Environmental Review Document prepared for the state of California, concluded on page V-3 of the summary that, "The potable water pipes, kept cooler by the water inside and of much lower mass, are not a significant fire safety issue."

Allegations on smoke toxicity are also not borne out by the facts. A document detailing tests done by Dr. Carlos Hilado using a test method patented by NASA concluded that "dry" polybutylene produced less toxic gases than Douglas fir does. Obviously a pipe wet with water as it will be used constitutes even less of a risk.

Electrical grounding - We were surprised that Mr. Perkins would bring this point up as the National Electrical Code cautions against the use of water pipes as electrical grounds.

Permeability - This allegation only relates to buried piping and as such has no bearing on the installation of hot/cold water plumbing pipe in walls of buildings.

Worker safety - This is another curious point for Mr. Perkins to raise. In their objective study, SRI International concluded on page V-8 of their summary that, "PB is clearly a preferred material from the worker safety and health viewpoint compared with both metal systems and with plastics that require cementing."

Mr. Vernon Akin (sp.?) commented on toxicity/health issues, the installation requirements for polybutylene pipe, his opinion that polybutylene pipe will not be less expensive to install than metal pipe systems and thermal expansion/contraction. Again, addressing the facts as they relate to these issues:

Toxicity/health - Every component of polybutylene pipe - the resin itself, the pigments, and the stabilizers - are approved for food contact use up to 180°F (the maximum sustained plumbing temperature) under the Food and Drug Administration regulations. None of the piping materials currently approved by the Alaska code can make that statement. In fact, some of the metal systems currently approved by the state of Alaska are coming under increased scrutiny (see enclosed comments on 50/50 time-lead solder). Far from being a heath risk, polybutylene pipe is likely the safest potable water piping material.

Installation requirements - Mr. Akin alleged that the requirements in the code cannot be practiced. The facts are that over 500,000 residences were plumbed with polybutylene piping during this last year to the satisfaction of the local plumbing officials.

Installed costs - We certainly recognize Mr. Akin's right to his own opinion on this matter, but the facts are otherwise. The National Association of Homebuilders Research Foundation documented a 44 percent reduction in plumbing costs. In his report to Congress on February 18, 1982, the Comptroller General of th United States estimated a savings of $300 per house.

Thermal expansion/contraction - Whereas polybutylene does have a higher coefficient of thermal expansion than metal, it is at least 100 times more flexible. As a result, it can flex to accomodate any thermal expansion or contraction, actually generating fewer concerns than metal systems. In almost 5,000,000 plumbing systems installed with polybutylene pipe in the United States, I am unaware of thermal expansion causing a single problem.

Several comments were also raised about the solvent cements thought to be used with polybutylene. The simple fact is that polybutylene pipe is not joined with solvent cements. The 1982 IAPMO code calls for mechanical joining systems. Referring back to my earlier comments on worker health and safety, these joints are actually safer than metal joints.

Judged by the facts as interpreted by objective, credible third parties, polybutylene pipe is not only equal to the metal pipe currently approved in Alaska, it is decidedly superior. It offers the consumers of the state of Alaska a better, safer material at a lower cost. It offers the tradesman a safer material that is easier to use. The facts as differentiated from the opinions and allegations clearly show that the approval of polybutylene pipe as embodied in the 1982 IAPMO code will pay substantial benefits to all of the citizens of Alaska. I urge you to

Polybutylene plumbing pipe saved thousands of home and apartment owners the cost and inconvenience of broken water pipes during the extremely severe cold spell over the 1983 Christmas holidays.

"It was a major disaster in this area," says Jack Smith of Sundance, Inc., a plumbing contractor in Marietta, GA, where temperatures dropped to near zero and high winds pushed the chill factor to -50°F. "We had 500 to 700 service calls. They came in waves. But only one involved a system piped with polybutylene pipe. All the others involved breaks in copper and galvanized pipe. And we've installed hundreds of polybutylene piped water systems in this area."

The experience with polybutylene pipe during the freeze in Cobb County, GA, has fire and building code inspectors smiling. Cobb County, which is part of the rapidly growing Atlanta metropolitan area, has been a leader in changing building codes to allow the use of polybutylene pipe in hot and cold water plumbing and to authorize cost-saving building code modifications to encourage the installation of residential fire sprinkler systems.

"There were leaking pipes all over town -- and one in an unheated area of a new school may have caused a quarter of a million dollars or more in damages by itself -- but virtually no problems with the residential systems based on polybutylene pipe," says Lt. Jerry W. Grier of the Cobb County Fire Department. "We've got about 9,000 water systems and sprinklers based on polybutylene pipe in the county." Because of the dramatic difference in performance, the Cobb County Fire Department is now considering mandating polybutylene pipe for all sprinkler systems installed in the attic.

"We're very pleased with the performance of polybutylene," says Jim Bechtel, Senior Vice President of Post Properties, Inc., which is one of the largest builders and operators of multi-family dwellings in the Atlanta area. "We have 250 domestic water systems and 148 fire sprinkler systems based on polybutylene pipe in operation. There was only one break involving a system based on polybutylene pipe during the freeze."

"This freeze changed a lot of people's minds about plastic pipe," says Danny R. Gosdin, a field supervisor for Carroll & Boyd, Inc., of Jonesboro, GA, a mechanical contractor for Pulte Homes. "We've installed hundreds of water systems based on polybutylene pipe, and during the freeze we had only one fitting push off from freezing, but virtually no water damage resulted. Yet, the first day after the hard freeze, we had 250 calls, all involving water systems made with copper or galvanized pipe. That makes you think this polybutylene pipe is pretty good stuff."

"Knowing what I know now, I'd pay more to have a water system piped with polybutylene than I would for a system made with metal pipe," says W. T. Anderson, who is director of inspections for Cobb County. In actual practice, polybutylene plumbing systems can be installed less expensively than copper systems, even at today's depressed copper prices.

In Houston, the same cold front dropped temperatures to a record low of 11 degrees on Christmas morning and held the area below freezing for more than 100 hours. According to preliminary estimates, freeze damages were expected to match or exceed damages caused by the wind and flooding from Hurricane Alicia last August. Some 5-10 percent of homes and apartments in the area experienced frozen and broken pipes.

"One apartment complex I repaired had over 180 breaks," says Laurence Klein, a master plumber who specializes in repair and replacement plumbing for large apartment and condominium operators. For several years, Klein has used polybutylene pipe to replace copper and galvanized pipe in water systems and during that time has replaced hundreds of metal water systems in the Houston area with polybutylene pipe.

"I did a good month's work in the week following the freeze, but didn't get a single call involving polybutylene pipe," he said. "The freeze really separated the good from the bad plumbing. Polybutylene isn't giving me very much repair business."

Wood Brothers Homes, one of the larger home builders in the Houston area which switched to polybutylene pipe for its plumbing a little over a year ago, also reported no complaints of breakage or water damage from occupants of some 250 to 300 homes constructed with the high performance plastic pipe.

"Our sales department, because of problems in the past with other plastic pipe, has been uncomfortable about our changing to polybutylene, and felt they were having to sell over it," says Trudy Starkey, who is purchasing agent for Wood Bros. "Since the freeze, that has changed and they now feel that it is a sales point in favor of Wood Bros. Homes."

PUBLIC HEALTH NEWS

Virginia Department of Health
109 Governor Street
Richmond, Virginia 23219

DATE: December 16, 1983
RELEASE: IMMEDIATELY

CONTACT: Thomas B. Gray, Assistant Technica Services Chief, Water Supply Engineering (804) 786-5566

A health advisory is being issued by state Health Department officials to persons whose home plumbing consists of metallic pipe. State Health Commissioner, Dr. ies B. Kenley, is advising persons who live in newly constructed homes (less than two years old) or homes where plumbing has been recently replaced to flush the stagnant water from their taps for 3 minutes before using it for human consumption.

Dr. Kenley said, "Whenever a water tap that has not been used for 6 hours or longer is opened, the initial portion of water may contain dissolved metals in excessive amounts. Flushing a tap for several minutes will remove stagnant water from a house's plumbing and should ensure that water obtained after this maneuver is safe for human consumption."

Recent scientific articles have indicated elevated levels of piping and jointing metals (copper, zinc, lead) in the water after it has been allowed to stand for a period of time. Due to a limited amount of data presently available regarding the extent of this problem in Virginia, Dr. Kenley has established a work group to collaborate with the Department of Housing and Community Development in investigating the occurrence of these corrosion products in stagnant water.

--END--

Solder labeled health threat

By Hugh Robertson
News Leader staff writer

In an investigation with statewide and possibly national implications, an engineering consultant hired by Chesterfield County has concluded that the use of lead-based solder to seal plumbing joints can pose a health threat to owners of new homes.

The investigation was undertaken following complaints this summer by a Brandermill couple, Douglas and Jeanette Corkum, that the water in their new, $158,000 home at 4016 McTyree's Cove Terrace was bad and they had suffered from vomiting, diarrhea and fatigue since moving into the home in January.

Because of the consultant's findings, the solder problem will be laid before the state Board of Housing and Community Development next month with the suggestion that the use of lead-based solder be prohibited in future construction.

The state board administers the Uniform Statewide Building Code to which home and other construction in Virginia must conform.

Additionally, the Virginia Department of Health plans to undertake a statewide study to determine how much of a health danger, if any, may exist in new homes where the lead-based solder was used.

In the meantime, according to Assistant Health Commissioner Robert B. Stroube, owners of homes less than 2 years old who feel they may have a water safety problem should run their water through faucets "a couple of minutes" before drinking it.

Problems with lead and copper in new home plumbing systems usually are resolved, with the metals flushed out, in about two years, he added.

However, Dr. Stroube cautioned that just how much of a problem exists from use of lead-based solder is unknown at present.

Dr. Stroube also reported that water quality problems may be created by using water with a high acid content, such as is sometimes found in wells. Corrosion may occur, putting copper into the water system, in these cases, he said.

In Chesterfield, County Administrator Richard L. Hedrick also cautioned that "our data right now is rather uncertain" and how much of a problem exists is unknown.

Laboratory testing of the Corkums' water by the state health department disclosed it was highly contaminated by both lead and copper. In one sample, the metal content was 200 times that allowed under federal and state health standards. The tests also showed the county-supplied water was not at fault.

The Corkums' problem then became involved in suits and countersuits filed by the Corkums and their contractor, Edward J. Buzzell Jr.

On Oct. 27, the county hired the Jordan firm to investigate the situation and recommend what could be done about it.

Last month, the plumbing beneath the Corkums' home was removed and the soldered joints opened and examined.

Additional tests were made by the health department of water which had been allowed to stand for several hours in the joints. Again, high lead and copper content was found.

In a Nov. 10 preliminary report to the county's top building official, Robert S. Hodder, the Jordan firm said, "Several relatively new homes in Chesterfield ... have been found to have high lead levels in the internal water piping system which are far in excess of the ... limit." The limit for lead is .05 milligrams per liter.

"Some have levels in the 5 to 6.1 milligrams per liter range," the report said.

"All of the homes involved were relatively new and built by different builders and plumbers" and were in different parts of the county, the Jordan report continued.

The firm also reported that all the houses concerned had copper tubing in which the joints had been sealed by what is called "50-50" solder, which is half tin and half lead. The 50-50 solder is commonly used in home construction, according to building officials.

Additionally, the Jordan firm reported that a "self-cleaning" plumber's flux had been used in each instance. The flux is a liquid which is used in conjunction with solder in sealing pipe joints.

The problem apparently is a far-ranging one, the report continued, because difficulties with water systems where lead solder has been used have been found in Long Island, N.Y.; Carroll County, Md.; Seattle; Portland, Ore.; England; Canada; Scotland and the Netherlands.

"There definitely is a problem associated with the use of 50-50 solder in copper pipe joints which results in lead levels in the water system higher than the federally mandated levels," the report said. "The overwhelming consensus has been in previous problem areas to preclude the further use of lead solder in copper piping."

The report urged that lead-based solder be banned and that solder without lead be required in the future. It also said use of the "self-cleaning" flux should be investigated further.

As did the health department, the report recommended that owners of new homes let their water run for several minutes before drinking it.

"It does appear, however, that the problem dissipates within about (two years) ..., after all the lead in contact with the water has been corroded and flushed through the water system," the report also noted.

Neal Barber, deputy director of the state's housing and community department, said the agency's staff would lay the problem before the state board at its Jan. 9 meeting and suggest that a solution would be to prohibit use of the 50-50 solder.

Instead, the code should be revised to require use of "95-5" solder, which is 95 percent tin and 5 percent antimony, Barber said. The antimony contains just .02 percent lead, according to the building code.

Barber said the department has learned the use of lead solder recently has been banned in California and New Jersey.

However, the Virginia building code allows the use of 50-50 solder, and, until it is changed, local building officials have no authority to prohibit use of that type solder.

Barber said that, if the board decides to require use of 95-5 solder, the code-amending process would take about seven months. Various procedures, including the calling of public hearings on the proposal, would have to be followed, Barber said.

In a followup Dec. 5 report to Hodder, the Jordan firm reiterated, "It is apparent that the lead-tin solder was the source of the contamination in the Corkums' piping system."

Once new piping, using 95-5 solder and a different flux, was installed in the home, the problem disappeared, the report said.

"We feel that the recommendations made in our preliminary report are still valid," the followup continued, adding that the state building code should be changed.

"Consideration should be given to testing the water supplies in recently constructed public buildings," where children are present, such as schools, day-care centers and nurseries, where lead solder and copper piping have been, the report also recommended.

"We hope that our reports will help to solve what has apparently been a longstanding problem which no one was aware of until recently," the report concluded.

— From Richmond News Leader, Wednesday, December 14th Edition —

<u>Tests of Polybutylene Pipe at PT Relief Valve Conditions</u>

Over four years ago, Shell contracted with Springborn Testing Institute, Inc. to evaluate the performance of polybutylene tubing subjected to a constant pressure of 150 psi at a constant temperature of 210°F. Sustained pressure testing was done in accordance with the ASTM D1598 test method. The results accumulated to date (see table below) clearly show that the tubing far surpasses the IAPMO performance requirement of 48 hours at 210°F and 150 psi.

Test Sample	Nominal Size (inches)	Failure Time (hrs.)*
1	1/2 CTS	N31792
2	1/2 CTS	26929
3	1/2 CTS	26653
4	3/4 CTS	N31792
5	3/4 CTS	N31792
6	3/4 CTS	N31792
7	1/2 CTS	N31008
8	1/2 CTS	N31008
9	3/4 CTS	N30072
10	3/4 CTS	25887
11	1/2 CTS	N31008
12	1/2 CTS	N31008
13	3/4 CTS	21792
14	3/4 CTS	14415
15	3/4 CTS	N31008
16	3/4 CTS	N31008

*N denotes a sample which has not yet failed and is still under test.

BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

Greater Use Of Innovative Building Materials And Construction Techniques Could Reduce Housing Costs

Problems exist within different levels of government and the homebuilding industry that hinder the development and use of innovations which could check rising costs. For example:

--Builders are reluctant to accept risks associated with using new technology.

--Local building codes are sometimes restrictive and administered inconsistently.

--Builders lack technical information on innovative technology.

GAO makes several recommendations to the Secretary of Housing and Urban Development and the President of the National Institute of Building Sciences to encourage the development and use of cost-saving innovations in homebuilding.

UNITED STATES GENERAL ACCOUNTING OFFICE

CED-82-35

FEBRUARY 18, 1982

A 1971 study prepared for HUD 1/ regarding builders' use of 12 cost-saving innovations showed that, on the average, 70 percent of the responding builders did not use the innovations. According to building code officials, 73 percent of the time builders in their areas used the innovations occasionally, seldom, or never. Subsequently, a 1973-74 NAHB survey, which included 11 of the 12 items, showed that 8 of the 11 were not used in the great majority of new single-family houses nationally. Our 1978 report, which addressed 8 of the 12 items, showed 3 of the 8 were still widely unused by builders in the 87 communities included in our review. The three still widely unused items and the estimated potential savings per house at the time were: spray painting ($185), 2x4 studs 24" oncenter for exterior bearing walls ($119), and the preassembled plumbing tree ($55).

Examples of available cost-saving innovations currently not widely used by builders, as identified by HUD and NAHB research officials, and estimates of savings they could yield in the medium-price house include:

Engineered 2" by 4" studs, 24" oncenter interior and exterior wall framing (in lieu of 16" oncenter)	$300 - $700
Under floor plenum heating system (in lieu of duct work system)	$400
Polybutylene piping for plumbing (in lieu of metal piping)	$300
One-piece fiber glass bathtub with integral surround (in lieu of tilework)	$50

Rapid, widespread adoption of cost-saving innovations is hindered in part because the traditional onsite homebuilding industry is extremely fragmented--more than 100,000 builders, the majority of which build less than 25 units annually. However, the 1971 HUD study identified and analyzed a range of other factors impeding builders' use of innovations. While the study has not been updated, its results were substantially corroborated by the widely varied sources we consulted during our review. The study ranked in order of importance a total of 20 constraints, of which it called the following "important":

1/"Constraints to Builders' Use of Cost Saving Innovations," NAHB Research Foundation, Inc., July 1971.

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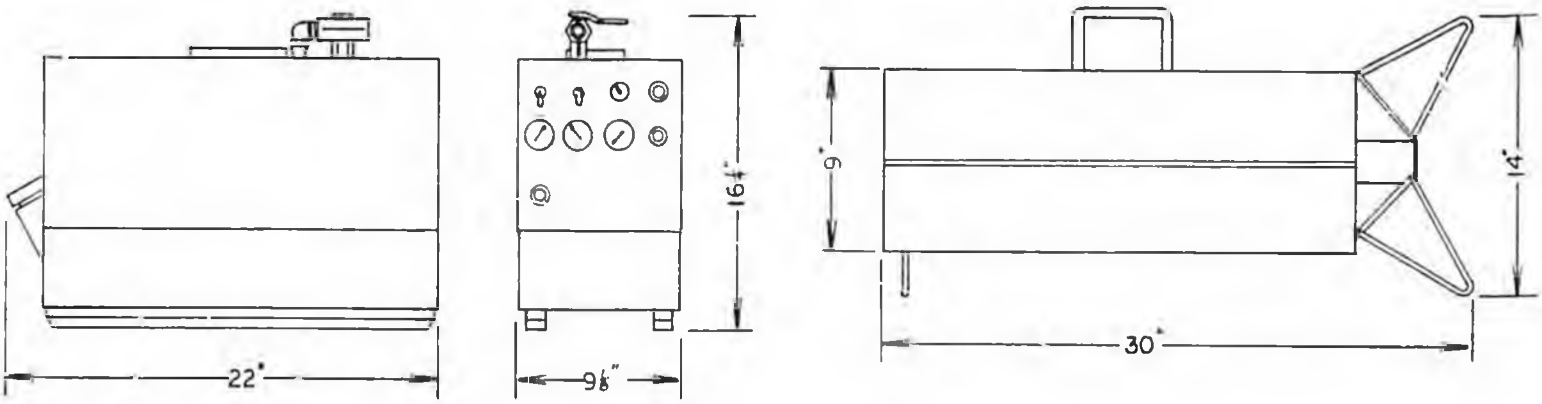
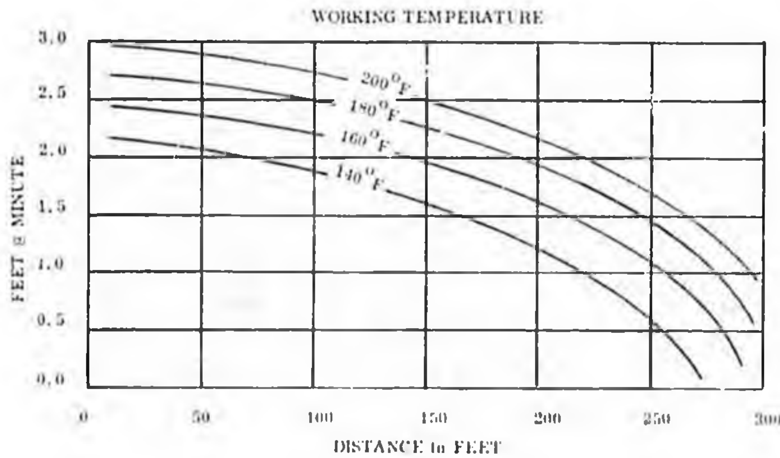
007 8 80

HYDRA THAW II DIMENSIONS



PERFORMANCE (¾" PVC)



SPECIFICATIONS

Pump Design	500 PSI piston
Capacity	3 GPM at 400 PSI
Motor	115 VAC ¾ HP continuous duty
Working Pressure	Adjustable to 400 PSI
Heat Exchanger	150,000 BTU @ Hr. input
Design (HE)	Conical Wound ASTM B-75 Cu.
Rating (HE)	860 PSI to 200 degrees F. 400 PSI to 400 degrees F.
Weights:	
Pump Unit	aprox. 60 pounds (empty)
Heat Exchanger	30 Pounds
Propane Cylinder	From 2 to 20 pounds as desired by operator

STANDARD EQUIPMENT

Power Unit with Electronic Pulsation
Heat Exchanger with All necessary Hoses
Thaw Tubing—200' x 1/4" OD 300' x 5/16" OD
Propane Pressure Regulator
Adapter Fittings for PVC Pipes ½" to 1"
Instruction Manual
Parts Book
(not included: Propane Cylinder)
Dimensions & Specs: subject to change without notice

DISTRIBUTED BY:

D U R A F L E X   P O L Y B U T Y L E N E

PIPER

Published by Shell Chemical Company — Volume IV, Number 1, 1983

Corrosion-resistant Duraflex™ polybutylene pipe specified for Florida medium-rise.

The water in Jacksonville, Florida, is so corrosive that it can eat through copper and galvanized metal pipe.

"In Jacksonville, the only way you can use copper or galvanized metal pipe is to treat the water first," says David Batzka.

Batzka served as owner's representative for Sundale Manor, a six-story apartment building currently under construction. To avoid installing a costly water treating system, Batzka specified corrosion-resistant Duraflex* polybutylene pipe for Sundale Manor's potable water system and PVC pipe for the drainage system.

Sundale Manor will be the first medium-rise building in Jacksonville with all-plastic plumbing. Polybutylene pipe received Jacksonville city code approval in late 1981.

W. W. Gay Mechanical Contractor, Inc. is handling the polybutylene pipe installation at the 90-apartment complex.

Job superintendent Jimmy Lasco is the key installer for the polybutylene pipe, which ranges in size from ½ inch to three inches in diameter. Heat fusion is used to install the larger (one-inch to three-inch) diameter pipe. Insert/compression ring fittings are used for the smaller diameter pipe. The installers can pressure-test the pipe and fittings immediately.

Billy Knight, who handles all of the heat fusion, says, "Once you learn to heat-weld the pipe, it's really quick and easy. We had some trouble with the first couple of welds, but now it's really simple."

According to Lasco and Knight, the larger diameter polybutylene pipe's flexibility and light weight provided unique advantages over rigid pipe; installation of Duraflex polybutylene pipe became a simple two-man operation. Risers for the pipe were shop-fabricated in an open area outside the building, coiled up for

(Continued on page 4)

*"Duraflex" is a trademark of Shell Chemical Company for its polybutylene resins. Shell Chemical does not manufacture pipe.

Duraflex pipe installed in California solar-based housing project.

In an effort to provide substantially lower utility bills for heating, cooling and hot water, a farsighted county housing authority has initiated the development of the first solar-based public housing project in California.

"Solar housing benefits all the taxpayers by conserving energy for other uses. We believe that these homes will serve as a model for other public agencies and for private developers who seek to respond to the energy realities of the 80s," said Roger Salquist, president of Trident Energy Systems, Davis, CA, the developers and installers of the solar system.

The systems are being installed in sixty-two 3 and 4 bedroom single family homes in the Rancho Algodon project outside Delano in Kern County. Completion is scheduled for late 1982.

For heating, Trident uses roof-mounted solar collectors to heat water which is then circulated through coils of flexible pipe made from Duraflex polybutylene resin embedded in the slab of each house. For cooling, a radiant chiller with a counterflow heat exchanger provides three tons of cooling capacity

(Continued on page 3)

D U R A F L E X   P O L Y B U T Y L E N E

Fire sprinkler system tested in Scottsdale.

Fire sprinkler systems retrofitted into two new Scottsdale, Arizona homes quickly extinguished deliberately-set test fires, thereby dramatically reducing the potential damage to the homes.

Federal and local fire officials monitored the tests which ranged from wastebasket fires to kitchen grease fires and burning dry Christmas trees.

Insurance officials estimated damages in the series of duplicated fires in the two homes and compared the losses to the property damage that would have occurred without sprinkler systems.

On the basis of eight tests, damages in the sprinklered fires were estimated at $17,200 while the average damage estimate without sprinklers totaled $116,000, a savings of $98,000 or 85 percent.

"The answer to reducing the number of lives lost in residential fires is in-place protection with automatic suppression systems and smoke detectors," said Harry Shaw of the U.S. Fire Administration (USFA) in Washington, D.C. following the tests.

Sprinkler systems were installed after the two $70,000 subdivision homes were built. One house was retrofitted with a standard iron pipe system and the second house used flexible pipe made from Duraflex polybutylene resin and a black iron pipe system. Both systems employed newly developed fast response sprinkler heads.

Grantham Fire Protection, Inc. of Phoenix, Arizona, installed both sprinkler systems in the second house and tabulated material and labor costs. The system using the flexible polybutylene pipe required only half as many man hours to install as the system with the metal pipe.

"The house was retrofitted with polybutylene in three days using two men and it took four and one-half days and three men to complete the black iron pipe system," said Terry Glenn of Grantham.

In order to install the black iron system, it was necessary to cut a hole in the roof. Sections of the pipe were cut outside the home, brought in through the roof, then threaded into position in the sprinkler head installation.

The lightweight Duraflex polybutylene pipe was assembled in a garage. Sections of the pipe were heat fused and then easily snaked through an attic opening. In addition to installation advantages, the pipe will not crack if water should freeze inside the pipe and it has the highest heat rating of any thermoplastic pipe, a particular advantage in the "Sun Belt" where attic temperatures soar in the summer.

Scottsdale Administrative Fire Chief Bob Edwards said the cost of installing the polybutylene system was about one percent of the cost of the homes; about 40 percent less than for the iron system.

The tests were conducted by the Rural/Metro Fire Department, an independent corporation contracted by the city, and were financed by the USFA. Factory Mutual, a national testing laboratory, monitored the results.

In a demonstration of confidence in both systems, executives of Rural/Metro

sat on couches in the living rooms as fires were started in nearby wastebaskets. In one house the sprinkler was actuated in 1:17 minutes and in the other house, at 2:55 minutes.

Sentry Insurance Company observers estimated that the damage would have averaged about $3,500 in each home (in this specific fire test) had there been no sprinkler systems. In actuality, damage was estimated at only $1,000 in one home in which the sprinkler was actuated first and $1,500 in the other.

In another comparative test, cake pans of cooking oil were heated on an electrical stove with open flames occurring three to four minutes later. After the sprinkler heads were actuated to extinguish the fires, damage was estimated at $2,400 in one house and $3,600 in the second house. If sprinkler systems had not been installed, the insurance company estimated damage would have been $6,500 in the first house and $12,500 in the second house. (Estimates of losses without sprinkler equipment were based on normal fire department responses in terms of time, manpower and equipment. Estimates of damage with sprinkler operation were based on review of actual conditions after each test.)

Besides local media coverage, more than 170 representatives of fire departments, local governments and builder associations witnessed the tests. The test descriptions were recorded and posted for the audience while videotape replays were also shown. In a majority of the tests, only one sprinkler head was actuated.

Among the interested observers were representatives of the Cobb County (Georgia) Fire Department. Cobb County recently conducted extensive fire sprinkler tests that resulted in building code amendments for multifamily dwellings authorizing the use of polybutylene pipe in sprinkler systems.

The tests demonstrated that effective protection against extensive damage and deaths caused by fires can be economically added to an existing home.

(Continued from cover)

which, if needed, can drop the water temperature as low as 38 degrees during the summer. The chilled water is circulated through the pipe in the slab to cool the house.

Not only does the radiant heating system provide an excellent means of using the medium temperature heat from the solar panels, but it also reduces the total energy requirements. The radiant slab and water storage tank can store enough heat in winter to maintain desired room temperatures for several sunless days before requiring back-up from the flash boilers which are installed as part of the overall system.

"Rancho Algodon vividly demonstrates that solar is not just a tool of the affluent," said Salquist. "It is even more essential in situations where tight incomes cannot compensate for rocketing utility bills, and the Housing Authority of the County of Kern is one of the first agencies to take this into account." Trident estimates a utility savings of about 75%.

The radiant slabs are constructed by placing a plastic vapor barrier over a sand base eight inches above the grade. This is covered with another inch of sand and a wire mesh. Before the coils of half-inch Duraflex polybutylene pipe are placed into the desired position for each zone, lime is sprinkled over the sand to show crews where to set the prefab walls.

Approximately one linear foot of one-half-inch CTS polybutylene pipe per square foot of space was embedded in the slab of each house. Trident chose Duraflex polybutylene pipe for its combination of high temperature properties and flexibility.

"A three man team can lay the pipe for the slabs of four houses in a day," said Geoff McNeilly, Trident crew manager at Rancho Algodon. Ties were used to attach the pipe to the wire mesh and maintain desired zone spacing.

There are four or five zones in each of the houses with positive shut-off valves controlling the flow through each zone. Continuous coils of pipe used in each zone were connected to return and supply valves in a manifold box installed just below the concrete surface in the garage. The pipe was laid so that the supply water circulates from the perimeter of the zone to the center before returning to the manifold box.

The Kern County Building Inspection Department tested the system by applying an air pressure of 30 psi for 30 minutes. Under operating conditions, only 3 psi pressure is needed to circulate about four gallons per minute of water throughout the 1000-1200 feet of pipe. Following inspection, about 25 cubic yards of concrete were poured for the standard 4" slab of each house and its garage.

A computerized controller will monitor the air inside the home, the water in the storage tanks and the collectors on the roof. A digital readout indicates the temperature of each. The controller automatically operates the system to collect and store all available solar energy and to maintain the desired setting on a solar dial. Another dial setting establishes the lowest acceptable inside air temperature and maintains it during periods of low solar conditions.

The California Department of Housing and Community Development is providing construction funding of about $3.2 million, including the cost of installing the Trident Energy Systems' solar heating and cooling. Kern County Community Development block grant funds will be used for the land purchase cost of about $207,000.

Elimination of a central air conditioning system, furnace and ductwork will offset a portion of the installation cost for the system. The net installation cost for the Trident system at Rancho Algodon is about $2,000 a house more than a conventional system.

Rancho Algodon is a project of Lewis Development Inc. of Carmichael, California. Lucky Bell Corporation, also of Carmichael, is the contractor.

(Continued from cover)

transport, and installed by pulling them all the way up through a shaft in the middle of the building. Anchor plates provide a clamp on each floor. Thermal expansion and contraction are accommodated by the flexibility of the pipe.

Duraflex polybutylene pipe's light weight enables one man to carry up to a 500-foot coil of pipe over his shoulder. Project manager Al Boree, of W. W. Gay, has not calculated the time savings for installation yet, but he states, "We are just learning to use polybutylene and, in the long run, we do expect there will be considerable savings in installation time."

Boree views the polybutylene pipe installation as a pilot project to test the pipe's corrosion-resistance and simple, low-cost installation.

According to Boree, "Many normal domestic systems in Jacksonville, using copper or galvanized steel, will leak through electrolysis or corrosion within a few months after initial operation."

Boree mentions an additional benefit offered by polybutylene: its elasticity lessens the effects of water shock. "On this job we are using two shock stops per floor; normally we need two in each bedroom." And, although freeze damage to pipes is not a major problem in Jacksonville, Boree says that the pipe's freeze resistance provides another extra benefit in that the pipe will "never break because of bad weather."

Sundale Manor was completed in October, 1982, with a total of 8,480 feet of Duraflex polybutylene pipe in place at that time. The long-term benefits of polybutylene pipe in this particular building are not yet proven. But, says Jimmy Lasco, "If this works as well as we hope, we'll be using it all the time."

Code bodies grant approval for polybutylene pipe.

Recent code approvals for Duraflex polybutylene pipe for use in hot and cold water plumbing service include:

State of New Hampshire
State of New Mexico
Bay County, Florida
Montgomery County, Maryland
Prince George County, Maryland
Clark County, Nevada
Watcom County, Washington
Bellingham, Washington
Sioux City, Iowa
Las Vegas, Nevada
Scottsdale, Arizona

Where to buy polybutylene pipe

Shell Chemical does not manufacture pipe, but the following independent manufacturers produce pipe from polybutylene resin:

Bristolpipe
P.O. Box 184
Bristol, Indiana 46507
219/848-4402
Attn: Mr. Tony Ernst

Delta Faucet Co.
55 East 11th Street
P.O. Box 40980
Indianapolis, Indiana 46280
317/848-1812
Attn: Mr. George Davis

Trojan Plastics, Inc.
2211 N. 38th Street
Tampa, Florida 33605
813/242-4211
Attn: Mr. Brand Laseter

U.S. Brass
Qest Plumbing Systems
901 Tenth Street
Plano, Texas 75074
214/423-3576
Attn: Mr. B.E. Smith

Vanguard Plastics, Inc.
P.O. Box 346
McPherson, Kansas 67460-0346
316/241-6369
Attn: Mr. Keith Swinehart

Westflex Manufacturing Co.
P.O. Box 4009
Richmond, California 94802
415/233-6670
Attn: Mr. J. Nusbaum

Western Products Company
P.O. Box 803
Union City, California 94587
415/471-8856
Attn: Mr. W. J. McGlinchy

Wrightway Mfg. Co.
Beatrice Plumb Products Group
1050 Central Avenue
Park Forest So., Illinois 60466
312/534-0500
Attn: Mr. Ralph W. Arboe

The Duraflex Polybutylene Piper is published periodically by the Plastics Business Center of Shell Chemical and is available to anyone wishing to receive it. Comments and questions are welcome.

Address correspondence, including requests for additional copies, to Shell Chemical Communications, Room 1227, One Shell Plaza, Houston, Texas 77002.

DURAFLEX™ POLYBUTYLENE

PERFORMANCE REPORT

SHELL CHEMICAL COMPANY

Comparison tests confirmed: Installed cost of polybutylene plumbing was 44% less than that of copper.

DURAFLEX™ POLYBUTYLENE PERFORMANCE REPORT

SHELL CHEMICAL COMPANY

Recent quantitative comparison tests have concluded that the total labor and material costs to install a plumbing system with Duraflex™ polybutylene pipe were 44% less than those of copper in virtually identical installations.

The tests were conducted in the Pleasant Valley subdivision located west of Fairfax, Virginia and Washington, D.C., by the National Association of Homebuilders Research Foundation, Inc., an independent research firm. Homes in the subdivision range from modest to luxury offering a variety of handsome energy efficient designs.

For the tests, plumbing installations in two similar, 2½ bath, single-family homes were compared. One home had a full basement and was plumbed with copper plumbing using the traditional cut, fit and solder installation method. The other home had a crawl space and was plumbed with Duraflex* polybutylene plumbing pipe, using insert fittings and aluminum crimp ring connections. The houses were plumbed by a plumber who was experienced in copper installation and who had previously installed five plumbing systems using Duraflex polybutylene.

The polybutylene plumbed house had more cramped working conditions in one area and required slightly more pipe than the copper house because the crawl space limited direct routing. This meant a slight advantage for the copper installation. The only other difference in the two houses was the location of the water heater and the water meter.

*Duraflex™ is a trademark of Shell Chemical Company for its polybutylene resins. Shell Chemical does not manufacture pipe.

Objective and fair testing yields relevant results

The 44% cost savings realized in the polybutylene plumbed house are based on the material and time savings. Total installed material and labor costs for the polybutylene plumbed house were $138 less than the copper installation. It took 7 hours and 39½ minutes to plumb the copper house, but only 5 hours and 55½ minutes to plumb the polybutylene house. Material costs included all indoor supply piping and fittings running from the meter yokes to the fixture connections, but did not include valves.

Armed with a stop watch, a specially ruled recording book, a camera and a pen, Hila Anderson, Senior Industrial Engineer with NAHB Research Foundation, Inc., observed, measured, counted and recorded the work performed, actions made, and materials used by the plumber.

To ensure objective, comparable and applicable results, Anderson used several established sampling and factoring methods common in gathering and comparing this type of research data. These included an averaging of the plumber's efforts and conditions with other plumbers in general. Thus, the results are applicable for an adequately trained plumber to perform the installation with an acceptable amount of personal time and breaks.

NAHB Research Foundation, Rockville, Maryland, a wholly-owned subsidiary of the National Association of Home Builders which operates separately as an autonomous unit, conducted the study. Over 80% of their work is for clients other than the NAHB and its members. Anderson said, "We're interested in anything that helps the building industry, verifying a new product or technique, and telling the industry about it."

Strength and flexibility set Duraflex pipe apart.

The real difference between polybutylene pipe and other plastic pipe is the Duraflex polybutylene resin. Duraflex is a durable, tough plastic. But unlike many other plastics, polybutylene is flexible rather than stiff or brittle. As a result, the pipe made from Duraflex resin can easily withstand household water pressures at elevated temperatures and its flexibility and light weight allow plumbers to curve it around obstacles and bends with fewer connections. Because it is chemically inert, there will be no problems with corrosion, electrolysis, or scale buildup.

Hila Anderson observed and recorded the plumber's actions and materials used.

Connections and fittings can be made by one of several mechanical methods which are easily learned and performed. Gary Peed, the plumbing contractor for the test houses, said, "The first time I put the pipe (polybutylene) in was slow, but you pick up how to work with it pretty easily. My time is much better now." Each of the installation methods takes advantage of the flexible nature of polybutylene to make quick, strong, and permanent connections. As Gary Peed puts it, "You don't have to solder anything or use any glue. There's less time, energy and equipment involved."

A durable pipe full of advantages.

How does Peed feel about polybutylene pipe in general? "I like it better than copper. It's easier, faster and it's lower in cost. I use it for almost all of my work now."

Other advantages to polybutylene pipe, both builders and plumbers cite: corrosion and scale resistance; self-insulating, thus energy efficient for hot water lines; and if water freezes in it, the pipe won't break.

Those were the reasons Don Crosen, Superintendent for R.J.L. Associates' Pleasant Valley subdivision, selected polybutylene pipe. Crosen has realized the cost savings which the NAHB Research Foundation tests revealed, stating:

"We're saving on the average of about $150 to $200 per house." Another big advantage Crosen cited... "is customer satisfaction. That's very important to us. We want our owners to be happy with the house they buy. This polybutylene pipe helps us supply that satisfaction."

Comparison Tests—Results:

Materials	Copper System	Polybutylene System
Pipe	$156.93	$64.84
Solder & Flux	$ 20.73	negligible
Fittings	$ 21.79	$19.12
Suspension Clamps	$ 1.98	$ 4.81
TOTALS	$201.43	$88.77
Labor at $15/hr		
Cut & install pipe & fittings	(176.0 min.) $ 44.00	(146.5 min.) $36.63
Connect pipes & fittings	(162.5 min.) $ 40.62	(88.0 min.) $22.00
Misc.	(51.5 min.) $ 12.88	(53.5 min.) $13.37
Mounting Blocks	(41.5 min.) $ 10.37	(39.5 min.) $ 9.87
Set-up & Layout Job	(28.0 min.) $ 7.00	(28.0 min.) $ 7.00
TOTALS	(459.5 minutes) $114.87	(355.5 minutes) $88.87
	Copper System	**Polybutylene System**
Total Costs Material & Labor for supply piping installation	$316.30	$177.64
Polybutylene Savings		
Time		104.0 minutes less to install than copper
Money (includes labor costs savings)		$138.66

Note: For each $1.00 wage rate differential increase above the $15/hour figure used in the comparison, polybutylene's advantage increases $1.73 in savings.

Test homes' subdivision superintendent, Don Crosen, cited customer satisfaction as a polybutylene pipe advantage.

Polybutylene pipe supplies customer satisfaction.

"One of the biggest complaints in a new house is noise in the plumbing," Crosen continued. "This pipe is quiet, no hammer, no vibration. You don't even hear water running. So polybutylene eliminates that source of complaints, and satisfies our customers."

Another problem solved by polybutylene pipe involves hanging the sheet rock. According to Crosen, occasionally a rigid pipe will get bumped hard enough during sheet rock installation to cause it to break, crack and leak. "Often that leak won't show up until after the construction is completed, or worse... after the owner moves in. That's an expensive repair. But because this polybutylene pipe is so flexible, it doesn't break if it gets bumped or knocked. So once again, customer satisfaction," he said.

Satisfaction for builders, too.

Crosen has found satisfaction with polybutylene pipe in many ways, summing up, "It's less expensive. Better for customers. Easier to install, repair and add extra fixtures to later. It won't corrode and minerals won't adhere to it. We get less call-backs for repairs because of polybutylene pipe. It's another way to please our customers."

Crosen added, "It's good for builders and supervisors, too. Supervisors have to deal with the problems. They're less problems with polybutylene pipe."

Warranty

Polybutylene pipe is manufactured from a material produced by Shell Chemical Company. All products purchased from Shell are subject to terms and conditions set out in the contract, order acknowledgement and/or bill of lading. Shell warrants only that its product will meet those specifications designated as such herein or in other publications. All other information supplied by Shell is considered accurate but is furnished upon the express condition that the customer shall make its own assessment to determine the product's suitability for a particular purpose. **No warranty is expressed or implied regarding such other information, the data upon which the same is based, or the results to be obtained from the use thereof; that any product shall be merchantable or fit for any particular purpose; or that the use of such other information or product will not infringe any patent.**

February, 1983

Shell Chemical Company
Sales Offices Polybutylene

Northeast (914) 694-1116	2 Corporate Park Drive, Suite 404, White Plains, New York 10604
Southeast (404) 955-4600	320 Interstate N. Parkway, Atlanta, Georgia 30339
Central South (713) 241-3897	One Shell Plaza, Houston, Texas 77002
West (209) 952-1908	P.O. Box 7637, Stockton, California 95207

For international sales, contact:
Pecten Chemicals, Inc.
(713) 241-6161 One Shell Plaza
Houston, Texas 77002

SC 550 81
Printed in U.S.A. 2.83 50M

DURAFLEX™ POLYBUTYLENE

PERFORMANCE REPORT

SHELL CHEMICAL COMPANY

Utility saves almost $67,000 with polybutylene discharge system

DURAFLEX™ POLYBUTYLENE PERFORMANCE REPORT

SHELL CHEMICAL COMPANY

Installation of pipe made from Duraflex* polybutylene resin for discharge systems at two of Duke Power Company's coal-fired stations resulted in a cost saving of almost $67,000 compared with a traditional steel pipe system and helped create an efficient method of waste disposal.

The discharge lines, which were attached as extensions to existing cast iron lines, were laid at Duke's Riverbend Steam Station near Charlotte, North Carolina, and at the Cliffside Station. Duke engineers estimated that the company saved $17,000 in material costs with the Riverbend installation and almost $50,000 at Cliffside because steel supports were not required for the polybutylene pipe.

**Duraflex™ is a trademark for polybutylene resins made by Shell Chemical Company. Shell Chemical does not manufacture pipe.*

Increased waste disposal

The use of polybutylene pipe for discharge lines came after the utility completed a $50-million program to control emission from the coal-fired plants. The company faced a major task in the ultimate disposal of increased volumes of fly ash and other residual byproducts of the coal burning process. At Riverbend, for example, Duke engineers estimated about 180 tons of abrasive fly ash and 45 tons of sharp-edged bottom ash would be produced daily.

Duke's solution to the problem was a system using existing settling ponds in combination with the novel utilization of large-diameter polybutylene pipe. More effective use of the settling ponds was made possible by the installation of the flexible polybutylene discharge lines that help distribute evenly the high volume of residual materials captured by the emission control devices.

The SDR 13.5 polybutylene pipe was made from resin produced by Shell Chemical Company.

At the Riverbend Station, as with other coal-fired generating stations, unburned material previously was mixed with water. The slurry then was pumped from the station through a durite pipe, cast stainless steel of 550 brinnell, to a cast iron discharge pipe on into settling ponds. After the particulate matter settled out, environmentally acceptable waste water was fed into the nearby Catawba River.

The added volume of material captured by electrostatic precipitators at Riverbend caused the debris to build up at the outlet of the discharge pipe, just inside the dike enclosing [illegible]-acre pond. This hampered dispersal of solids in the effluent.

Old system too expensive

A standard response to the dispersal problem would have been construction of sponson-mounted steel pipe, joined with goosenecks to permit mobility, that would have carried slurry to the far reaches of the empoundment. The system would have been both expensive and cumbersome.

Instead, Duke engineers, attracted by polybutylene's toughness, resistance to scour and abrasion, flexibility and light weight, decided to install 1,600 feet of 12-inch butt-welded pipe in the pond to serve as a conduit for dispersing the effluent.

Use of the polybutylene pipe, instead of the traditional steel pipe hookup, produced a $17,000 saving on just one installation.

Requires no supports

An added advantage of the pipe manufactured from Duraflex polybutylene is that since it is less dense than water, it

requires no additional supports, only an anchoring system at its terminus that is moved periodically to direct slurry discharge into areas of the pond that otherwise would be left unfilled.

Temperature in the line at Riverbend ranges from 79° to 100° F, depending upon the temperature of the river from which the plant draws water. The percentage of solids carried by the line can range up to 85 to 90 percent, but the average is less than half that number. Flow velocity in the line is 3.5 fps.

Duke Power engineers estimate that since the installation in October, 1977, the effluent line has carried more than 140,000 tons of fly ash and over 50,000 tons of bottom ash.

The polybutylene line, which was inspected at the flange joining the metal pipe two months after installation and at its outlet frequently since then, still shows no appreciable wear after two years of service.

Second line installed

Impressed by both the economy and effectiveness of the slurry line, Duke engineers installed a second polybutylene line at the Riverbend

station to carry mill tailings (stones and other impurities delivered with coal) out to the settling pond. The second line is 10 inches in diameter and 800 feet long. It, too, connects to a cast iron pipe that formerly discharged directly into the water from the pond side of the dike.

Mill tailings, carried with water through the line at a flow velocity of 5.8 fps, range in size from one-half to three-quarters inch in diameter. Although abrasive, they do not have the scouring effect of the particulate matter flowing through the larger line.

The mill tailings line has been in use almost two years. As the ponds become full, Duke reclaims the surface and relocates the installation.

Based on the success of the Riverbend facility, the power company decided to install similar systems at two additional coal-fired power stations, Cliffside and Allen, in the Carolinas.

At Cliffside, two 14-inch lines, each 3,500 feet long, were installed to carry bottom and fly ash and mill tailings from about 5,000 tons of coal a day. The ash line operates at 350 psi, with jet pump and booster, and with an open discharge. This line represents an additional saving for the power company. Since the polybutylene line could be laid directly on the ground, its use resulted in a construction cost saving of almost $50,000 because 117 steel supports that would have been required by a steel pipeline were not needed.

The similar Allen installation is scheduled to be operational around the first of the year.

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Western One Shell Plaza
(713) 241-6719 Houston, Texas 77002

For international sales, contact:
Pecten Chemicals, Inc. One Shell Plaza
Houston, Texas 77002
(713) 241-6161

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February, 1982

Come to Shell for answers

SC 498 82
Supersedes SC 498 81
Printed in USA 2/82 10M

Reprinted courtesy of Western Fire Journal

EXECUTIVE SUMMARY

Widespread use of plastics has added both convenience and hazards to modern living. Below is a study of the dangers of toxic gases produced by the combustion of plastic pipes . . .

Toxicity of Gases From Polybutylene And Douglas Fir

By CARLOS J. HILADO & PATRICIA A. HUTTINGER
Product Safety Corporation

Because of their versatility and performance advantages, plastics have found their way into numerous applications. This widespread use has inevitably brought them into many applications in which safety upon exposure to heat or fire is an important consideration, and their response characteristics need to be known.

One aspect of safety which has caused considerable concern is the possible generation of toxic gases upon exposure to heat or fire. It is impossible to simulate all possible conditions under which such exposures could occur, but manufacturers conscious of their responsibilities to the consumer and to the general public nonetheless make an effort to evaluate their products by means of available technology to obtain some degree of assurance that there would be no unreasonable risk. Screening of materials is needed, because investigation of every possible formulation for every possible exposure is not feasible.

A laboratory toxicity screening test method has been developed by the authors to serve as a means for comparing materials on the basis of relative toxicity under specified test conditions, using apparatus, facilities and personnel which would be within the capabilities of most laboratories. With the purpose of screening in mind, this method is intended to indicate which materials are more toxic under spe-

Table 1. Toxicity Test Data on Polybutylene Pipe and Douglas Fir (PSC Condition 1 or NASA-USF Procedure B)

material	test no.	time to staggering min	time to convulsions min	time to collapse min	time to death min
DURAFLEX 4127	1	16.32 ± 0.88	17.75 ± 1.02	20.22 ± 2.44	24.35 ± 3.20
	2	16.53 ± 0.27	17.54 ± 1.34	18.70 ± 1.73	22.39 ± 2.77
	mean	16.42 ± 0.15	17.64 ± 0.15	19.46 ± 1.07	23.37 ± 1.39
DURAFLEX 4121	1	16.45 ± 0.45	16.88 ± 0.73	18.47 ± 0.14	21.49 ± 0.95
	2	16.33 ± 1.08	17.77 ± 0.96	18.45 ± 0.88	21.93 ± 0.54
	mean	16.39 ± 0.08	17.32 ± 0.63	18.46 ± 0.01	21.71 ± 0.31
Douglas fir	1	10.92 ± 2.18	14.98 ± 0.58	16.09 ± 1.05	18.57 ± 0.79
	2	12.29 ± 0.69	14.04 ± 0.52	14.41 ± 0.42	16.77 ± 0.40
	mean	11.60 ± 0.97	14.51 ± 0.66	15.25 ± 1.19	17.67 ± 1.27

cified test conditions and not necessarily to explain why they are more toxic (1-11).

A large selection of test conditions can be used. The toxicity screening program used by the Product Safety Corporation employs 16 different sets of test conditions: the rising temperature program at 40°C/min from 200 to 800°C and seven fixed temperatures at 100°C intervals (200, 300, 400, 500, 600, 700, and 800°C), both without forced air flow and with nominal 1 L/min air flow. This program has been used with polyethylene (12), polypropylene (13), polystyrene (14), polycarbonate (15), polyoxymethylene (16), polyethersulfone (17), polyetherimide (18), polytetrafluoroethylene (19) and Douglas fir (20).

Experiments at a succession of fixed temperatures have research value in that they determine the material responses at particular temperatures. The rising temperature method offers the potential for more cost-effective screening by attempting to integrate the effect of successive temperatures, and provides the ability to compare test results with those obtained for over 300 materials previously evaluated under the same rising-temperature conditions.

This report presents the toxicity test data obtained for two samples of polybutylene pipe and one sample of Douglas fir wood, evaluated under the routine screening test conditions of rising temperature at 40°C/min from 200 to 800°C without forced air flow. These test conditions have been described as Procedure B of the NASA-USF toxicity screening test method, and are included in the BART specifications for seat cushioning materials (21).

MATERIALS

The materials evaluated were two samples of polybutylene pipe received from Shell Oil Company, Houston, Texas. The samples were identified as follows:

DURAFLEX Polybutylene 4127 (grey)

DURAFLEX Polybutylene 4121 (black)

For purposes of comparison, a sample of Douglas fir wood was obtained from Underwriters Laboratories, Santa Clara, California. This material met the requirements of UL Standard 127 for testing of fireplace inserts.

DATA AND DISCUSSION

The times to various animal responses are presented in Table 1. Reproducibility was generally good.

Average times to death with the polybutylene pipe samples ranged from 21.5 to 24.4 minutes, compared to 16.8 to 18.6 minutes for Douglas fir wood. On the basis of time to death, the polybutylene pipe samples appeared to be significantly less toxic than Douglas fir under these particular test conditions.

CONCLUSIONS

The polybutylene pipe samples evaluated appeared to exhibit significantly less toxicity than Douglas fir under these particular test conditions.

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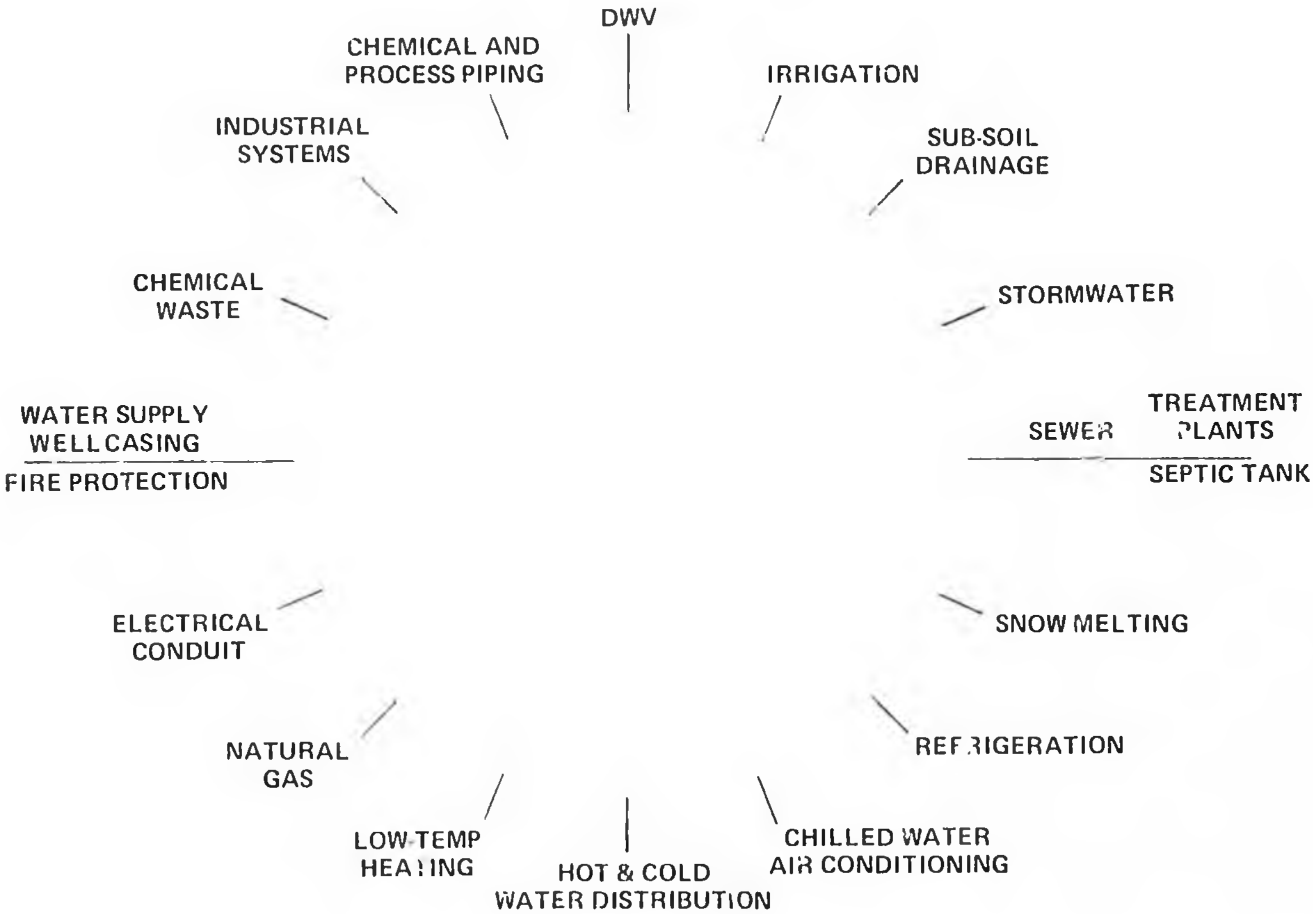

A COMPREHENSIVE LISTING OF COMMON APPLICATIONS OF PLASTIC PLUMBING SYSTEMS COVERED BY NATIONAL CONSENSUS STANDARDS

Published by

Plastic Pipe and Fittings Association

999 North Main St. • Glen Ellyn, IL 60137 • Phone: 312/858-6540

Dear Reader:

Welcome to the *Growing World of Plastics Piping!* This pamphlet is an introduction to one of the truly exciting, growth industries in America. Since 1960, the use of plastics in piping applications has multiplied 46 times! There are millions of plastics plumbing installations in service all across the country.

It has been estimated that 95% of all new piping installations made in residential construction is plastics. In the early stages of its development as a plumbing product, plastics were primarily used in drain-waste-vent applications. Over the years plastics piping has grown not only by dominating the DWV market, but by adding new materials and applications as well.

Plastics are now used extensively in water service piping and in water distribution systems. Additionally, many other plumbing products are now manufactured partially or completely with plastics materials.

The use of plastics in plumbing has grown because its use is economical and efficient. Its characteristics are also superior to competitive materials in a variety of important ways.

Even though the feedstocks of most plastics are derivatives of oil, plastics piping uses are highly energy efficient because it takes far less energy to manufacture comparable lengths and sizes of plastics pipe than metal piping products.

We are pleased to provide this easy reference guide to the *Growing World of Plastics Piping* giving the reader the basics of plastics in plumbing and its many, many applications.

Sincerely,

The Plastic Pipe and Fittings Association

INTRODUCTION

You will find plastic plumbing materials to be an excellent value because of initial cost, ease of installation, low maintenance cost, long life, and their significant energy savings in manufacture and use. Plastics pipe and fittings compare favorably with all other materials.

This brochure provides engineers, code officials and consumers with basic information about plastics piping. Used successfully in the United States since 1943, these "engineered" plumbing materials, often called plastics piping systems, have met the challenge of providing improved technological advancements needed in the construction industry.

Plastics vary greatly in their characteristics and properties from one to another. These differences are utilized in plastics piping to the advantage of the consumer in two ways: first, through proper design each plastic raw material is properly applied and controlled (see ASTM Standards); and, second, a competitive market exists within plastics piping systems since the suitable characteristics and properties of different plastics often overlap in piping applications.

Plastic plumbing materials commonly in use are;

ABS — ACRYLONITRILE-BUTADIENE-STYRENE, hard, strong, smooth interior surface, chemically resistant, not affected by contact with water or soil.

PE — POLYETHYLENE, excellent resistance to chemicals, corrosive environments and rupture from mechanical shock.

PB — POLYBUTYLENE, higher temperature strength combined with long-term strength and chemical resistance.

PVC — POLYVINYL CHLORIDE, hard, strong, smooth interior surface, chemically resistant, not affected by contact with water or soil.

CPVC — CHLORINATED POLYVINYL CHLORIDE, higher heat and chemical resistance than PVC.

PP — POLYPROPYLENE, excellent rigidity, high strength and chemical resistance.

SR — STYRENE RUBBER, high in tensile strength and stiffness, also, resistant to both corrosive soils and sanitary wastes.

Plastics piping do not conduct electricity and are not susceptible to galvanic or electrolytic corrosion.

The following chart shows the general categories of piping applications of plastic materials covered by applicable national consensus standards:

Piping	Plastic Material						
Application	ABS	PE	PB	PVC	CPVC	PP	SR
Tubular waste	X			X		X	
Outside sewers and drains	X			X			X
Drain, waste & vent (DWV)	X			X			
Water piping	X	X	X	X	X		
Gas piping	X	X	X	X			
Septic fields - sub-soil		X		X			X
Chemical waste piping	X	X		X		X	
Industrial process piping	X	X	X	X	X	X	
Other piping applications	X	X	X	X	X	X	X

THE MAJOR BENEFITS OF USING PLASTICS PIPING MATERIALS

● Plastics piping is **energy efficient.** In a recent study it was estimated that during 1977, 324 trillion B.T.U.'s more energy would have been required to make metal piping to replace the plastics piping which was manufactured. That equals a savings of about 56 million barrels of oil because of plastics pipe. Additionally, in hot water distribution systems, plastics piping serves as an insulator itself to reduce heat loss. While plastics piping is made from petroleum based products, it is truly doing its share to reduce energy consumption.

● The **initial cost of piping materials** is important to users. Here, again, plastics piping receives high marks. Its initial cost is significantly less than the cost of other material.

● **Installation costs** of plastics versus other materials represent further savings to the user. Cutting, joining and installing plastic pipe is far simpler than the same processes for other materials. At today's labor rates, increased productivity is vital.

● The **ease of handling** plastics pipe is a tremendous benefit. Not only does its light weight present real benefits to the installer when working in tight places, but a normal length of DWV pipe can be carried by one man whereas two men or a machine are required to move heavier metal piping.

● The **long life** of a material is important to the consumer of the material. Millions of plastics piping installations have been in service for over a quarter of a century and are still functioning the way they did the day they were installed.

● Plastics piping is **corrosion resistant and free flowing.** Plastics piping systems are resistant to normal household chemicals and many other substances which might enter a sanitary drainage system. DWV piping does not "gum up" as does some other materials. The smooth wall of the plastics makes transport of wastes and water more effective. Plastics water piping also resists the kind of interior build up that sometimes plagues metal piping systems.

● Plastics piping is usually marked to aid in **identification.** Manufacturers making pipe and fittings according to ASTM standards and having the material tested to those standards usually mark the pipe and fittings to show the use and the applicable standard. This procedure makes it simple for users to properly identify the many kinds of plastics pipe and fittings which are available for different applications.

That's a pretty impressive list of benefits for any material. If you have not used plastics piping before, it may be time you did. If you have not been served by plastics piping, you are missing the many benefits which are available through its use. Our industry is proud of the materials which it offers for so many varying piping applications. We stand ready to serve our customers to bring them the benefits of **The Growing World of Plastics Piping.**

CODE ACCEPTANCE

Plumbing codes are the basis for acceptance of materials for specific plumbing installations and for the methods of installation. Model plumbing codes, sponsored by associations of building and plumbing code officials or other industry groups, are the basis for most of the over 14,000 local codes in this country.

The following organizations (and their model plumbing codes) accept the use of plastics for piping applications:

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Southern Building Code Congress International, Standard Plumbing Code

Plastics piping is also an approved material for use in U.S. Government building projects according to directives of the U.S. Department of Housing and Urban Development.

Regardless of the material you choose to use, check your local plumbing code for approved materials and accepted installation practices.

Additional information on plastics piping in plumbing applications may be obtained from the **Plastic Pipe and Fittings Association,** 999 North Main St., Glen Ellyn, Illinois 60137.

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APPLICATION	PLASTIC MATERIAL	RIGID FLEXIBLE	ASTM STANDARD	SCOPE
DRAIN, WASTE & VENT (DWV)— Building drain and waste, building storm and rainwater piping	ABS	rigid	D2661 & F628 D2235 F402	Pipe & Fittings ABS solvent cement Safe handling of S.C.
	PVC	rigid	D2665 D2564 F402 D2855	Pipe & Fittings PVC solvent cement Safe handling of S.C. Making S.C. joints
	PVC	rigid	D2949 D2564 F402 D2855	Pipe & Fittings (3.25 o.d.) PVC solvent cement Safe handling of S.C. Making S.C. joints
HOT & COLD WATER DISTRIBUTION SYSTEMS	CPVC	rigid	D2846 F493 F402	Pipe, Tubing & Fittings CPVC solvent cement Safe handling of S.C.
	PB	flexible	D3309	Pipe, Tubing & Fittings
OUTSIDE SEWERS AND DRAINS — Building sewer, building storm sewer	ABS	rigid	D2751 & F628 D2235 F402 D3212 D2321 F477	Pipe & Fittings ABS solvent cement Safe handling of S.C. Elastomeric joints Underground installation procedures Elastomeric seals
	PVC	rigid	D3033 D2564 D2855 F402 D2321 F477 D3212	Pipe & Fittings, Type PSP PVC solvent cement Making S.C. joints Safe handling of S.C. Underground installation procedures Elastomeric seals Elastomeric joints
	PVC	rigid	D3034	Pipe & Fittings, Type PSM

APPLICATION	PLASTIC MATERIAL	RIGID FLEXIBLE	ASTM STANDARD	SCOPE
WATER PIPING — Water supply, water distribution, yard sprinkler, swimming pool piping, chilled water piping, low-temp heating, irrigation systems, industrial process piping, ice rinks, ice melting, water well casing.	ABS	rigid	D1527 D2468 D2469 D2465 D2235 F402	Pipe, Schedules 40 & 80 Fittings, Schedule 40, socket-type Fittings, Schedule 80, socket-type Fittings, Schedule 80, threaded ABS solvent cement Safe handling of S.C.
	ABS	rigid	D2282 D2235 F402 D2468 D2469	Pipe, SDR-PR, o.d. controlled ABS solvent cement Safe handling of S.C. Fittings, schedule 40, socket-type Fittings, schedule 80, socket-type
	ABS	rigid	F480	Water Well Casings & Couplings, SDR
	PE	flexible	D2239 D2609	Pipe, SDR-PR, i.d. controlled Fittings, insert type
	PE	flexible	D2104 D2609	Pipe, Schedule 40 Fittings, insert type
	PE	flexible	D3035	Pipe, SDR-PR, o.d. controlled
	PE	flexible	D2737 D3261	Tubing, SDR-PR Fittings, butt-type, heat fusion
	PE	flexible	D2447 D3261	Pipe, Schedules 40 & 80 Fittings, butt type, heat fusion
	PB	flexible	D2662 D2609	Pipe, SDR-PR, i.d. controlled Fittings, insert type
	PB	flexible	D2666	Tubing, o.d. controlled
	PB	flexible	D3000	Pipe, SDR-PR, o.d. controlled
	PVC	rigid	D1785 D2564 D2855 F402 D2466 D2467 D2464	Pipe, Schedules 40, 80 & 120 PVC solvent cement Making S.C. joints Safe handling of S.C. Fittings, Schedule 40, socket-type Fittings, Schedule 80, socket-type Fittings, Schedule 80, threaded

			D2564 D2855 F402 D2321 F477 D3212	PVC solvent cement Making S.C. joints Safe handling of S.C. Underground installation procedures Elastomeric seals Elastomeric joints
	PVC	rigid	D2729 D2564 D2855 F402 D2321	Pipe & Fittings PVC solvent cement Making S.C. joints Safe handling of S.C. Underground installation procedures
	SR	rigid	D2852 D3122 F402 D2321 F477 D3212	Pipe & Fittings SR solvent cement Safe handling of S.C. Underground installation procedures Elastomeric seals Elastomeric joints
SEPTIC DISPOSAL FIELDS & SUB SOIL DRAINAGE – Perforated Piping	PE	flexible	F405 F481	Corrugated Tubing & Fittings, Perforated Installation
	PVC	rigid	D2729 F481	Pipe & Fittings, Perforated Installation
	SR	rigid	D3298 F481	Pipe, Perforated Installation
TUBULAR WASTE – Tube & fittings for accessible waste connections	ABS	rigid	F409 D2235 F402	Tube & Fittings ABS solvent cement Safe handling of S.C.
	PVC	rigid	F409 D2564 D2855 F402	Tube & Fittings PVC solvent cement Making S.C. joints Safe handling of S.C.
	PP	rigid	F409 D2657	Tube & Fittings Heat joining

NOTE: Plastics pipe also has many applications for gas piping, chemical/industrial waste piping and chemical/industrial process piping.

thermoplastic pressure pipe underground see ASTM D 2774. For information on joints for plastic pressure pipe using elastomeric seals see ASTM D 3139. For procedures on flaring PE and PB Tubing see ASTM D 3140.				40 & 80, socket-type
	PVC	rigid	D2241 D2564 D2855 F402 D2466 D2467 D3036	Pipe, SDR-PR, o.d. controlled PVC solvent cement Making S.C. joints Safe handling of S.C. Fittings, Schedule 40, socket-type Fittings, Schedule 80, socket-type Line Couplings, Schedules 40 & 80, socket-type
	PVC	rigid	D2672 D2564 F402 D2855	Pipe, Schedule 40, Bellend, & Pipe, SDR-PR, o.d. controlled PVC solvent cement Safe handling of solvent cement Making S.C. joints
	PVC	rigid	D2740	Tubing, SDR-PR, o.d. controlled
	PVC	rigid	F480	Water Well Casings and Couplings, SDR
	CPVC	rigid	F441 F493 F402 F438 F439 F437	Pipe, Schedules 40 & 80 CPVC solvent cement Safe handling of S.C. Fittings, Schedule 40, socket-type Fittings, Schedule 80, socket-type Fittings, Schedule 80, threaded
	CPVC	rigid	F442 F493 F402 F438 F439	Pipe, SDR-PR, o.d. controlled CPVC solvent cement Safe handling of S.C. Fittings, Schedule 40, socket-type Fittings, Schedule 80, socket-type
	CPVC	rigid	F443 F493 F402	Pipe, Schedule 40, Bellend CPVC solvent cement Safe handling of S.C.

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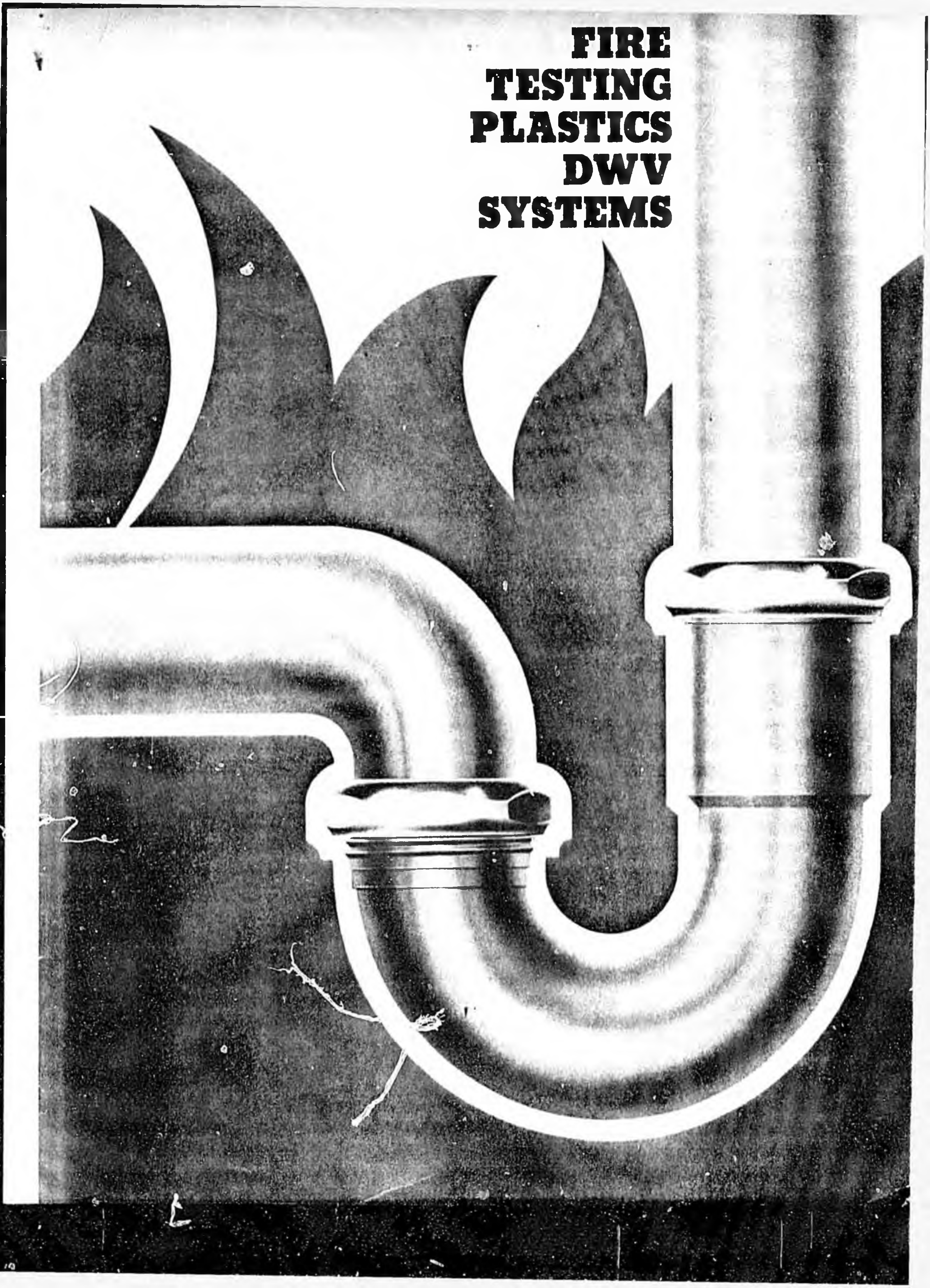
FIRE TESTING PLASTICS DWV SYSTEMS



BACKGROUND INFORMATION

TESTING of ABS and PVC-DWV piping systems to determine their performance characteristics in fire situations has been going on for a number of years. Since 1965, various tests, primarily on small mock-ups of actual installations have been conducted by various agencies.

While the results of such tests were for the most part reassuring to those actually conducting the tests, they were considered by others to be inconclusive since they did not conform to any nationally recognized test method. It was therefore difficult for persons not actually present during the tests to relate the results to his own installation conditions.

An acceptable test method for piping systems has been a major question in the building and fire prevention community during the last several years since there are no tests specifically designed to rate the performance of such systems in fire rated construction.

As a result, a group was formed within the Plastics Pipe Institute to seek out a means of testing ABS and PVC DWV piping systems according to a test method which could, and would, be accepted by regulatory officials.

After lengthy deliberation and consultation with recognized experts in the field of fire technology, it was agreed that ASTM Test Method E-119 would best serve as the basis for an exhaustive research project to be carried out by an impartial and well-credentialed laboratory.

ASTM E-119 is not a test method specifically for piping systems. Rather, it is a method for determining the fire resistance rating (expressed in minutes or hours) of wall and floor assemblies. However, it was decided that useful and valid results could be obtained by testing listed fire-rated wall and floor-ceiling assemblies plumbed with Plastics DWV piping systems.

After due consideration of several facilities, the Building Research Laboratory of Ohio State University (OSU) was selected. The OSU Laboratory has one of the best E-119 test facilities in the U.S. ■

PURPOSE

DUE to the ever increasing useage of plastics DWV piping systems in fire rated structures, unbiased test data was needed to establish the suitability and acceptance of these systems.

It was with this basic philosophy in mind that the Ohio State University (OSU) test program was undertaken. Obviously, it was the Institute's hope that the tests would establish, to the satisfaction of all, the suitability of plastics DWV systems. Great pains were taken to make sure that the tests were conducted in strict accordance with the ASTM E-119 test method. To do otherwise would have been meaningless.

The primary objective of thge program was to learn what happens to a fire-rated wall and/or floor-ceiling assembly when the assembly has been plumbed with plastics DWV piping. Is a one-hour wall still a one-hour wall when it includes a back-to-back lavatory drain assembly made of ABS or PVC DWV? Can a two-hour wall endure a fire for two hours when it contains a plastics DWV System protruding on both sides of the wall?

It is a known fact that ABS and PVC thermoplastics are combustible materials. That, of itself, is not the central issue since other combustibles are also used in fire-rated construction.

Rather, the central issue is whether ABS or PVC DWV, when properly installed, will transmit fire through walls or floors, thereby reducing or otherwise affecting the fire endurance of such walls or floors. This, then, became the primary objective of the OSU fire test program.

A secondary objective was to learn what constitutes proper installation techniques for combustible piping in fire-rated construction. Over the years, various methods have been proposed including the use of metal sleeves or thimbles through the walls as well as the exclusive use of metal P traps as opposed to plastic traps. The OSU tests have laid to rest certain long-standing myths. ■

Test Requirements:

ASTM E-119; the Standard for Fire Tests of Building Construction and Materials (also known as UL 263 and NFPA 251) is a standard to evaluate the performance of walls, floors, columns and other building members under standard fire exposure conditions.

The aim is to secure constructions that are safe and not a menace to neighboring structures, or to the public. To do this, fire resistive properties of building assemblies are measured and specified according to a common standard expressed in hours or minutes of fire resistance. The standard provides the means to measure the fire resistance for these types of building construction during a standard fire expsoure.

Fire tests of non-load bearing walls, when conducted in accordance with this standard, are considered successful if the following conditions are met:

(a) The wall or partition shall have withstood the fire endurance test without passage of flame or gases hot enough to ignite cotton waste, for a period equal to that for which classification is desired.

(b) The wall or partition shall have withstood the fire and hose stream test as specified in Section 8 (of E-119) without passage of flame, of gases hot enough to ignite cotton waste, or of the hose stream.

(c) Transmission of heat through the wall or partition during the fire endurance test shall not have been such as to raise the temperature on its exposed surface more than 250F (139C) above its initial temperature.

Load bearing walls when tested according to E-119 are considered successful if the following conditions are met:

(a) The wall or partition shall have sustained the applied load during the fire endurance test without passage of flame or gases hot enough to ignite cotton waste, for a period equal to that for which classification is desired.

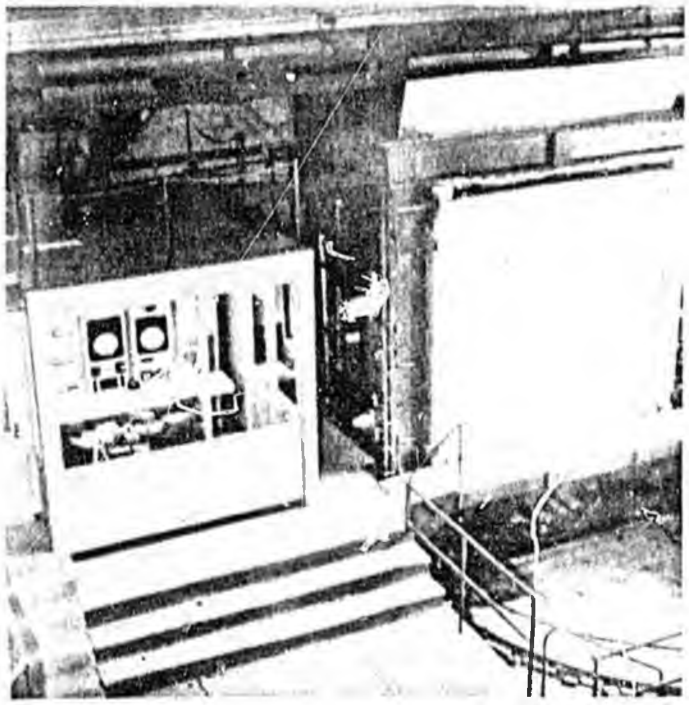
(b) The wall or partition shall have sustained the applied load during the fire and hose stream test as specified in Section 8 (of E-119) without passage of flame, of gases hot enough to ignite cotton waste or of the hose stream, and after cooling but within 72 hours after its completion shall sustain the dead load of the test construction plus twice the superimposed load specified above.

(c) Transmission of heat through the wall or partition during the fire endurance test shall not have been such as to raise the temperature on its unexposed surface more than 250F (139C) above its initial temperature.

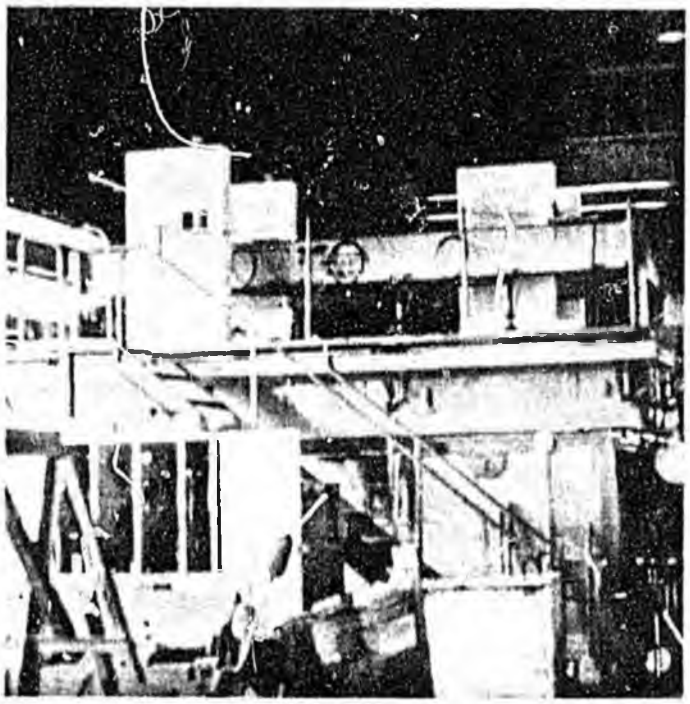
Fire tests of floor and ceiling assemblies, when conducted according to E-119, are considered successful if the following conditions are met:

(a) The construction shall have sustained the applied load during the fire endurance test without passage of flame or gases hot enough to ignite cotton waste for a period equal to that for which classification is desired.

(b) Transmission of heat through the construction during the fire endurance test shall not have such as to raise the temperature on its unexposed surface more than 250F (139C) above its initial temperature. ■



Wall furnace and control room at Building Research Laboratory of Ohio State University. Sophisticated electronic equipment provides minute-by-minute readings on test conditions. The OSU lab is recognized as one of the nation's leading test facilities.



Section of laboratory where floor-ceiling tests were conducted. Brick section is the furnace. Floor assembly is mounted over furnace. Wall sections with vents-to-atmosphere were placed atop floor to simulate actual installation conditions.

WALL ASSEMBLIES

The test walls were built of wood framing and gypsum board representing minimum fire-rated construction. Both 2 x 4 and 2 x 6 walls were tested as representatives of the types of walls normally used to accommodate plumbing systems. All walls were constructed in accordance with the details specified in the listing of the fire-rated assemblies.

The standard DWV configurations that would be encountered in a typical multi-story building were used. These systems would of necessity require 4" soil stacks, 3" vent stacks and usually 2" re-vent. Thus, this configuration would necessitate at least a 2 x 6 wall to accommodate these pipe sizes. However, DWV piping for kitchens, utility rooms, and other applications that can be accommodated by smaller pipe sizes, can be installed in a typical 2 x 4 wall.

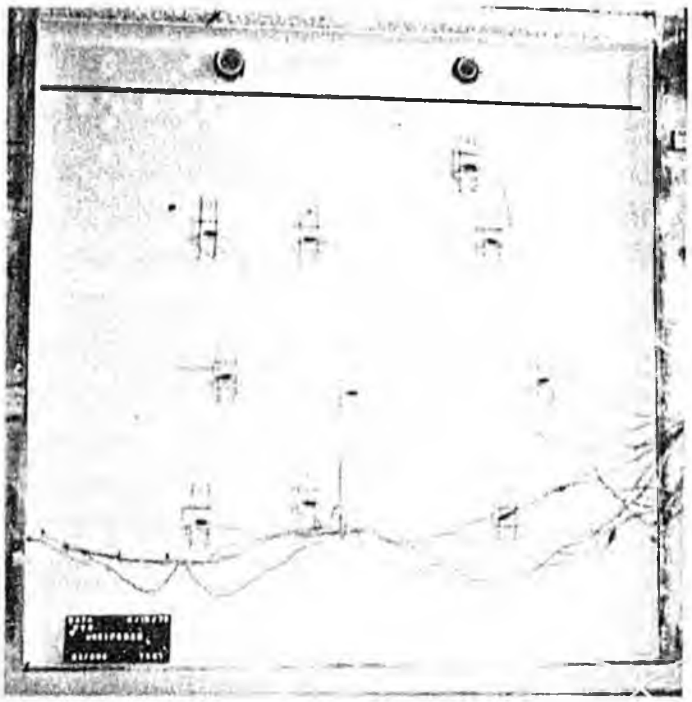
In DWV systems, the walls are normally penetrated for connections to wall hung fixtures such as lavatories or sinks. These penetrations were provided by a twin ell and trap adapters which afforded a plastic bridge completely through the wall. Both tubular brass and plastic traps were tested. The plastic DWV pipe and fittings used in all of the tests were chosen at random from stock and conformed to existing ASTM Standards for the respective material being tested.

Installation of the piping was in accordance with nationally recognized plumbing codes and manufacturers published recommendations. Care was taken to seal the opening around the penetrations of the plate and the gypsum wall board in accordance with existing building codes.

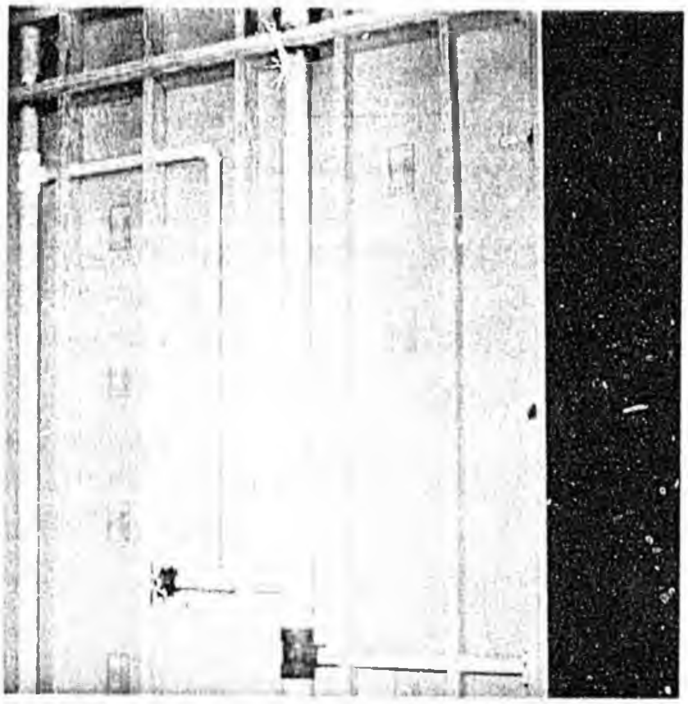
In all tests the traps were supported with wires to simulate a connection to fixtures and were filled with water to simulate service conditions.

Since DWV systems are always vented to the atmosphere it was essential that the piping systems in the assemblies be vented during the test. Because the concrete yoke made it impossible to vent vertically, a 1 foot vent section was provided at the top of the test wall by installing a typical double-plate header.

The pipe extending into the vent section was vented by installing a Sanitary tee opening through the unexposed side of the wall. The penetration of the double plate also simulated the passage of piping from floor to floor. ■



Test wall, showing thermocouples and wires which are connected to computer in the control room. Line near top of wall indicates position of plate simulating floor above. Vents rise, penetrate plate and then turn through wall to atmosphere.



DWV configurations in test walls were typical of back-to-back lavatory rough-ins. Pipe diameters ranged from 1½" to 4". Walls using both 2 x 4 and 2 x 6 studs were tested. Both one-hour and two-hour rated walls were tested.

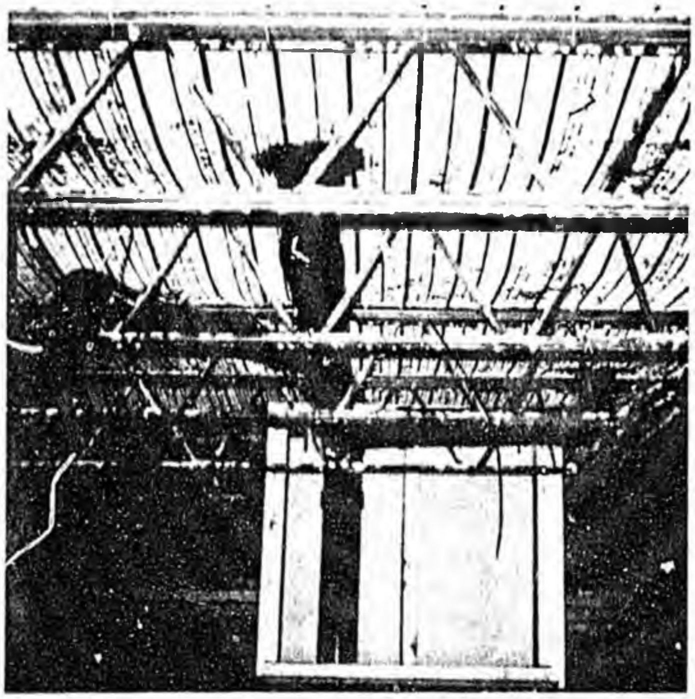
FLOOR-CEILING ASSEMBLY

The floor-ceiling assembly tested was a typical poured concrete floor on steel bar joists with a suspended acoustical lay-in tile ceiling below. This assembly has a two-hour fire-resistance rating.

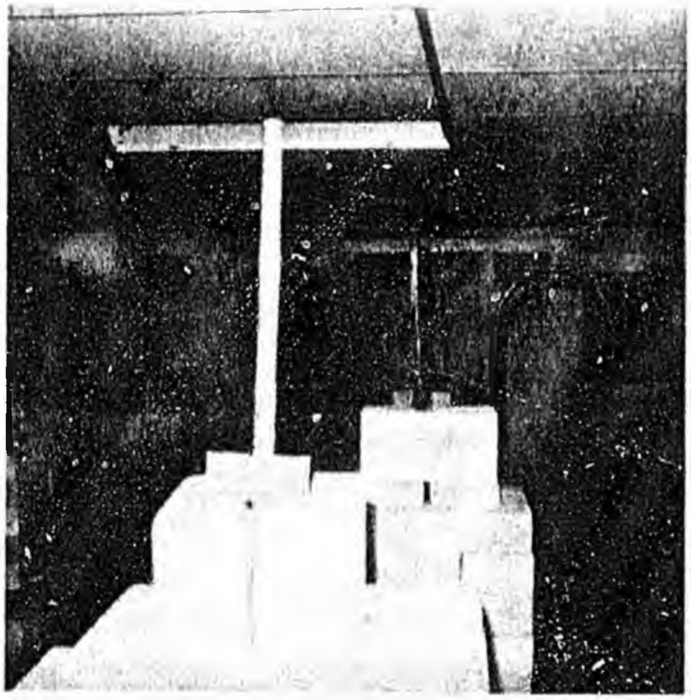
ABS and PVC DWV piping systems were installed at opposite corners of the assembly. Each system consisted of a 4" vertical waste stack, with a 3" horizontal branch line with connections to a water closet and a tub. This branch then continued to a vertical floor penetration to simulate a vent or re-vent stack above the floor. A lavatory opeing was installed in this 3" stack.

In order to fully simulate actual DWV piping installations, wall sections were built above and below the floor slab to accommodate the vertical stacks. The vertical piping protruded through the wall sections above the floor to simulate sanitary vents through the roof. Water closets with water-filled traps and tub waste and overflows were installed on their respective openings to simulate service conditions.

Special glass ports were installed in the wall sections above the floor in order to observe passage of flame through the floor should it occur. ■



DWV piping in floor-ceiling tests was connected to water closets above as well as risers which vented to atmosphere. As in the wall tests, great care was taken to simulate actual field conditions. Ceiling system is typical of most commercial construction.



Inside furnace, looking up at finished ceiling which contains plastics DWV. Vertical conduits are thermocouples. One of several gas jets can be seen near the floor. Furnace generated temperatures of up to 1700 degrees F.

TEST DATA

One Hour Non-Load Bearing 2 x 4 Wall Test (No. 5615)

These walls were of nominal 2 x 4 wood framing protected with one layer of 5/8" UL classified gypsum wallboard on each face. These walls were plumbed with both ABS and PVC DWV with a maximum pipe size of 2". These walls demonstrated a fire resistance classification of one hour.

One Hour Non-Load Bearing 2 x 6 Wall Tests (No. 5473-ABS) (No. 5474-PVC)

These walls were of nominal 2 x 6 wood framing protected with one layer of 5/8" UL classified gypsum wallboard on each face. These walls were plumbed with either ABS or PVC DWV with maximum pipe size of 4".

The walls in both tests demonstrated a fire resistance classification of one hour.

Two Hour Load Bearing 2 x 6 Wall Tests (No. 5560-ABS) (No. 5561-PVC)

These walls were of nominal 2 x 6 wood framing protected with two layers of 5/8" UL classified gypsum wallboard on each face. These walls were plumbed with either ABS or PVC DWV with maximum pipe sizes of 4".

The walls in both tests demonstrated a fire resistance classification of two hours.

Two Hour Floor-Ceiling Assembly (No. 5539)

This test assembly was a 14' x 16' typical 2½" thick concrete floor on bar joists protected below by a suspended acoustical tile lay-in ceiling.

Complete plumbing installations of both ABS and PVC DWV were installed in two corners diagonally across from one another.

This test terminated at 112 minutes caused by failure of the exposed grid suspension system which allowed premature loss of ceiling panels. However, at this point, no passage of flame through the floor had occurred. ■

In wall tests, collapse of piping above simulated floor plate sealed off opening which prevented upward spread of fire or smoke. This points up importance of closing of opening around pipe after installation as required by most building codes.

At the conclusion of wall tests, P-traps were always intact and still capable of holding water. Even during tests, they were cool enough to touch with bare hands. Because of plastics' low thermal conductivity, furnace temperatures never made it through the wall.

CONCLUSIONS

1. The performance of all five wall assemblies in the fire endurance and hose stream tests was, in all essential features, identical to that of the same wall assemblies without the ABS or PVC DWV plumbing systems incorporated.

2. These tests demonstrated that plastics piping, within walls, is not involved in the early stages of a fire. This was evident from the appearance of the piping after the hose stream tests.

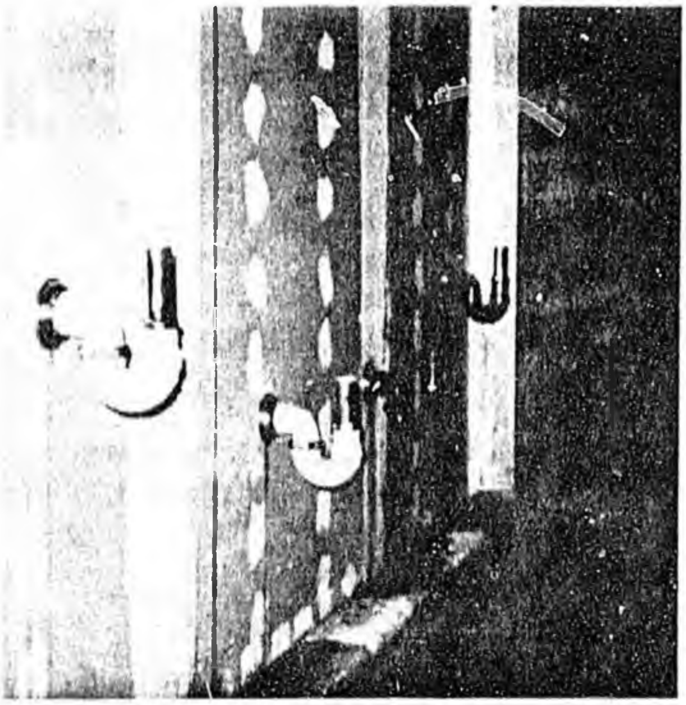
3. Fire consumption of the plastics piping, within the wall, is very slow. In those tests where measurements were taken over 50% of the plastics remained by actual weight.

4. Passage of flame through vertical and horizontal penetrations is minimized with plastic piping. Heat softened plastics tends to close openings thus reducing heat and flame transmission and flue effects through such penetrations.

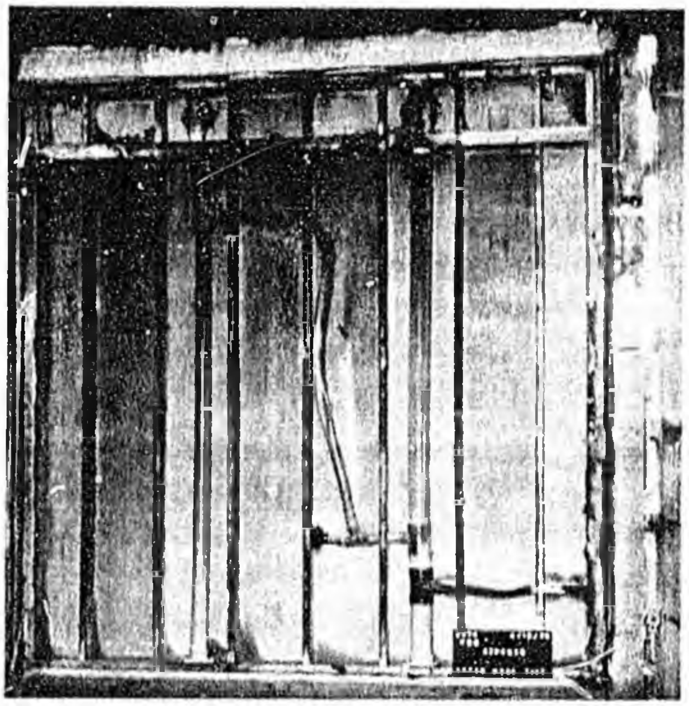
5. Plastics traps proved to be equal to, if not better than, the brass tubing traps. In these tests, while both were used successfully, less heat transmission was observed with the plastic traps.

6. Sealing openings around penetrations with non-combustible sealants is essential. These tests indicated that without sealing, no piping material could be expected to pass the test.

7. Properly installed plastics plumbing systems will not conduct flame through a fire-rated concrete floor of the type tested. Fixtures act as their own barriers. Properly sealed stack penetrations effectively retard flame passage. ■



A variety of DWV configurations were tested using both ABS and PVC plastics. Both materials performed equally well. OSU tests proved conclusively that claims of superior fire performance for one plastic over another are not valid.



After 30 minutes of exposure to fire, this plastic DWV piping shows only mild heat distortion. Such tests layed to rest myths about plastic pipe igniting quickly and serving as a conduit for the rapid spread of flame through walls and floors.

GLOSSARY OF TERMS

ABS — Acrylonitrile-Butadiene-Styrene plastic.

ARM — Horizontal drainage line connecting fixture into stack.

BACK-TO-BACK INSTALLATION — Fixture openings exactly opposite one another requiring double opening fitting.

BRANCH — Horizontal line taken off of main stack or main horizontal line.

BRIDGE — Horizontal connection penetrating both sides of wall in line with each other.

DWV — All of the drainage waste and vent system within the building.

EXPOSED — The face of the assembly in the furnace.

FIRE ENDURANCE — A specified period of time or until failure.

FIRE STOPPING — Sealing off air passage around penetrations.

HOSE STREAM — Application of hose stream under standard pressure to a duplicate wall assembly after fire exposure for a period equal to one-half of the fire endurance rating.

LOAD BEARING — A test assembly that sustains an applied design load during the entire test.

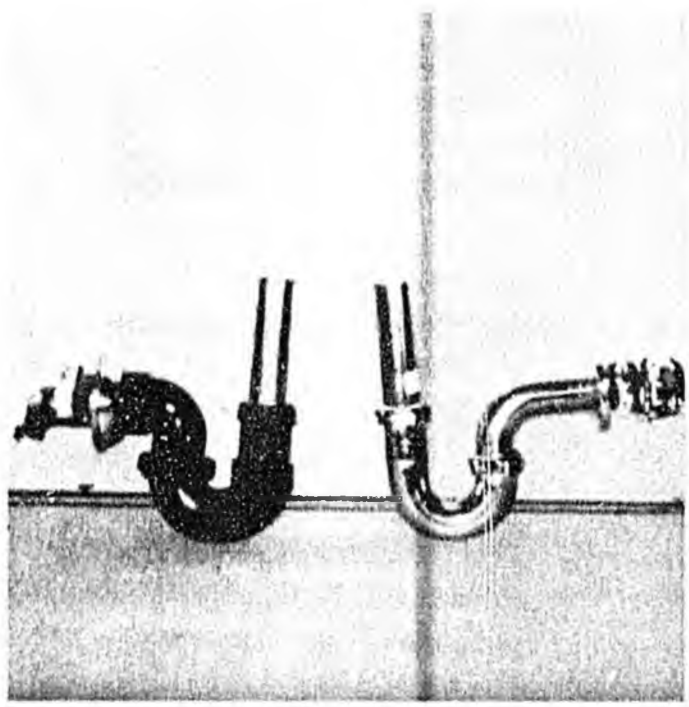
NON LOAD BEARING — A test assembly with no applied load during test.

PVC — Polyvinyl Chloride plastic.

STACK — Vertical soil, waste or vent piping.

UNEXPOSED — That side of the assembly away from flame exposure. ■

E-119 test requirements call for separate hose [illegible] tests. After exposure to fire for one-half the time rating of the [illegible] test assembly is opened and a 30-psi hose stream is applied to the burnt side. No water must penetrate wall. None did.



In order to develop comparative data, both metal and plastics P-traps were used on test walls. Because metal traps quickly melted and fell away, they provided no additional fire protection. Plastics P-traps performed as well or better than metal traps.

Rolf Jensen & Associates, Inc.

Fire Protection Engineers
Building Code Consultants

June 18, 1974

Plastics Pipe Institute
A Division of the Society of the
Plastics Industry, Inc.
250 Park Avenue
New York, New York 10017

Attention: Mr. Ray Durazo, Executive Director

PPI - BUILDING ASSEMBLY FIRE TEST PROGRAM

Gentlemen:

Rolf Jensen & Associates was engaged by the Plastics Pipe Institute to act as a third-party consultant in a Fire Test Program to qualify plastics (ABS & PVC) drain-waste-vent pipe in fire resistive building construction. We provided guidance in the design and instrumentation of the test assemblies, witnessed the actual fire tests, and verified that the tests were conducted in accordance with ASTM E119-1971, Standard for Fire Tests of Building Construction and Materials.

The tests have demonstrated that plastics DWV pipe, when properly installed can be used in building assemblies of up to two hours fire resistance without degrading the fire resistance rating of such assemblies. The wall tests were conducted on load-bearing stud construction and the results led us to conclude that metal-stud wall assemblies will also perform satisfactorily.

One floor test was conducted which was an exact duplicate of an earlier fire test which resulted in publication of Underwriters' Laboratories, Inc., Design G216 (formerly designated as Floor & Ceiling Design No. 72 - 2 Hour), except that ABS and PVC drain-waste-pipe were installed to determine their effect on the fire resistive performance

100 Wilmot Road
Deerfield, IL. 60015
Phone: (312) 948-0700

of the floor. From an analysis of the results of this test, we have concluded that plastics DWV pipe can be used in fire resistive floor construction without adverse effect.

The original floor assembly earned a 2 hour rating when the floor surface temperature failed at 2 hours, 21 minutes. The duplicate assembly, incorporating the plastics DWV pipe, failed at 1 hour, 52 minutes, because several of the acoustical ceiling tiles fell out. Prior to the tile fall-out, temperatures throughout the assembly were approximately the same as in the original test. Examination of the floor after the test revealed that the cross tees supporting the acoustical tile had not expanded properly into the slots of the main runners. Instead, the cross tees sagged down and, late in the test, twisted and caused premature fall-out of the tiles and the early demise of the assembly. Had the cross tees performed as was intended, the rating of the original assembly would have been duplicated.

In summary, the results of the 17 tests conducted lead us to conclude that the use of plastics DWV piping, when properly fire-stopped, does not weaken the performance of fire resistive building assemblies having up to two hour fire resistance.

Very truly yours,

Roland F. Bellman

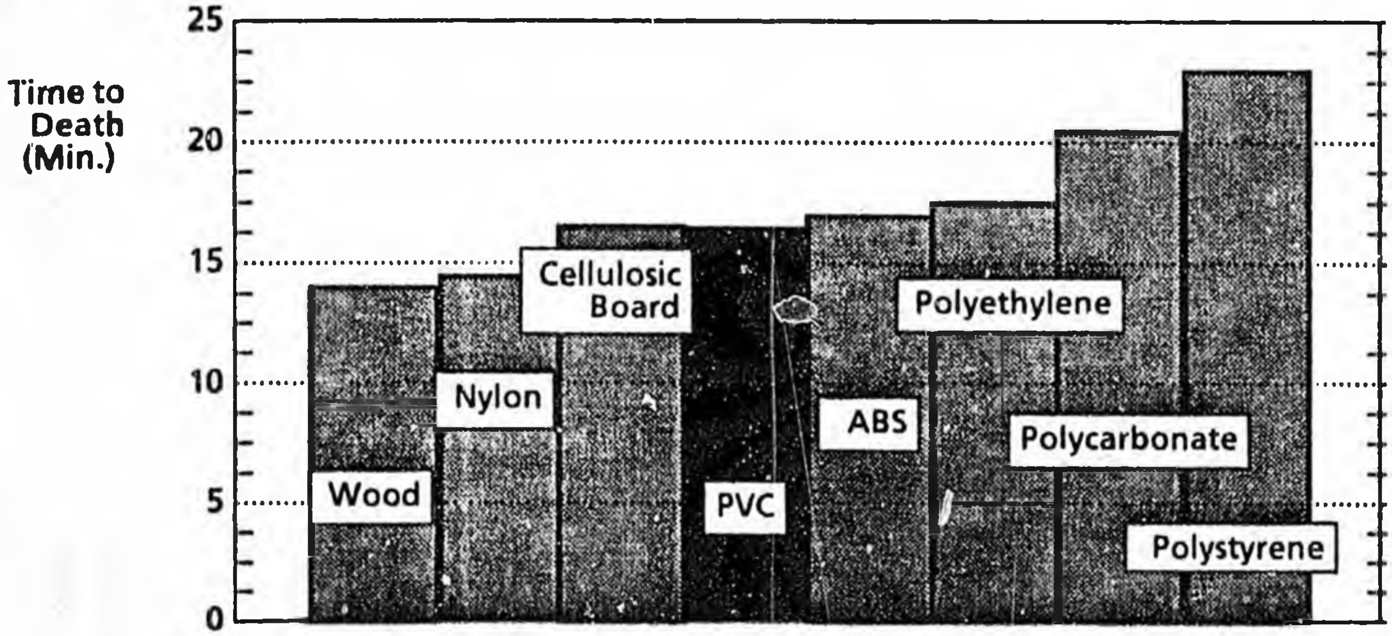
Roland F. Bellman, P. E.
Consulting Engineer

TOXICITY TESTING

- The test results below show the off-gases of PVC and other synthetics to have a toxicity very similar to that of wood.

- The National Bureau of Standards (a non-partisan, government agency) test results corroborate those shown below. Jack Snell of the Bureau, however, cautions: "This report is primarily intended for research...It is not suitable for use by itself for evaluating the fire safety of materials in use since a number of additional factors must be considered in a specific situation. Further development and evaluation of this test method and, in our view, all others currently available is necessary to determine their suitability or utility for regulatory purposes presuming the intent of course, is fire-safe material/product design, selection, or evaluation."

TOXICITY OF OFF-GASES
Wood and Plastics



REFERENCE: Hilado, C.J., Huttlinger P.A., "Toxic Hazards of Common Materials", Fire Technology, Aug. 1981, pp. 117-182 (Table VI p. 181) Carlos J. Hilado is the director of the Fire Safety Center, University of San Francisco, and is well known for his work in the toxicity of materials.

Conoco Chemicals Company 3/83
For more information contact: Ed Kieschnick 713-531-3522

CITY OF PHOENIX

TO: Roscoe J. Hildebrandt
Building Safety Director

FROM: Alan V. Brunacini AVB
Fire Chief

SUBJECT: Proposed Amendments to Plumbing Code

DATE: January 19, 1983

Item 18 - p.13
Formal Agenda
January 25, 1983

PS

The Fire Department has reviewed the proposed changes to the Plumbing Code which would permit the use of plastic pipe and fittings in drain waste and vent systems, wherever combustible construction is allowed by the Construction Code. This has been an area of ongoing concern and continuing analysis for our staff over the last few years.

While the Fire Department has an ongoing concern with the growing use of plastics in buildings, our analysis indicates that this proposal is not unreasonable. Plastics generally tend to burn more rapidly than "conventional materials", give off more heat, produce more smoke and give off more toxic products of combustion. All of these are certainly major concerns to this department and we have stated many times that plastics are a major contributor to the increasing fire danger in our built environment. Our codes need to reexamine this whole area, particularly with regard to the toxicity of products of combustion produced by burning plastics.

In spite of our basic concern with the increased use of plastics, we are not opposing this change in the Plumbing Code. It appears that the limited amount of plastics which would be added to buildings, and the fact that the piping would be within concealed spaces which are already permitted to be combustible construction, make the impact of this change insignificant. The amount of plastics in most occupancies, in the form of furnishings and fixtures which are not governed by any code, is much more significant from a fire safety perspective.

In this case our philosophical concern with the addition of any more plastics is outweighed by a serious consideration of the actual impact. We feel that allowing plastic DWV pipe in combustible construction does not add to the hazards already present in most occupancies. Our experience with these materials in residential occupancies, where it has been permitted for several years, indicates no particular problems.

Thank you for inviting us to comment on the proposal.

AVB:JGR:cap

cc: Mayor & City Council
Mr. Andrews
Mr. Starratt
Mr. Howlett
Mr. Tevlin
Mr. Fairbanks
Mr. Baumert
Chief Brunacini
Mr. Hildebrandt
Ms. Hoyos
CAO
City Clerk

Fire Chief
3/83

SIZE UP

What about the hazards of burning plastics?

In the early 1970s, the fire service became concerned about the hazards of burning plastics. People were apprehensive about the new and unknown products of combustion given off by plastics. Gradually this concern waned as more and more fire departments began to realize the safety benefits of self-contained breathing apparatus. Now the pendulum is swinging back. Once again we are seeing an emphasis on the toxicity of burning plastics.

Why this escalation of concern after several years of relative quiet about the problems of burning plastics? The emergence of new information might be the logical answer. But there are more subtle reasons, such as the one revealed in an article in the February 7, 1983, issue of *Fortune* Magazine titled "The Dubious War on Plastic Pipe." This well-researched article documents one company's battle against plastic pipe. The company is Allied Tube & Conduit Corp., the nation's largest producer of rigid metal pipe used for electrical conduit. In case you don't have the opportunity to read the article, a short report appears in this issue, beginning on page 22.

Fortune published the article to show how a company has used "half-truths and misinformation" and "unfair tactics in the marketplace" to retain its share of the $190 million conduit market. We call the article to your attention because there are some lessons in it for the fire service. Here are a few of the more salient points and some comments.

○ The article admits that burning PVC and other plastics produce toxic gases, but it also explains what any firefighter knows, that anything that burns gives off toxic gases. Comment: It would be helpful to know more about the hazards of burning plastics, but for firefighters the problem hasn't changed. Plastics may burn faster and produce different gases but, whatever is burning, the rule for firefighters should be: "Wear your SCBA." The key to public safety in hotels and homes lies in public education, using EDITH, for example; more built-in protection, such as smoke detectors and automatic sprinklers; and a keener awareness of the hazards of burning materials of any type—wood, plastic, gasoline, and so on. This overemphasis on the hazards of plastic may cause the public to forget that burning wood, cotton, and wool also give off toxic gases. We have learned to live with other hazardous products—gasoline, for example. Why shouldn't we learn to live with plastics while we try to improve their fire safety?

○ The article says that Allied provides about 75% of the funding for the Foundation for Fire Safety and that foundation personnel have not always represented the dangers of plastics objectively. Comment: The work the foundation is doing in toxicity could be helpful in saving lives in the future, but a vested interest such as this raises questions about the objectivity of its work, particularly when the ethics of the funding source is so questionable. Furthermore, toxicity is not the only issue. What about burning characteristics such as ease of ignition and flame spread?

○ The *Fortune* article explains how Allied and others in the metal industry packed the 1980 NFPA Electrical Code committee meeting to vote down the acceptance of PVC conduit into the code. This was done by purchasing 100 new NFPA memberships just to cast votes against PVC conduit. Comment: NFPA's standards and code system has been criticized before. If companies with cash to spare can buy enough memberships to influence code and standards writing in this way, it is a situation that ought to be corrected. But we must be careful about changing the system. It's the best we've got. It works by consensus—the American, democratic way. A standard set by a consensus of concerned interests cannot be a perfect document, but it works because it was established through a democratic, give-and-take process. The system has its faults, one being the NFPA's vested interest in building its membership. But let's work to improve the system we have.

The *Fortune* article shows how far some businesses will go to win the battle of the marketplace. It also reveals some important lessons for the fire service: (1) Know the source of your information—vested interests may not lie, but they may not tell the whole truth either. (2) NFPA's code- and standard-making system needs scrutiny. (3) The modern world is a hazardous place. In the end, the public will determine the balance between safety and the standard of living it wants.

Let's put plastics into perspective. They don't deserve all this special attention. Like other things that burn, they give off toxic fumes. Let's encourage research to learn more about them, but keep our emphasis on prevention measures that we know work—automatic sprinklers, smoke detectors, public education and, for firefighters, wearing SCBA.

Bill Randleman

The Commercial Appeal, Memphis, Wednesday, May 20, 1981

Improper Wiring Is Cited In MGM Grand Hotel Fire

LAS VEGAS, Nev. (AP) — The final Clark County Fire Department report on the MGM Grand Hotel fire says that the primary cause of the blaze that killed 84 persons and injured 700 was an improperly installed electrical system that overheated because it was not grounded correctly.

"It is the opinion of the officers reporting that not one but several factors were present which contributed to the cause of the fire, and that the primary cause was electrical," said the report, which was released Monday.

A preliminary Building Department report on the fire listed hundreds of alleged building-code violations discovered after the Nov. 21 blaze, which forced the shutdown of the hotel. The Strip resort is scheduled to reopen July 30.

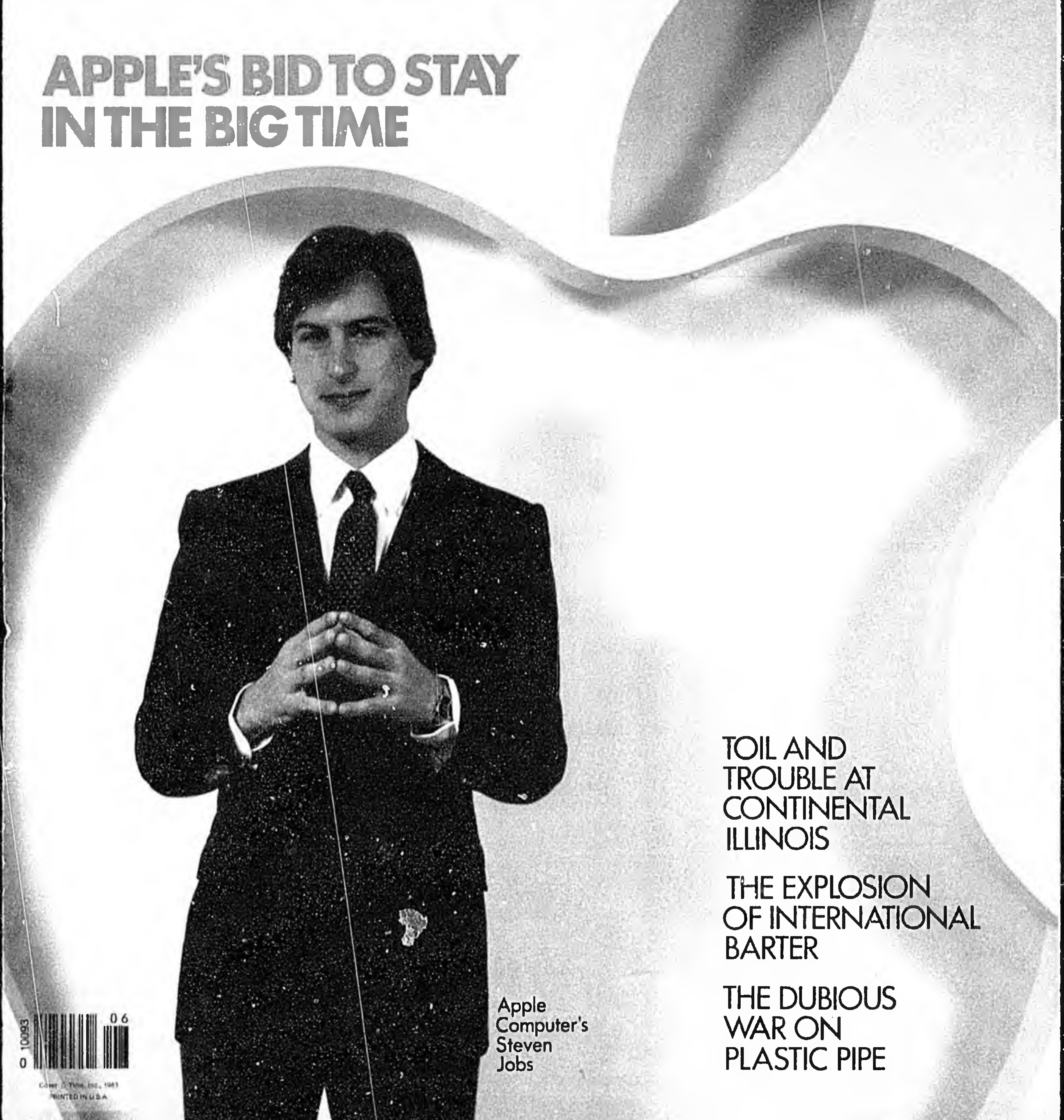
The final report concluded, as had the preliminary report, that the blaze had started behind a wall in the hotel's delicatessen. It said that insulation on two copper wires running through an aluminum conduit or "raceway" had deteriorated, allowing the wires to make contact with the conduit.

Although the conduit was supposed to be grounded, the report said, it was not.

FEBRUARY 7, 1983 $3.00

FORTUNE

APPLE'S BID TO STAY IN THE BIG TIME



Apple Computer's Steven Jobs

TOIL AND TROUBLE AT CONTINENTAL ILLINOIS

THE EXPLOSION OF INTERNATIONAL BARTER

THE DUBIOUS WAR ON PLASTIC PIPE

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THE DUBIOUS

BUILDING MATERIALS/STEVEN FLAX

■ Fire horrif
billowing smc
ing on stretc
bags—the sights arouse a deep-seated urge to control the
like the hotel fire below can also be a marketing windfall f
fight competing products by playing on the fear of fire.

This is the story of a company that has done so with an extraordinary outpouring of half-truths and misinformation. Its target: plastic pipe. Allied Tube & Conduit Corp. of Harvey, Illinois, is the largest U.S. producer of rigid metal pipe used to contain and protect electrical wiring. Plastic conduit, mainly made of polyvinyl chloride (PVC), has made heavy inroads, partly because it's easier to install. According to Predicasts, a market-research firm, its share of the conduit market widened from an estimated 9% in the late 1960s to 54% in 1980. Meanwhile, steel conduit's share fell, from nearly 50% to 32% of a business worth hundreds of millions a year. But Allied, a privately owned company with 1982 sales of about $300 million, has not been content to fight back with conventional salesmanship.

Since the late Seventies, Allied has run a campaign to publicize the supposedly unusual fire hazards of PVC, pitching it at consumers, contractors, legislators, and officials who write building codes. To give its effort the appearance of impartiality, Allied has set up a not-for-profit organization, the Foundation for Fire Safety. Supposedly the foundation, with offices in Rosslyn, Virginia, is dedicated to disseminating impartial scientific information. But with about 75% of its $750,000 budget coming from Allied, it has often served as a vehicle for anti-PVC propaganda. The foundation's officials frequently travel the country citing plastics as contributing to some of the deaths in prominent fires, even though there's no proof that their combustion products were responsible.

Allied has also lobbied heavily against the inclusion in the National Electrical Code, which serves as a guide for local codes, of a new, flexible type of PVC conduit. The new conduit—that's a sample above—is even cheaper to install. Allied's efforts have prompted the Carlon division of New York-based Indian Head Inc.—in turn controlled by Curaçao-based Thyssen-Bornemisza N.V.—to sue it for restraint of trade. The Society of the Plastics Industry, which has long retained the public relations firm of Hill & Knowlton, has also redoubled its efforts to present its side of the controversy. Carlon, with 1982 sales of $150 million, introduced the flexible conduit in 1980; it's also the leading maker of rigid PVC conduit. Other makers include CertainTeed Corp. of Valley Forge, Pennsylvania, and Robintech Inc. of Fort Worth, both publicly owned. Leading suppliers of PVC are B.F. Goodrich, Tenneco, and Du Pont.

ALLIED SAYS IT HAS "a moral and legal responsibility" to oppose products that constitute "an inherent, immediate, and substantial danger to the public." Asserts Theodore H. Krengel, 57, Allied's founder, president, and controlling shareholder: "The plastics produced now kill." Allied's awareness that plastics are hazardous goes back to 1972, he says. "We began to hear more and more about the problems of toxicity, flammability, and smoke of plastics." Buildings, warns Krengel, are becoming "plastic bombs—they go up in a matter of seconds." Allied's general counsel, John Lison, adds ominously: "Any company that knowingly puts a harmful product into the stream of commerce is liable for punitive damages."

Allied is not the only campaigner against plastic pipe. Carol Bellamy, New York City's

RESEARCH ASSOCIATE *Ford S. Worthy*

ON PLASTIC PIPE

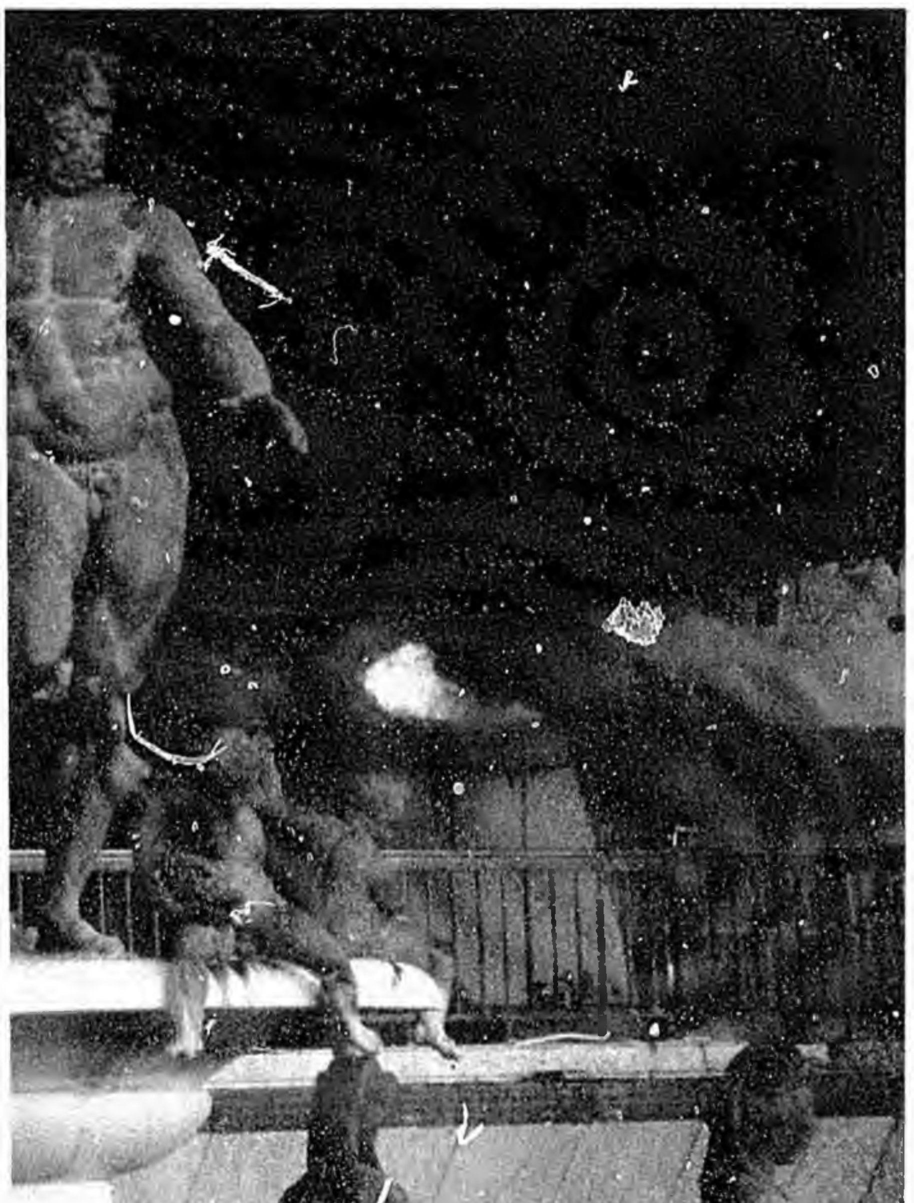
cally ambitious city council president, a fuss last year about new PVC conduit led in subways. At her insistence $2 n is being spent to rip out some and re- it with metal, though most of the sub- system's PVC will be left where it is. es' growing use in plumbing, primarily ater and drain pipes, has also come in riticism. Allied's crusade against PVC een especially vehement, however. A icant proportion of its sales are threat- The last straw may have been Carlon's le conduit, aimed at a $190-million-a- narket that steel had all to itself. wouldn't deny we have a commercial interest," says Allied's President Krengel. "It's a big market. If you include cable, conduit, ducts, and pipe, you're talking in the multibillions of dollars." If the competition gets much worse, Krengel adds, Allied might switch to plastics—"*if* we could find one that is proven safe." Krengel goes on to declare: "I'm not going to make any Three Mile Islands or any Love Canals. I'm not going to make anything where I can't sleep nights because we've made a product that's unsafe. I don't want that on my conscience."

Krengel could be speaking his convictions, of course. But doubt is fanned by a curious fact recently discovered by FORTUNE: Allied itself has marketed PVC conduit on and off in recent years. In fact, it's still selling PVC-coated products.

PVC *is* hazardous when it burns, as the plastics industry admits. So is everything else that burns. PVC may give off, among other things, hydrogen chloride, a corrosive gas that is lethal in high concentrations. But burning natural materials also give off a host of dangerous substances, such as carbon monoxide and acrolein. When wool carpeting or upholstery catches fire, it can produce deadly cyanide gas. Furthermore, a government-sponsored study has shown that Douglas fir, widely used in construction, is every bit as hazardous when it burns as PVC.

Still, wouldn't it make sense to ban plastics and use just noncombustible metal for conduit? The answer, according to experts not financed substantially by either side in this dispute, is a surprising no. There is much more to fire hazards than the toxicity of a material's combustion products. "You may be making the situation worse by having metal conduits," says Dr. Edward Radford of the University of Pittsburgh's Graduate School of Public Health. "Many fires result from electrical short circuits. One common type occurs as a result of improperly grounded metal conduits." Adds Radford, a leading authority on what kills in fires: "There is no evidence that PVC plays a major role in whether an individual dies in a fire."

Since no material is hazard free, the real issue is whether PVC is more hazardous than others. Here again the answer, according to impartial authorities, seems to be no. Accordi , to Jack Snell, director of the Center for Fire Research at the National Bureau of Standards, PVC conduit would probably be among the least of the worries in most fires. "Plastics would *not* create a significant additional hazard to life," says Snell. "Typically it's the contents of a building—in contrast to construction, plumbing, and electrical materials—that represent the largest fuel load. You would need a large fire before the conduit became involved, and by that time the burning contents of the room would have caused the occupants to succumb."



Neptune stood helpless *as flames ravaged the MGM Grand Hotel in Las Vegas on November 21, 1980, leaving 85 dead. Allied Tube & Conduit has cited this and other fires to publicize the supposedly extraordinary hazards of the lethal products given off when plastic pipe catches fire. The final report on the fire, however, did not blame plastics for any of the deaths.*

Caught with his funding showing, *Michael Olsen (right), then managing director of the Allied-supported Foundation for Fire Safety, admitted in an interview for TV that the bulk of his support came from the metal industry. At left on this April 1982 broadcast on Houston's KHOU-TV is reporter Roger Lindberg, interviewing Olsen at the foundation's headquarters.*

Snell's opinion is tersely endorsed by Irwin Benjamin, an eminent fire researcher and now a private consultant after many years at the Bureau of Standards. Says Benjamin, "If the public has been terrified about plastic conduit, that's completely ridiculous."

Surprisingly, these opinions are echoed even by Merritt Birky, director of research at the Allied-supported Foundation for Fire Safety. "Plastic conduits play little role in an ordinary hotel fire," Birky conceded in a recent interview. "It is unlikely," he adds, "that plastic conduit played any role in, for example, the fire at the Westchase Hilton in Houston." He refers to a March 1982 fire that took 12 lives.

A toxicologist with a Ph.D. in chemistry from the University of Virginia, Birky until January 1982 headed combustion toxicity studies at the National Bureau of Standards. He has generally been careful in his public utterances. Yet some of them, both before and after he changed jobs, have been used by Allied to give spurious scientific credibility to its campaign against PVC.

One of Allied's chief exhibits is the November 1980 fire at the MGM Grand Hotel in Las Vegas, which killed 85 people and injured hundreds of others. The cause of the fire, it should be noted, was a short circuit in the hotel's metal conduit. But burning PVC plumbing, Allied asserts, has been implicated in some of the deaths. The company has seized on a statement made by Birky while he was still with the Bureau of Standards and involved in the investigation of the blaze. The carbon monoxide levels in the victims' blood, Birky speculated at that time, were too low to have caused all the deaths.

This implied that something else caused them, and Allied has repeatedly pointed to plastics ever since. In a September 1982 news release headlined "Plastics in Construction Add to Fire's Tombstones," the company's public affairs vice president, Laurence Zoeller, declared: "There is mounti evidence that decomposing plastics contributed to the vast majority of fatalities in such recent tragic fires as at the MGM Grand Hotel."

This release did not mention that in November 1981 the National Fire Protection Association, an investigative and code-writing body, had issued its final report on the fire. It said that 79 out of the 85 victims died primarily from a combination of smoke inhalation and carbon monoxide or smoke inhalation only. Burns and smoke inhalation killed three more, while the remaining three each died of a different cause: burns, skull fracture, and heart failure. As Birky emphasizes, the report's findings are vague. But they are a far cry from implicating plastics.

Birky may nevertheless have done a bit of out-and-out propagandizing, though he vigorously denies it. He had taken up his post at the Foundation for Fire Safety when he was interviewed by reporter Rolando Santos of KPIX-TV in San Francisco. Santos reported last March 23: "The leading researcher in the study of the deaths at the MGM, Dr. Merritt Birky, told me in these cases the toxic gases had to come from the plastics in the room, probably cyanide." Birky claims that Santos misquoted him. Santos says that he and Birky had a detailed conversation prior to the broadcast, and that Birky said exactly what was reported.

Whatever Birky may have said about cyanide, Allied brandished this scare word before the final report on the MGM fire was out. In one May 1981 advertisement in the trade press, the company said: "The Clark County Coroner reported that five victims, who were among the first autopsied, showed evidence of cyanide in their bodies. Cyanide is produced from burning plastic pipe frequently used for drain, vent, and waste disposal, as well as plastic that is commonly used for decorative wall coverings." Allied omitted to say that cyanide is also given off when other synthetic materials burn. In any event, the presence of cyanide is no proof that it killed anyone. The final investigation report on the MGM fire never mentioned synthetic materials—plastic pipe or whatever—as the primary cause of any death.

One of the Foundation for Fire Safety's officials has resorted to innuendo in discussing the Westchase Hilton fire in Houston. Birky, as noted, says it's unlikely that plastic conduit caused any deaths there. Yet Michael Olsen, then the managing director of the foundation, got on KHOU-TV in Houston a month after the fire, offering his "preliminary report" that "toxic gases in addition to carbon monoxide must be considered as causes of death." The TV reporter told his audience, "The Fire Safety Foundation believes some of those deadly gases can come from plastics."

AS A RULE, the foundation's spokesmen have not volunteered the source of their funds during such interviews. Unfortunately for Olsen, KHOU-TV's reporter Roger Lindberg was one of the few to ask him where the money came from. Olsen admitted, listeners were told by another reporter, that "he was funded largely by the metal industry." Olsen insisted that his report was unbiased. KHOU-TV then presented Dale Everitt of the Houston Fire Department, who dismissed Olsen's views. Said Everitt, "When you have a group like this, I think they're going to be interested in keeping those funds coming in." Olsen has since left the foundation. Conveniently for Allied, some professional firefighters have strong opinions against plastics and will state them publicly. Shortly after the Westchase Hilton fire, Andrew Casper, then chief of the San Francisco Fire Department, appeared on KPIX-TV. Casper sketched a simple causal sequence in the MGM Grand fire: "More plastics, more fires, more deaths caused by the inhalation of toxic fumes." Later he went on the payroll of the Foundation for Fire Safety, which he has since left.

WHILE AN EX-FIRE CHIEF has credentials to speak out, this can hardly be said for another PVC opponent financed by Allied. Deborah Wallace is president of the Public Interest Scientific Consulting Service, another organization mainly backed by the company, to the tune of $17,000 a quarter. With a Ph.D. in environmental physiology, Wallace has little expertise in deaths from fires. Yet she travels the country preaching the dangers of PVC and calling herself "an expert on fire toxicology."

She also made a pretrial deposition in 1980 as an "expert witness" in the litigation arising from a May 1977 fire at the Beverly Hills Supper Club in Southgate, Kentucky, in which 165 died. Later she testified that autopsy reports, hospital admission records of survivors, and questionnaires strongly suggested that PVC was responsible for the deaths and injuries at the fire. On this point she was disputed during the trial by the medical examiner of St. Louis County.

The Foundation for Fire Safety has lobbied repeatedly. Several states have been considering bills that would require that all materials be tested for their combustion toxicity before they can be considered for approval in building codes. Since metal conduit can't burn, it would pass such tests; PVC might not. Unfortunately, satisfactory testing procedures don't yet exist. Yet on May 6, 1982, Birky appeared before the fire safety subcommittee of the New York State senate finance committee and declared that they do. An inhalation test protocol that he helped develop at the National Bureau of Standards, he said, is able to prove that one material is more toxic than another.

One reputable authority disputes Birky. "There's no correlation between the test method and what happens in a real fire," says Irving Einhorn, an adjunct professor at the University of Utah, who has published 100 papers on combustion toxicology. "Yet Birky is going around the country trying to ban materials based on incomplete tests." The Bureau of Standards adds that even if its test protocol were ready to be used, which it isn't, it alone would not justify banning some materials from building codes.

The plastics industry and Carlon have charged Allied with using questionable tactics within the National Fire Protection Association. Prior to an NFPA vote in May 1980 that would have recommended the inclusion of Carlon's flexible PVC conduit in the National Electrical Code, they say, Allied and other companies and trade organizations in the steel industry purchased scores of (and perhaps as many as 100) $50 memberships in the organization. When the vote came up, these new members helped to defeat Carlon's conduit by 394 to 390.

SEVERAL NFPA MEMBERS were outraged by the way the outcome was achieved. One, Nathaniel Addleman, a registered fire protection engineer with Boeing Co., was particularly incensed when he addressed the group after the vote: "I had occasion to have lunch with a gentleman who is a salesman for one of the steel companies and he didn't know why he was here. He was going to go to a meeting at 12:30 to find out why he was here and be told how to vote. This is what's happening here today. We cannot let the NFPA degenerate to that type of thing."

Before and after Allied helped vote Carlon's conduit out of the electrical code, it was selling PVC products. Even though Allied President Krengel claims that he was aware of plastics' hazards as far back as 1972, his company sold PVC conduit during the mid-Seventies through distributors. Asked how he could sell a product that he considers hazardous, Krengel says, "Maybe we began to realize how bad it was later. Anyway, as soon as we began to realize how bad it was, we got out of the business."

Allied's general counsel, John Lison, says Allied got out of the PVC business for a different reason: it lost its supplier. He adds, "Our suppliers could not keep us price competitive. There wasn't enough profit margin in 1975." Allied got back into the PVC market during the summer of 1980. Krengel and other Allied officers worked out a deal in which Robintech would produce rigid plastic conduit for Allied on a private label basis. Krengel now says he wasn't aware that Allied was in the PVC business a second time. Asked if subordinates had put Allied back into PVC without his knowing about it, he responds: "Look, it was a nothing kind of thing. It was incidental and momentary. When we knew what was going on we backed off."

Actually Allied sold PVC conduit from about September 1980 to March 1981. It did so, moreover, without warning users of the fire hazards it professes to be concerned about. According to Lison, Krengel got out of the business because this time he *really* found the material hazardous. "Ted was amazed by the horrors of the MGM fire, and then the others," says Lison.

Allied's suppliers remember a completely different story. When Allied concluded its relationship with Robintech, Pat Madormo, Robintech's executive vice president, met Bernie Auerbach, Allied's product development manager, and asked why Allied was calling it quits. According to Madormo, Auerbach told him that Allied felt that PVC was a different market from those it was used to. "The PVC market got pretty tough around then," says Madormo, "and there wasn't enough margin for them to buy from Robintech and resell."

Allied returned to the PVC business for a third time in November 1981. It acquired Elcen Metal Products Co. of Franklin Park, Illinois, one of whose product lines is PVC coated. A current product, called Strut, is a hanging PVC-coated pipe holder. If the big hotel fires convinced Krengel he should get out of the business, why is Allied selling something like this? "Look," says Lison, "we don't know why people die from fires in this country." But wouldn't PVC be dangerous in this sort of application? "We don't have a corner on the wisdom of the world," Lison says, "and Factory Mutual [a testing organization that does inspections for the insurance industry] kept telling us that this stuff is fine, that it'll be included in all the codes. You know, for lots of applications PVC is better than our stuff."

Despite this strange admission, Allied's war on PVC has continued without letup. Last September the newsletter of the American Council on Science and Health, a consumer education group, published an article headlined "The Merchandising of Fear" on some less than savory aspects of Allied's campaign. Zoeller's quick reply was morally lofty: "Although Allied obviously has an interest in this issue, we had every opportunity to enter the PVC market and chose not to on safety grounds. We believe this issue concerns human life and safety, and therefore transcends the commercial interest of any company or industry. We believe our record shows this concern."

■ Allied's record is something rather different—a rare well-documented example of unfair tactics in the marketplace. Companies battling new products often play rough, with high-pressure salesmanship, aggressive pricing, antagonistic ads. But a few go further, in ways that sidestep notice. Allied has called attention to itself by overreaching. ■

frost
CONSTRUCTION

January 25, 1983

Phoenix City Council

Gentlemen:

This study was prepared to determine the amount of plastic pipe that exists in relation to the total square footage in three types of apartment units currently being constructed in the City of Phoenix. If flammability is an issue, determine the quantity of A.B.S. plastic pipe relative to the other types of materials used in combustible construction systems.

The precise issue for consideration is the use of plastic pipe for waste and vent piping within combustible construction. The very nature of combustible construction carries with it the code requirements, restrictions and parameters that provide reasonable and prudent uses of this type of construction.

CASE I STUDIO APARTMENT

439.10 Square Feet
EXACT AREA OF VERTICAL WASTE AND VENT PIPING

2 - 1½" NOM
3 - 2" NOM
1 - 3" NOM
7.051 = TOTAL SQUARE INCHES OF ACTUAL PIPE MATERIAL
0.04896 = TOTAL SQUARE FOOT OF ACTUAL PIPE MATERIAL

.04896 ÷ 439.10 = .01115%

CASE II ONE BEDROOM APARTMENT

652.03 Square Feet
EXACT ARE OF VERTICAL WASTE AND VENT PIPING

2 - 1½" NOM
3 - 2" NOM
1 - 3" NOM
7.051 = TOTAL SQUARE INCHES OF ACTUAL PIPE MATERIAL.
.04896 TOTAL SQUARE FOOT OF ACTUAL PIPE MATERIAL.

.04896 ÷ 652.03 = .0075%

2113 S. 48th ST. SUITE #106 TEMPE, ARIZONA 85282 — TELEPHONE (602) 894-9871

January 25, 1983
Page Two
Phoenix City Council

CASE III TWO BEDROOM APARTMENT

885 Square Feet
EXACT AREA OF VERTICAL WASTE AND VENT PIPING

1 - $1\frac{1}{2}$" NOM
3 - 2" NOM
2 - 3" NOM
8.48 = TOTAL SQUARE INCHES OF ACTUAL PIPE MATERIAL.
.0588 = TOTAL SQUARE FEET OF ACTUAL PIPE MATERIAL.

.0588 ÷ 885 = .00665%

CONCLUSION:

In combustible types of construction, plastic pipe is an extremely minute element when you consider the total amount of combustible products that make up a typical unit.

Taking that one step further, averaging the three cases, plastic pipe is one part in 12,437.

Sincerely,

Roger W. Steill

Roger W. Steill, A. I. A.

FROST CONSTRUCTION CORPORATION
2113 South 48th St. Suite 106
TEMPE, AZ 85282
894-9871

JOB ______
SHEET NO. 1 OF 2
CALCULATED BY r. steill DATE 22 Jan 83
CHECKED BY ______ DATE ______
SCALE ______

UNIT TYPE 'A' - STUDIO

23'-0" × 20'-4" − (4'-4" × [20'-4" − 8'-8"]) + (4'-0" × 5'-6") = 439.10 G.S.F.

PLUMB'G VERTICALS: 1½"V & 2"W., 2"V & 3"W., 1½"V. & 2"W.

UNIT TYPE 'B' - ONE BEDROOM, ONE BATH

28'-8" × 24'-6" − (4'-8" × [24'-6" − 9'-0"]) + (4'-0" × 5'-6") = 652.03 G.S.F.

PLUMB'G VERTICALS: 2"V & 3"W., 1½"V. & 2"W, 1½"V & 2"W.

UNIT TYPE 'C' - TWO BEDROOM, TWO BATH.

26'-0" × 35'-0" − (4'-0" × [35'-0" − 23'-5"]) + (4'-0" × 5'-6") = 886.00 GSF.

PLUMBING VERTICALS: 2"V. & 3"W., 1½"V & 2"W., 2"V & 3"W.

1½" φ 	1½" O.D. NOM	1.90" O.D.	1.61" I.D.	WALL	.145
2" φ		2.375 O.D.	2.067 I.D.	"	.154
3" φ		3.50 O.D.	3.068 I.D.	"	.216

1½" $(1.90 \div 2)^2(3.1416) - (1.61 \div 2)^2(3.1416) = 2.8353 - 2.0358 = .7995$

2" $(2.375 \div 2)^2(3.1416) - (2.067 \div 2)^2(3.1416) = 4.4301 - 3.3556 = 1.0745$

3" $(3.5 \div 2)^2(3.1416) - (3.068 \div 2)^2(3.1416) = 9.6212 - 7.3927 = 2.2285$

PRODUCT 206-1 /NEBS/ Inc., Groton, Mass. 01471

FROST CONSTRUCTION CORPORATION
2113 South 48th St. Suite 106
TEMPE, AZ 85282
894-98[illegible]1

JOB

CALCULATED BY DATE

CHECKED BY DATE

SCALE

UNIT 'A' = 439.10 G.S.F.

STUDIO :	1½"	2 × .7995	=	1.5990
	2"	3 × 1.0745	=	3.2235
	3"	1 × 2.2285	=	2.2285
				7.051 si ÷ 144 = 0.048965 S.F.

439.10 G.S.F.

.048965 s.f. ÷ 439.10 sf = .0001115 = .01115 %

(439.10 × 144) ÷ 7.051 = 8967.58 ∴ for each SQ IN OF PLASTIC PIPE there is 8967 SQ IN OF APT.

UNIT 'B' = 652.03 S.F.

ONE B.R. :	1½"	2 × .7995	=	1.5990
	2"	3 × 1.0745		3.2235
	3"	1 × 2.2285		2.2285
				7.051 si ÷ 144 = 0.048965 sf.

.048965 ÷ 652.03 S.F. = .000075

(652.03 × 144) ÷ 7.051 = 13316 ∴ each sf of PLASTIC PIPE there is 13,316 SF OF APT.

UNIT 'C' = 885 G.S.F.

TWO B.R. :	1½"	1 × .7995	=	.7995
	2"	3 × 1.0745	=	3.2235
	3"	2 × 2.2285	=	4.4570
				8.48 si. ÷ 144 .05888 S.F.

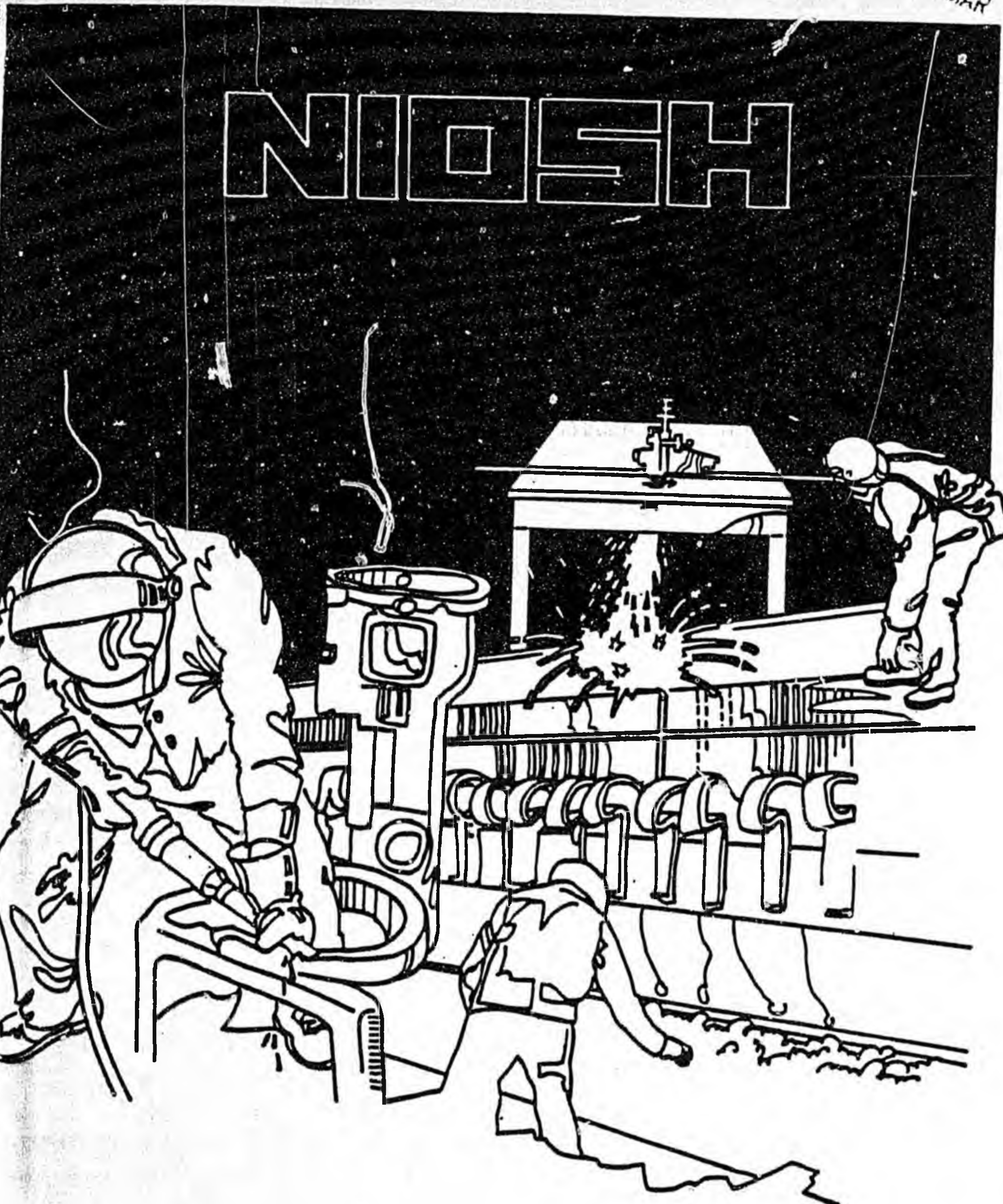
.05888 ÷ 885 = .0000665

(885 × 144) ÷ 8.48 = 15,028.

PRODUCT 204-1 NEBS Inc., Groton, Mass 01471

MAR 16 1983

Centers for Disease Control ■ National Institute for Occupational Safety and Health



Health Hazard Evaluation Report

HETA 81-336-1237
PLUMBERS AND GASFITTERS LOCAL UNION 12
BOSTON, MASSACHUSETTS

HETA 81-336-1237
DECEMBER 1982
PLUMBERS AND GASFITTERS LOCAL UNION 12
BOSTON, MASSACHUSETTS

NIOSH INVESTIGATORS:
Edward L. Baker, M.D.
Thomas J. Smith, Ph.D.

I. SUMMARY

In June 1981, the National Institute for Occupational Safety and Health (NIOSH), received a request from the Plumbers and Gasfitters Local Union 12, Boston, Massachusetts, to evaluate health effects from working with polyvinyl chloride (PVC) pipe cements and cleaners. To evaluate the effects of these exposures we conducted: 1) a mail questionnaire survey of the local union's membership; and 2) an environmental evaluation of solvent exposures and medical evaluation of nine exposed workers at three work sites, where high solvent exposures might occur.

Of nine time-weighted average (TWA) exposure determinations for methyl ethyl ketone (MEK), tetrahydrofuran (THF), and cyclohexanone, none exceeded the survey criteria of 590 mg/M^3, 590 mg/M^3, and 100 mg/M^3, respectively. Likewise, four "peak" exposure determinations did not exceed survey criteria of 885 mg/M^3, 735 mg/m^3, and 400 mg/M^3. TWA exposures for: 1)MEK ranged from none detected to 170 mg/M^3 (mean of 26 mg/M^3); 2)THF ranged from 0.6 to 400 mg/M^3 (mean of 100 mg/M^3); and 3)cyclohexanone ranged from none detected to 36 mg/M^3 (mean of 4 mg/M^3). Dimethyl formamide was not detected on any of the air samples. A combined exposure index calculated for the vapor mixture and based on irritation and nervous system effects indicated one of the nine plumbers' exposure to be above survey criteria (1.33 vs 1.0).

Of the 740 plumbers surveyed by mail questionnaire, 353 (48%) responded. Most had worked with plastic pipe, almost half for 10 or more years, but only 78 has worked with it for more then 13 weeks in the preceeding year. Dizziness (54%), headache (41%), eye irritation (36%), irritation of the skin of the hands (36%), and tingling or numbness in the fingers (33%) were frequently reported and were attributed by the plumbers to working with PVC pipe. However, the low response rate for the survey and the tendency for responders to report more symptoms than non-respondars indicates that the prevalence of reported symptoms may be overestimated.

The nine plumbers participating in the medical survey reported a prevalence of symptoms, similar to that found in the mail questionnaire survey. Physical examinations and laboratory testing showed no abnormal findings attributable to solvent exposure. As a group, the participants had no appreciable decrement over the workday in any of the neuropsychological tests.

The environmental data did not indicate excessive solvent exposures. None exceeded survey criteria or OSHA standards, and only one of nine combined solvent exposure fractions exceeded evaluation criteria. The medical study of a limited number of plumbers documented no impairment of brain function and no work-related chronic disease, but the questionnaire survey revealed a high reported prevalence of acute symptoms associated with working with PVC pipe. However, due to the nature of this study, a definite link between the solvent exposures and reported health effects was not established. Recommendations to reduce solvent exposures in plumbing are included in Section VIII of this report.

KEYWORDS: SIC 1711 (Plumbing, Heating, and Air Conditioning), PVC pipe cement, methyl ethyl ketone, tetrahydrofuran, cyclohexanone, dimethyl formamide, neurobehavioral tests, headache, dizziness, nausea, eye, nose, throat, and skin irritation.

City of Chula Vista
CALIFORNIA

BUILDING AND HOUSING DEPARTMENT

June 5, 1981

Mr. Jack Lancaster
P. P. S. A.
Route 1, Box 370
Brighton, TN 38011

RE: Construction of Bay General Hospital, 435 "H" Street
Chula Vista, CA

Dear Jack:

I am sending you complimentary the slides taken of the installation of plastic DWV and PVC cold water lines at the Bay General Hospital, Chula Vista, California.

The following is a background of the project. The original one-story reinforced grouted brick masonry hospital was constructed in 1969. The plumbing in the original was cast iron DWV and copper water lines. On May 5, 1969, a building permit was issued for a four (4) story, 70,000 sq. ft. addition of reinforced grouted brick masonry. (Architects, Burman and Rasmussen, 1451 E. Chevy Chase Drive, Glendale, California.) The permit valuation for the structure was $2,000,000. With the consent of the owners, a request was made to the Chula Vista Board of Appeals and Advisors to allow the use of ABS, DWV, and PVC cold water lines. The seven-member board unanimously approved the request. Kitzman Plumbing Company of La Mesa, California did the installation; however, they chose not to use ABS underground but to continue with the existing cast iron. The building was given final approval on November 17, 1971. The building engineer for the hospital has nothing but praise for the selection of ABS and PVC and wishes it had been used underground.

Sorry for the delay in sending the slides.

Sincerely,

Eugene J. Grady
Director of Building and Housing

EJG:js

Encl.

STATE of INDIANA

INDIANAPOLIS, 46204

ADMINISTRATIVE BUILDING COUNCIL
OFFICE OF THE STATE BUILDING COMMISSIONER
300 GRAPHIC ARTS BUILDING
215 NORTH SENATE AVENUE
INDIANAPOLIS, INDIANA 46204

November 13, 1980

Jack Lancaster
Plastic Pipe & Fittings Association
999 North Main
Glenn Ellen, Illinois 60137

Re: Your letter of October 8, 1980
concerning code acceptance of plastic
plumbing systems

Dear Mr. Lancaster:

On November 4, 1976 the Administrative Building Council adopted the 1976 Edition of the Uniform Plumbing Code with an amendment to Table A "Plumbing Material Standards", allowing CPVC or PVDC, Chlorinated Polyvinyl Chloride Water Piping ASTM D 2846-70 and also with an amendment to Subsection 401(a) allowing the use of ABS & PVC for sanitary plumbing. There is a note with this amendment to the effect that limits on ABS or PVC are not adopted as a part of this Code. To this date we have had no apparent problems with installations using these materials and the State of Indiana has found them to be acceptable when installed in accordance with the amended Plumbing Code and Manufacturer's recommendations.

If there are further questions concerning this matter please feel free to refer them to either myself or Mr. Hoyt Perry of this office.

Sincerely,

John W. Carmack, Director
Code Research Division

JWC:tw

cc: file

(NOT PRINTED AT GOVERNMENT EXPENSE)

Congressional Record

United States of America

PROCEEDINGS AND DEBATES OF THE 90th CONGRESS, FIRST SESSION

Vol. 113 WASHINGTON, THURSDAY, DECEMBER 14, 1967 No. 205

House of Representatives

PLASTIC PIPE: LOW COST AND HIGH RELIABILITY

Mr. HECHLER of West Virginia. Mr. Speaker, some years ago when a friend of mine came into my office and showed me a piece of plastic pipe, and said it might some day be widely used in plumbing and other piping, I thought the suggestion was a little fantastic. But it has held up under the stresses and the strains, resistance to chemical attack, and in many other ways proven to be the kind of tough competitior which continues to make great new advances every year.

The Federal Housing Administration, after analysis of the testimony presented, decided in 1961 to proceed with the insurance of homes equipped with plastic pipe. This is a particular type of plastic pipe known as "ABS". In case anyone wonders, Mr. Speaker, those letters stand for "acrylonitrils-butadiene-styrene." This particular form of plastic was invented in 1944.

WHAT ABOUT THE BUGGYWHIP MAKERS?

Whenever any new invention suddenly hits the market, it is quite natural in our competitive system that the product it replaces stuggles to retain its competitive position. This is certainly true of metal pipes, still widely used in residential construction. An interesting sidelight on the great struggle is the fact that in the process more and more public attention has been attracted to the potential uses of ABS.

Many plumbing codes, which have become obsolete since the development of ABS plastic pipe, have not yet recognized ABS. This appears to be the primary reason why cast iron is used in residential construction. Of course there have also been some efforts to discourage union acceptance of the new and less costly plastic pipe.

HISTORY OF ABS DEVELOPMENT

There is a 20-year history of solid development in the use of ABS plastic pipe. That is a short period of time, but giant strides have been made in that short period, as evidenced by the following timetable:

1944. ABS (acrylonitrils-butadiene-styrene) plastic invented.

1947. Initial use of ABS pipe—in highly corrosive applications, such as chemical process piping, water purification plans, and sewage treatment plants. ABS performs successfully where metal pipe failed.

1960. ABS drainage pipe accepted by the mobile home industry. Completely displaced metal drainage pipe because of light weight, thermal stability and toughness. Over one million mobile homes now have ABS pipe.

1961. Federal Housing Administration insures loans on homes equipped with ABS drain, waste and vent pipe (DWV).

1964. Formation of ABS Council representing basic raw material producers such as Marbon and Uniroyal Chemical, as well as manufacturers of ABS pipe and fittings. Specific purpose: code revision to permit use of ABS drainage pipe.

1966. All regional and national codes accept ABS DWV pipe. 200,000 new homes installed with this material.

1967. ABS drainage plumbing now accepted by 13 states and by local jurisdictions in 32 states. ASTM specification issued. ABS accounts for 17% of new home construction. Total residential installations now exceed 500,000.

RESISTANCE TO CHEMICAL ATTACK

Mr. Speaker, yesterday I had the interesting experience of witnessing a unique experiment visually conducted before a congressional committee. Dr. Robert L. Bergen, Uniroyal chemist, poured equal quantities of diluted mercuric chloride into two plumbing traps—one of metal and one of ABS plastic. In order to protect the rug in the Rayburn Building committee room, which is the pride and joy of the chairman, transparent plastic bags were carefully draped over the plumbing traps to avoid any chemicals being spilled on the rug. Within minutes, the metal trap was cracked and leaking; the ABS trap was intact.

Dr. Bergen explained to the committee that the demonstration had been presented in order to refute evidence which had been offered to the same committee last July by spokesman for metal-pipe interest.

Dr. Bergen further explained that any material can be caused to fail under laboratory conditions of stress, time, and environment. Any test to be useful, he said, must simulate actual use conditions, and only such tests are valid in predicting the service life of a material from laboratory data.

Dr. Bergen said:

> In plumbing systems, aggressive chemicals such as the photographic fluid used in the demonstration are invariably diluted and the exposure time is minimal due to flushing action.

He said stress corrosion has been known for decades to be common to all materials, including metals and plastics. The term refers to the fact that materials are more subject to chemical attack under conditions of applied stress.

He continued:

> In a laboratory, totally unrealistic conditions of stress can be established and a material can also be subjected to full concentration of active reagents for protracted periods, but such stresses simply do not occur in plumbing drainage systems. Aside from the fact that reasonably good workmanship can be expected from a skilled trade, and that the public normally has the protection of plumbing inspection, the very flexibility of ABS pipe minimizes any stress from bending at the fittings.
>
> Laboratory methods have been developed for predicting the long term life of ABS which show that a useful service of over 100 years can be expected. Such laboratory data is sustantiated by actual case histories where ABS chemical handling systems have rendered trouble-free service for 20 years. Such systems were installed where metal pipe

had failed from stress corrosion.

Dr. Bergen concluded:

The existence of 1,500,000 successful ABS drainage plumbing installations, with no evidence of stress corrosion or chemical attack, is the best evidence of the complete suitability of ABS pipe for drain, waste and vent service.

ENTER A WEST VIRGINIAN

I will always call E. R. Thompson, Jr., a West Virginian, Mr. Speaker, even though he is now technically a constituent of the gentleman from Missouri [Mr. BOLLING]. Perhaps Mr. Thompson was born in Paola, Kans. Perhaps he did receive his civil engineering degree from the same institution that granted an animal husbandry degree to my own father, the University of Missouri. Perhaps he was a civil engineer with the Los Angeles Department of Water and Power from 1958 to 1960. But no individual can deny, Mr. Speaker, that Mr. Thompson came to West Virginia in 1960, and he joined the Marbon Chemical Division in my own congressional district. At first, he was in charge of the pipe testing program in Marbon's technical department, and in 1962 moved on to become applications engineer in charge of pipe products. After this flowery introduction, I should add that Mr. Thompson is now sales manager of Borg-Warner pipe products for Borg-Warner Corp.

All this is leading up to testimony which I personally heard Mr. Thompson present yesterday to a congressional committee. He related the fact that the Federal Housing Administration had first been approached in November, 1960 to discuss the merits of plastic drain waste and vent pipe and fittings, in order to establish a suitable specification for use of this material for FHA-mortgaged homes. A second meeting was held with FHA officials in Washington on March 2, 1961, at which additional information was presented on chemical resistance, dimensional stability with respect to hot water, and crush strength. A Use of Materials Bulletin was published by FHA on December 15, 1961, authorizing permission to use ABS pipe in homes with FHA-insured mortgages.

FEDERAL HOUSING ADMINISTRATION DEFENDS PLASTIC PIPE

On February 10, 1966, I personally attended a further hearing and presentation to Assistant Secretary of Housing and Urban Development and Federal Housing Commissioner Philip N. Brownstein. Mr. Brownstein subsequently wrote to our colleague from Connecticut, the Honorable JOHN S. MONAGAN:

Our review of the material presented at the February 10, 1966 meeting in my office has been completed and, in addition, we have the results of an independent laboratory test. On the basis of the findings, we have no basis for changing the conclusion reached in 1961 when Materials Bulletin #33 was issued.

Commissioner Brownstein further reported:

We have recently surveyed all our field offices to learn if there had been any complaints from owners of homes with ABS drain waste and vent piping. The results showed that not a single complaint had been received.

The above quotations and factual developments were all reported by Mr. E. S. Thompson, Jr., who, despite the fact he is now a Missourian, I will always recall as a key official at the Washington, W. Va., plant of the Marbon Chemical Division of Borg-Warner Corp.

WHAT ABOUT COST COMPARISONS?

Aside from the cost comparisons of construction materials at the present time, long-term trends are much more significant. The cost disadvantage of all types of metal pipe versus ABS is bound to widen, because of the high labor cost in manufacture and the increasing scarcity and higher cost of raw material. All products which are inherently high in direct labor content are at an increasing economic disadvantage as wage scales continue to rise. This difference between steel, iron, or copper as opposed to ABS is dramatic.

The copper, iron, and steel industries are becoming increasingly dependent on ores from foreign sources. This tends to increase cost as well as instability of supply. By contrast, the petrochemical plants producing the acrylonitrile, butadiene, and styrene ingredients for ABS are almost literally placed over the oil and natural gas fields in the United States which are the source of these hydrocarbons.

The disparity in labor costs begins with the mineral deposit in the earth. The extraction, smelting ore reduction, and rail transportation of metal raw materials all require a high proportion of direct labor. By contrast, oil and natural gas are produced from wells and delivered to processing plants by pipeline. The chemical industry ranks among the lowest in labor content of all types of manufacturing.

METAL PIPE FABRICATION COSTLY

Fabrication into pipe also offers a striking contrast. Factory labor is typically over one-third the value of finished product in a cast-iron soil-pipe foundry. It is less than 10 percent in a well-managed ABS pipe extrusion plant. The light, tough ABS plastic then offers further savings in transportation, handling, and installation. The weight is a fraction of metal pipe, the chemically welded connections are faster, and mechanical damage is reduced because of the inherent toughness of ABS.

A concept of the ABS Council is that ABS helps to improve the productivity of labor on the job site, thereby helping to support the high and rapidly increasing standard of living of the journeyman plumber. The only alternative to increasing the productivity of onsite construction labor is prefabrication of materials at the factory. The chemically welded ABS joints required a skilled mechanic.

Aside from the economic aspects, Mr. Speaker, ABS owes much of its success to the performance advantages of greater permanence due to superior chemical resistance, toughness, and the chemical weld which is the strongest part of the pipe.

ULTIMATE RESOLUTION OF ISSUE

The obvious answer to the materials battle being fought for economic reasons is the complete diversification of the cast iron and copper industries into ABS pipe. This development is already well under way. Today, every major copper or cast iron pipe company is either in the plastic pipe business, distributing the product or studying the move. When this diversification is complete, the campaign of disparagement of ABS should be behind us.

The roster of cast iron companies now producing plastic drain waste and vent—DWV—includes industry leaders such as U.S. Pipe & Foundry, James B. Clow & Sons, Glamorgan Pipe & Foundry, American Brass & Iron Foundry, and Charlotte Pipe & Foundry.

The copper pipe and fitting industry is now represented in plastic DWV by Triangle Conduit & Cable, Nibco, and Mueller Brass.

It is also significant that in Canada the leading copper producer, Moranda Minco, as well as the largest cast iron pipe foundry, Canada Iron, are both well into the ABS DWV business.

No doubt these progressive and far-sighted metal pipe manufacturers will soon be joined by others.

material in fire are quantity, density, location, ventilation and the particular combination of materials.

Many plastics are more difficult to ignite than wood. Rigid PVC (polyvinyl chloride), for example, will not burn until fire temperatures reach over 700 degrees Fahrenheit. Also, PVC will not continue to burn unless supported by a direct flame. Likewise, neoprene and certain modified polyurethanes used for cushioning in public transportation resist both smoldering and flaming ignition.

Q Are there unique combustion products from plastics which are more of a hazard than the combustion products of natural materials?

A No. Science has yet to develop firm, unequivocal correlations between combustibility factors and toxic effects in evaluating overall fire hazards of materials. There is no evidence that smoke emitted by burning plastics presents any more of a hazard than smoke from wood, wool, leather or other natural materials. Smoke, from any fire source, can be toxic. This has been confirmed by studies conducted at Johns Hopkins University, Columbia University, Harvard University, Southwest Research Institute, and other independent research establishments.

Q Do plastics burn hotter and faster than natural materials, such as wood?

A Combustion rates of materials are related to both their form and composition. For example, a solid oak log will burn more slowly than oak shavings. Similarly, some foam plastics will burn much faster than a piece of solid plastics material. There are whole families of plastics that will not support combustion by themselves — that is, they must be subjected to a continuing flame source to sustain combustibility.

Q Are small scale combustion-toxicity tests adequate for setting fire safety standards for materials?

A The most current scientific evidence indicates that laboratory toxicity tests should not be used, by themselves, in developing pass-fail criteria for evaluating materials. Such small scale tests do not correlate the large number of variable factors involved in real fire situations. It is not possible to judge the safety merits of a material simply by identifying the toxicants generated when burned. The "toxic threat" in fires is determined by all of the materials burning, in terms of their resistance to ignition and flame spread, their total volume and several other important factors that must be considered.

Q Should combustion-toxicity criteria be included in major building codes?

A No, not at this time. Toxicity measures were removed from building code requirements in 1976 because there was no consistent and scientifically accurate test method to determine reliably whether one material presents a greater toxic hazard than another in fire. This situation has not changed.

Q Are there model building codes which effectively address fire safety?

A Yes. The most serious problem involving fire safety and building codes is not their adequacy, but rather the inconsistency of enforcement and adoption of code revisions. Plastics face some of the most rigorous standards of any materials covered in the nation's building codes.

Q What is the plastics industry doing about fire safety?

A The Society of the Plastics Industry and its member companies have supported actively the nation's goal to reduce deaths and property losses due to fire. The industry has cooperated in this crusade with many Federal agencies, as well as state and local code groups, legislative bodies, standard-setting organizations, members of the fire service community and academia.

The result has been a broad industry-supported fire safety program which includes:

- scientific analysis of hazards posed by various elements of the fire problem
- collection and analysis of fire incident data
- research into the combustibility characteristics of materials
- promotion of stricter enforcement of building codes
- improved education and training materials for fire service personnel
- promotion of a comprehensive systems approach featuring devices for fire detection, suppression and safe escape

For further information, contact:

The Society of the Plastics Industry, Inc.
355 Lexington Avenue, New York, N.Y. 10017

PLASTICS
The Facts about FIRE

THE FACTS ARE THESE:

- Both natural and man-made materials give off toxic combustion products when burned.
- The primary causes of fire fatalities today are smoke and carbon monoxide, the same as before the age of plastics.
- As yet, no test has been developed to "rate" adequately the toxicity of various combustion products in real fires.
- Fire safety depends primarily on fire prevention coupled with reliable detection, suppression and evacuation systems.

THE FACTS SHOW:

The U.S. fire death rate has decreased substantially over the last forty years while the use of plastics has increased dramatically.

gases. They always have been. Probably they always will be. The question today is whether the smoke and gases produced by burning man-made materials are any more hazardous than the smoke and gases produced by burning *natural* materials in the pre-plastics era.

Since before the age of man-made materials, carbon monoxide has been, and still is, identified as the dominant toxic gas.

There are those who claim that the introduction of man-made materials into our living environment exposes us to exotic gases from accidental fires, somehow placing us at greater risk.

Such a notion is without scientific foundation, contradicting the basic fact that the fire death rate is falling in the United States, and has been for years.

Fire and the hazards it presents make for a complex problem. Ease and type of ignition, the rate of fire growth, and amounts and types of smoke and gases generated, all must be considered.

In laboratory-scale testing, fire conditions can be controlled and certain phenomena can be observed and measured. But real fires are extremely complicated, each different from every other. Reliance upon small-scale toxicity tests that cannot be related to real fires will not lead to increased fire safety.

As the Federal Trade Commission pointed out in the early 1970's — and many other government and private agencies have verified behavior of materials or assemblies in real fire situations can be misleading.

Extensive laboratory research has been done on the nature of smoke and gases from burning materials. In addition, there have been a number of scientific examinations of smoke and gases produced in actual fires, as well as post-mortem studies of fire victims.

All of the studies have reinforced the position that carbon monoxide is the primary toxic gas.

Plastics and other man-made materials burn. They produce smoke and gases. And the smoke and gases from burning plastics will kill a person who inhales too much.

Exactly the same statements can be made about burning natural materials such as wood, paper, wool or leather.

Plastics are involved in more fires today than years ago simply because there are more plastics in the environment — construction, packaging, furnishings, transportation, apparel and so on.

If burning plastics were giving off unusually hazardous smoke and gases, the fire death rate would be expected to be rising, not falling.

Fire safety demands concentration on proven measures to reduce fire losses: smoke alarms and other detection devices, sprinklers and similar suppression systems, code enforcement, and a populace educated about fire hazards and evacuation procedures.

Q What is the cause of most fire deaths?

A The Fire Protection Handbook states that fire fatalities from inhalation of fire gases and hot air are far more common than are fire deaths from all other causes combined. Extensive investigations have shown carbon monoxide to be the primary toxicant.

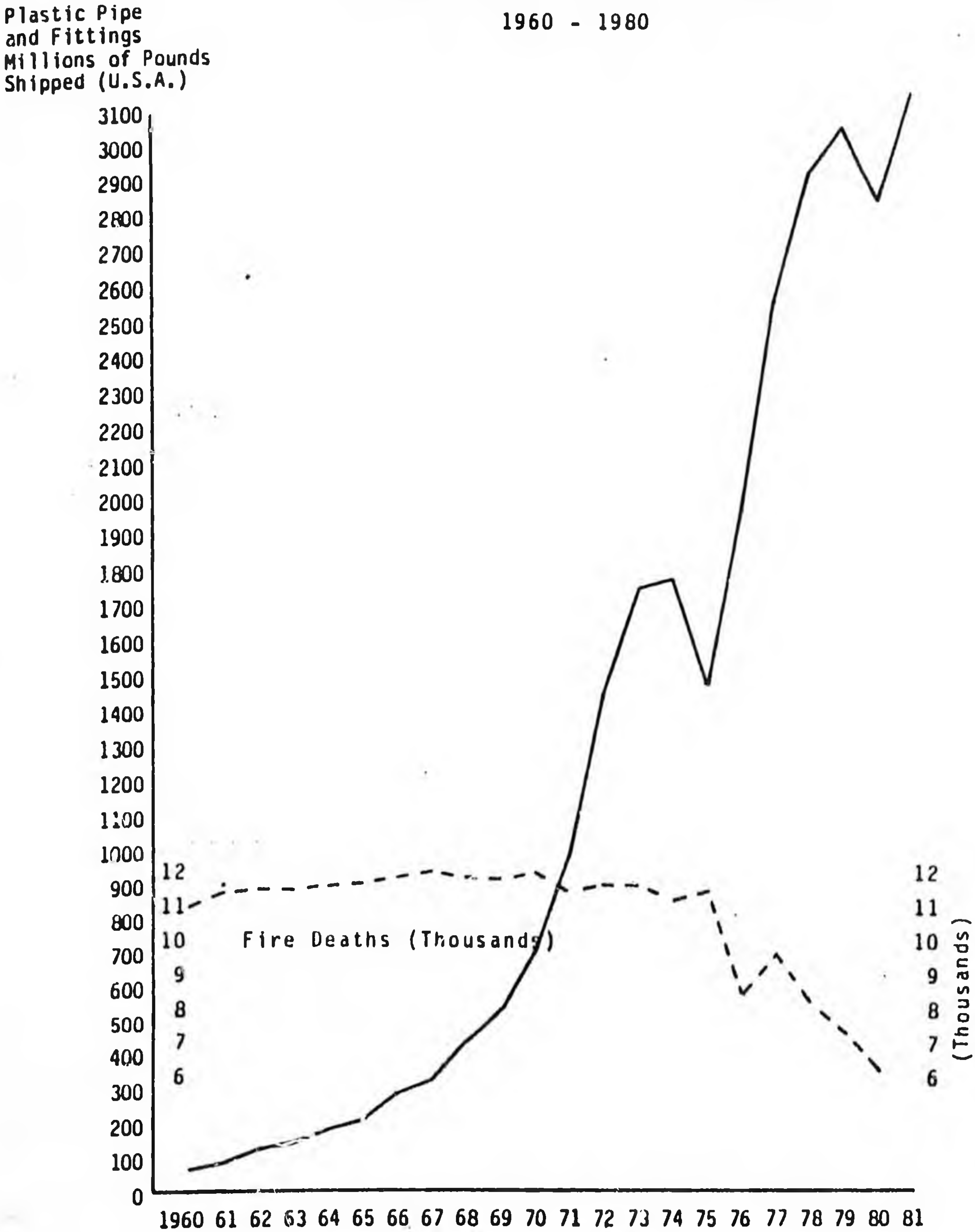
Q Is the fire death problem related to the growing use of man-made materials such as plastics?

A No. Despite the sharp increase in the use of man-made materials in homes and public buildings, the number of fire deaths in the United States is declining. For example, the use of plastics in building construction has increased by more than 900 percent since the mid-1950's. During the same period the fire death rate actually decreased by more than 40 percent. Also, according to National Fire Protection Association statistics, between 1977 and 1981, the number of U.S. fire deaths occurring in residential and non-residential buildings dropped from 6655 to 5860.

Q Do man-made materials such as plastics pose a greater hazard than natural materials?

A No. All organic materials — wood, wool, cotton, paper, and plastics — react differently in real fires. Among the factors that can affect the behavior of a

FIRE DEATHS DECREASE
AS USE OF
PLASTICS PIPE & FITTINGS INCREASE
1960 - 1980



*In 1976, the methodology of reporting fire deaths changed.
**From 1974 onward, includes plumbing pipe only, not fittings.
SOURCES: National Fire Protection Assoc., and Plastic Pipe & Fittings Assoc.

PLASTIC INDUSTRY

FIRE EXPERIENCE

OVERVIEW

1. THERE HAS BEEN NO SURGE IN FIRE CAUSED DEATHS FROM COMMERCIALIZATION OF PLASTICS FROM 1940 TO THE PRESENT TIME.

2. IN FACT, THE TOTAL NUMBER OF FIRE DEATHS HAS REMAINED QUITE STEADY FROM THE 1930'S TO THE PRESENT TIME. N.F.P.A. HAS RECENTLY RE-EVALUATED AND LOWERED THEIR ESTIMATE OF ANNUAL U.S. FIRE DEATHS.

3. THIS HAS OCCURRED IN SPITE OF THE MORE THAN DOUBLING OF THE POPULATION OF THE U.S. SINCE 1940. DEATHS PER CAPITA HAVE DROPPED.

4. HOLDING STEADY - FIRE DEATHS - IS NOT ALL GOOD BUT CAN BE GREATLY ATTRIBUTED TO THE GAIN IN EFFICIENCY AND SOPHISTICATION IN THE FIRE SERVICES.

5. NEVERTHELESS, STATEMENTS ARE BEING MADE ABOUT THE DIRE CONSEQUENCES RESULTING FROM PLASTICS USE, AND CPVC, PVC AND POLYBUTYLENE IN PARTICULAR, IN ONE BUILDING CONSTRUCTION USE -- IN PLUMBING. THIS DOES NOT MAKE SENSE.

6. IT DOES CERTAINLY SEEM POSSIBLE THAT THE PROLIFERATION OF POLYMERS IN BUILDINGS, HARD TO IGNITE CPVC AND PVC PRODUCTS IN PARTICULAR, HAVE HELPED RATHER THAN HINDERED ON THE FIRE SCENE.

C^2 - 4/3/78

SOUTHERN BUILDING CODE CONGRESS INTERNATIONAL, INC.

900 MONTCLAIR ROAD • BIRMINGHAM, ALABAMA 35213 • (205) 591-1853

"THE STANDARD CODES"

April 14, 1980

APR 17 '80

Mr. Jack Lancaster
Plastic Pipe and Fittings Association
490 Pennsylvania Avenue
Glen Ellyn, Illinois 60137

Dear Jack:

Reference is made to your letter dated March 28, 1980 regarding the acceptance of plastic piping materials in the Standard Plumbing Code.

The 1979 edition of the Standard Plumbing Code approves the use of the following plastic piping materials:

1. SCH 40 ABS-PVC DWV - above and below ground use, with no height limitations
2. ABS sewer pipe
3. PSP-PVG sewer pipe
4. PSM-PVG sewer pipe
5. PVC - thin wall sewer pipe (outside use only)
6. ABS & PVC pressure pipe
7. Polybutylene pressure pipe & tubing (hot & cold water)
8. Polyethylene pressure pipe & tubing
9. CPVC pressure pipe (hot & cold water)

When installed properly these materials perform their intended functions and we have no record of complaints or reported failures of these materials.

If we can be of further assistance, let us hear from you.

Yours very truly,

William G. Vasvary
Executive Director

WGV/jp

PLEASE NOTE: THE PRECEDING PAGES WERE TREATED AS A UNIT IN THE ORIGINAL DOCUMENT.

Mr. Levi Goes to Juneau

with Steve Levi, Legislative Aide

Last week — and this week, for that mater — there is the annual mad scramble for capital projects.

After protracted negotiations between the Alaska House and Senate — with an eye on estimated revenue figures — legislative leaders came out with a target amount and then allocated the money toward specific capital projects.

The general consensus at this point is to quite literally give the governor enough rope to hang himself.

Assuming the capital project bills are passed fairly quickly, which virtually is guaranteed, the governor will be faced with the dilemma of either signing the bills intact or risking the wrath of both the House and the Senate by vetoing negotiated projects.

It's interesting to note that many of the projects were the top priority projects vetoed out of last year's capital bill.

In other words, in an attempt to sooth relations with the governor, the House and Senate are not attempting to override the governor's veto of last year's capital projects, but are taking the more moderate road.

But if the governor again plays havoc with the appropriations, Juneau will heat up quickly and considerably.

For the business community, last week also brought to the fore another chapter in the episode known as the "plastics debate." Focus of this debate is House Bill 508.

The underlying question was whether Alaska should adjust its plumbing codes from 1979 to 1982 standards. For many it appeared to be a simple, quick bill. But that was until the day of the hearing.

The first witness before the House Labor and Commerce Committee noted that while no one was particularly opposed to the overall bill, there was grave concern over the use of plastic pipe.

It was noted that plastic can be burned, which would release toxic fumes and, if not properly installed, spread a fire from one apartment to another. Therefore, builders should not be allowed too much latitude in the use of plastic pipes in buildings.

The industry witness, however, said that while plastic can catch fire, Douglas fir burns at 300 degrees below plastic pipe.

Further ...

locates an underground plastic pipe and the effects of glue holding pipes together on humans who come in constant contact with it — the use of plastic for piping is spreading.

But as Dwight Perkins of the United Association of Plumbers & Pipefitters Local Union 262 said, "We feel plastic pipes are a hazard to the health of our workers as well as the people who are in constant contact with the glue used (with plastic) pipes, and we expect to testify against the bill in the future."

Another matter of concern last week was the upcoming Alaska Power Authority hearing on Anchorage concerning the "four-dam pool" in Southeast Alaska.

Basically, the power authority is counting on the cooperation of Petersburg, Wrangell, Ketchikan, Kodiak and Glennallen in resolving what would be the fatal flaw in hydroelectric financing in Alaska.

The problem is that the cost of hydroelectric power without a state subsidy might be higher than the same power generated by fossil fuels.

There are three problems:

First, there is the "Susitna Blackmail Clause," also known as the "Susitna Equity Clause," which states if the proposed Susitna Dam Project is not under construction by 1985, a great number of power authority grants immediately convert to loans.

The financial burden of this metamorphosis might put Alaska Power Authority out of business.

Second, the communities of Southeast Alaska, when faced with taking electricity from Tyee Hydroelectric Project, for instance, at a much higher rate than the established utilities, are concerned that once on the system, electric costs could escalate repeatedly.

Third, the long-range picture is that if the four-dam hydroelectric project is found to be uneconomical, it will mean that all future projects, and specifically the Susitna Project, may come under increasing fire.

Bonding could suffer. from the legislature's po view, this might mean the would be the final fiscal

CITY AND BOROUGH OF SITKA DECEMBER 2, 1971

City and Borough of Sitka

304 LAKE STREET. SITKA, ALASKA. 99835

May 9, 1984

TO: MEMBERS OF THE
SENATE LABOR & COMMERCE COMMITTEE
HONORABLE SENATOR DICK ELIASON, CHAIRMAN

FROM: CITY AND BOROUGH OF SITKA
HARRY CHARTIER
BUILDING OFFICIAL

Honorable Senators,

As the attached information indicates, the City and Borough of Sitka has, for some time, been interested in the development, adoption and enforcement of building codes.

A particular area of interest and research in recent months has been the Uniform Plumbing Code.

As a result of that research and interest, two primary areas of concern have developed;

1. In the interest of maintaining state-of-the-art building codes, municipalities often adopt uniform codes before those codes can be adopted at the state level.

   The Administrative Sections of these codes provide for a Board of Appeals to review materials and methods of installation of materials that have been nationally reviewed, tested, and approved for use during the years since the currently adopted codes were written.

   The State of Alaska has excluded this appeals process, from the code it has adopted, leaving municipalities with no formal interface with the State to provide for state-of-the-art materials and so on.

   Municipalities need either to be recognized by the state as administrative authorities or the state needs to retain that section of the Uniform Plumbing Code that provides for an appeals process.

2. From our research and piping experience, the City and Borough of Sitka feels that the debate over the use of ABS/PVC piping materials is a mute point.

   Arguments against the use of these materials appear to be based on parameters other than research and sound engineering judgement.

   Please refer to enclosures.

   The City and Borough of Sitka supports the adoption of the 1982 edition of the Uniform Building Code as written.

Thank you for your time and for your considerations.

Sincerely,

Harry Chartier
Building Official

HC:cj

September 13, 1983

A working paper:

STRINGENCY REVIEW OF ACRYLONITRILE-BUTADIENE-STYRENE (ABS) AND POLYVINYL CHLORIDE (PVC) DRAIN, WASTE, AND VENT (DWV) PIPING AND FITTINGS

Any review comparing ABS/PVC piping used in construction projects with cast iron (CI) or ductile iron (DI) piping must begin with fire safety. The first section of this working paper then, will review published reports addressing ABS/PVC DWV system performances under standard fire exposure tests.

A second area that must be examined is a piping material's ability to move fluids. Roughness coefficients, corrosin resistance, and other parameters will be compared.

Fire Exposure Performances Examined:

Extensive examinations of ABS/PVC DWV plumbing trees have been made of bearing and non-bearing, one and two hour rated fire wall assemblies, and in two hour rated floor/ceiling assemblies. These examinations have been made by both the College of Engineering of Ohio State University at Columbus' Engineer Experiment Station, and by the firm Rolf Jensen and Associates, Inc., fire protection engineers and building code consultants of Deerfield, Illinois. Over the years other testing organizations and consultants have examined fire performances of plastic pipe.

Details of the construction techniques used, material specifications, and testing parameters incorporated in the fire exposure procedures can be gleaned from the body of the published reports (see appendix) and will not be covered in depth in this paper. The reports will however, be quoted.

Ohio State University's fire exposure test program had two (2) primary objectives as outlined in the "purpose" section of their test publication:

1. "...the central issue is whether ABS or PVC DWV, when properly installed, will transmit fire through walls or floors, thereby reducing or otherwise affecting the fire endurance of such walls or floors. This, then, became the primary objective of the OSU Fire Test Program."

2. "A secondary objective was to learn what constitutes proper installation techniques for combustible piping in fire-rated

construction. Over the years, various methods have been proposed including the use of metal sleeves or thimbles through the walls as well as the exclusive use of metal "P" traps as opposed to plastic traps. The OSU tests have laid to rest certain long-standing myths."

ASTM E-119; the standard for fire tests of building construction and materials (also known as UL 263 and NFPA 251), was the standard fire exposure condition used at O.S.U.

The aim of fire exposure testing is to secure constructions that are safe and not a menace to neighboring structures, or to the public. To do this fire resistive properties of building assemblies are measured and specified according to common standards that are expressed in hours or minutes of fire resistance.

The wall sections and plumbing trees tested all performed well. The OSU fire exposure resulted in fire-resistive rating of up to two (2) hours on bearing and non-bearing walls incorporating ABS/PVC pipe materials exposed to temperatures reaching 1700°F.

Conclusions of the OSU program follow:

1. The performance of all wall assemblies in the fire endurance and hose stream tests was, in all features, identical to that of the same wall assemblies without the ABS/PVC DWV plumbing systems incorporated.

2. These tests demonstrated that plastic piping, within walls, is not involved in the early stages of a fire.

3. Fire consumption of the plastic piping, within the wall is very low.

4. Passage of flame through vertical and horizontal penetrations is minimized with plastic piping. Heat softened plastics tend to close openings thus reducing heat and flame transmission and flue effects through such penetrations.

5. Plastics traps proved to be equal to, if not better than, the metalic tubing traps. In these tests, while both were used successfully, less heat transmission was observed with the plastic traps.

6. Sealing openings around penetrations with non-combustible sealants is essential. These tests indicated that without sealing, no piping material could be expected to pass the tests.

7. Properly installed plastics plumbing systems will not conduct flame through a fire rated floor of the types tested.

8. Plastic fixtures act as their own flame barriers.

The results at OSU were consistant with the other building assembly fire test results reviewed, all incorporated the industry standard test procedure, ASTM-E 119. None of the tests reviewed contained any failures of plastic plumbing assembly due to fire exposure.

The summary of plastic materials performance written by H. F. Van Der Voort for the National Fire Protection Association best addresses the relevant points to consider when evaluating the proposed use of plastic plumbing assemblies. His remarks are quoted below:

1. "There are no documented cases of plastic conduit, insulated wire, or piping contributing unusual life hazards to a fire problem."

2. "These materials will produce combustion products that are different from, but no more toxic than those from other organic materials allowed in construction."

3. "Since the relative amount of plastic conduit, insulated wire, and piping used in construction is less than one percent of the total fuel load, it presents a minimal fire problem".

4. "Plastic's unique combination of flame resistance, corrosion resistance, and insulative properties makes it an excellent material for cond-it, wiring, and piping."

5. "Proposal to limit the use of plastic conduit, insulated wire, and piping on the basis of danger to life and property are unwarranted. Normal fire protection and fire-fighting techniques will be effective where these products are exposed to fire."

Fluid Transmission Characteristics:

Given piping of equal diameters, installed at the same slopes, the pipe with the smoothest wetted perimeter will move the most fluid in a given period of time. The texture of a pipes interior surface is rated by its roughness coefficient. The smaller the coefficient the smoother the pipe. Hence, the smaller the number, the more fluid transport occurs.

Cast iron/ductile iron pipe has an established roughness coefficient (n=) of 0.013 (good condition). Plastic pipe condition does not deteriorate under normal applications and has roughness coefficient of 0.0090.

When comparing hydraulic flow characteristics of cast iron pipe with those of plastic pipe having congruent diametrics laid to a typical slope; (S=0.004'/ft) it can be seen from a Mannings Nomograph that plastic pipe fluid velocity is approximately 26% greater than the more commonly seen cast iron fluid velocity.

It is clear that hydraulically, plastic pipe is superior in performance to the less smooth piping materials typically used in commercial installations.

ABS and PVC plastic pipes' ability to resist both chemical and electrical corrosion is well accepted in the engineering/construction industries.

Plastic pipe resists corrosion when flooded with a wide range of chemicals commonly found in the typical industrial/commercial installation. Ductile iron and cast iron piping does not resist corrosion as well as the plastics.

Some of these common chemicals include:

- Hydrogen sulfide, gas and condensates
- Methane gas
- Sulphuric acid, gasses, and condensates
- Carbon dioxide gas and related compounds
- Ammonias, gas, condensates, and related compounds
- Deturgents
- Non-combustible cleaning solvents

After a ten (10) year history of uncovering existing pipe assemblies, without a single exception coming to mind, all cathodic corrosion I have located would be found in unprotected (and occasionally protected) metalic piping materials; never in unprotected plastics.

Modulus of plasticity (Mp.), a materials tendency to sag in the middle when supported at each end, is a performance characteristic that must be viewed.

A ten (10) foot, 1 inch diameter willow will deflect more at it's center span than would a ten (10) foot, 1 inch diameter piece of reinforcing steel.

Plastic pipe sags more than a comparable section of cast iron pipe.

The 1982 Uniform Building Code clearly outlines allowable vertical and horizontal piping run spans, and specifies bracing locations.

Plastic pipe, when installed properly, produces sag no more evident than sags in properly installed metalic pipe.

Under normal design formats, the design life statistics of plastic piping materials compare very favorably with the design life statistics of metalic pipe materials.

<u>To Summarize</u>:

In this writer's opinion, the word stringent is not an engineering term but a legal term. Equivalent wording often found in specifications are "equal" or "approved equal". The word equal is used to address design and/or performance standards.

From reviewing both technical publications and personal experience with a wide range of commercial pipe installation, it is clear to this writer that plastic pipe materials are not less equal than metalic pipe. Plastic piping actually far out performs the commonly used metalic conduit in the types of uses proposed.

Given the results of massive data produced during the nationally recognized fire exposure test programs of plastic pipe; given the superior fluid transmission qualities of plastic pipe; given the excellent corrosion resistance of plastic pipe; given the usually encountered plastic pipe construction techniques; and given compatable design life of plastic pipe; this building official would be in error if he prevented the commerical installation of plastic pipe where allowed in the 1982 Uniform Plumbing Code.

It is this writer's opinion that the type of information included in this paper was the type of data used by the 1982 Uniform Plumbing Code Review Committee in approving the use of plastic pipe DWV systems in commerical construction.

Harry Chartier
Building Official

A Working Paper:

STRINGANCY REVIEW OF ABS AND PVC DRAIN, WASTE, AND VENT PIPING AND FITTINGS

The following is a list of the publications used in the preparation of this paper:

MC GUIRE, J.H., SFPF; "Penetration of Fire Partitions by Plastic DWV Pipe".

VAN DER VOORT, H.F.; "Characteristics of Polyvinyl Chloride Conduit, Insulated Wire, and Piping in Fire Situations".

DUPONT Co, The; "Fire Research Into Plastics".

NATIONAL BUREAU OF STANDARDS; "Fire Spread Potential of ABS Plastic Plumbing".

JENSEN, Rolf and Associates; "Fire Testing Plastics DWV Systems".

"Building Research Laboratory Report No. 5473"

WILEY; "Design for Civil Engineers"

City and Borough of Sitka

P.O. BOX 79 · SITKA, ALASKA · 99835

September 20, 1983

CERTIFIED 214709
Return Receipt Requested

Jim Robinson, Commissioner
State of Alaska
Department of Labor
Pouch 1149
Juneau, AK 99802

SUBJECT: APPEAL TO THE STATE OF ALASKA ALLOWING THE USE OF ABS DRAIN, WASTE, & VENT PIPING IN COMMERCIAL CONSTRUCTION AS PERMITTED IN THE 1982 EDITION OF THE UNIFORM PLUMBING CODE IN SITKA, ALASKA

Dear Commissioner Robinson:

As you may know the State of Alaska is currently using the 1979 edition of the Uniform Plumbing Code (U.P.C.). Some Municipalities, including the City and Borough of Sitka, have adopted the more current 1982 edition of the Uniform Plumbing Code.

The use of ABS drain, waste, and vent (D.W.V.) piping material is not specifically listed as an approved material in the 1979 U.P.C., ABS DWV piping is, however, listed as an approved material in the 1982 U.P.C.

Two problems arise from this conflict in materials listings:

1. Builders are potentially placed in "double jeopardy" in being forced to meet the requirements of conflicting or different codes.

2. Prevention of local municipalities from adopting and enforcing the most current editions of nationally recognized building codes.

The Municipality of Sitka has, and is attempting to resolve these two problems in a number of ways.

In order to give you a clarified history of this issue, I would like to review our steps at addressing this problems.

In mid-June of this year, Department of Labor inspector, Mr. Alan Anaka, informed this building official that the City and Borough could not enforce the 1982 edition of the U.P.C.'s approved materials listing since the updated materials listings were less stringent than those listings in the 1979 U.P.C.

During this mid-June discussion with Mr. Anaka, the Municipality took the following positions:

1. Sitka has the right under state law, and as a recognized administrative authority under the U.P.C., to enforce the nationally recognized building codes it has adopted, and;

2. That Section 201(f), minimum standards, allowed the use of the DWV piping materials not specifically listed in the 1979 U.P.C., if approved by an administrative authority.

In a June 6th letter to Mr. Anaka's supervisor in Anchorage, Mr. Don Cather, the Municipality took these same positions.

To this date, neither Mr. Anaka nor Mr. Cather have addressed Sitkas' statutory authority, and both have failed to recognize our administrative authority to allow the use of ABS DWV materials as an accepted alternative material under the provisions of Section 201 of the 1979 U.P.C.

In a telephone conversation with Mr. Cather in late August, he indicated the next step is an appeals request with you, thereby prompting this letter of appeal.

While Sitka believes it has every legal right to approve the use of this pipe, and that an "appeal" is a misnomer, I feel that something should be done to get the ball moving.

As matters stand now, the Department of Labor is illegally preempting plumbing code enforcement and is performing duplicate inspections in Sitka contrary to A.S. 18.60.735.

Local citizens are faced with the threat of State sanctions for following the local code (1982 U.P.C.) which is as "stringent" as the 1979 version and the State is illegally ignoring Sitka's status as an administrative agency under the 1979 U.P.C. with full power to approve such pipe.

Wishing to bring this issue to the fore, the City and Borough of Sitka is formally requesting that the use of ABS drain, waste, and vent piping materials by reviewed and approved for use in Sitka following the guidelines of the 1982 U.P.C. under Section 20.14 and 201 of the 1979 U.P.C.

Enclosed is a paper addressing the "stringency" of ABS piping for your use and the use of the members of the Board of Appeals.

The Municipality of Sitka would, of course, appreciate being kept current on the status of this issue. Please keep us advised of the date of the Board of Appeals.

If you have any questions or if we can be of any help in this matter, feel free to contact my office.

Sincerely,

Harry A. Chartier
Building Official

HAC:glb

Enclosure: Stringency Review of ABS DWV Piping & Fittings

cc: P. Hallgren, Municipality Attorney
F. Gutierrez, Administrator

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)
TOTAL:	97.5 - 97.65 million

Problems with plastic pipe - Source Unknown

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 RANCH WATER DISTRICT, CALIFORNIA

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.

TOTAL ESTIMATED COSTS FOR FAILURES FROM THE ABOVE JURISDICTIONS:

97.5 - 97.65 million dollars

1/11/83.