This comment is not academic. What the EIR apparently fails to recognize is that residences plumbed with CPVC will be fitted with fixtures made of brass. By lumping lead from brass with the invented lead from solder, EIR significantly miss-states a public health problem.

C. Permeation

Another area where the EIR gives short shrift to the potential public health impacts is in the area of permeation. The EIR assumes that CPVC pipe is sufficiently dense that permeation of organic materials from the outside of the pipe to the inside the pipe will be insignificant. The assumption of reduced diffusion seems reasonable based on a consideration of the increased chlorine content resulting from post-chlorination of PVC resin. However the concern for permeation continues to increase as the extent of contaminated groundwater becomes more widely known. The concern extends to new threats such as MBTE oxygenate a used in gasoline. It is significant to note of that the public water supply conveyors consider contaminated ground to be a counter indication for use of PVC pipe. Refer to the discussion in Section 2 of these comments. Note that the PVC pipe used for water supply is much thicker wall than the small diameter CPVC pipe proposed for residential use and would be far more resistant to permeation..

As was pointed out in comments on the inadequate project description, the project under consideration will lead to installation of CPVC in soil from the meter to the structure and under the slab in common residential construction. EIR should include specific test data on CPVC that will reflect the potential for permeation and as important, the potential for shortened pipe system lifetime due to exposure of the plastic pipe to potentially aggressive organic compounds.

D. Fire

The EIR treatment of fire and fire safety belies a lack of research. The treatment offered is nothing more than speculation as to the actual dangers attendant to residential structure fires.

Toxic Smoke

The major cause of death in residential structure fires is due to the incapacitation of occupants which prevents their escape before the fire has reached them. Smoke, with its toxic gas constituents, travels from room to room, within walls, and through ventilating systems reaching victims far before the direct heat of the fire. Carbon monoxide, hydrogen cyanide, hydrogen chloride, and phosgene all contribute to rapid incapacitation of fire victims.

The EIR discusses the generation of toxic gases during combustion of CPVC, but omits any mention of phosgene. Chemically, phosgene is carbon monoxide with two chlorine atoms attached. It is more toxic than carbon monoxide and was used in World War I as a poison gas. The EIR correctly notes the absence of nitrogen in the CPVC formulation, hence predicting the absence of cyanide, but incorrectly concludes that only carbon monoxide is a toxic concern for smoke.

Some 20 years ago the issue of phosgene as a component of toxic smoke from PVC fires was investigated. Articles such as, Dyer, R. F., and V. H. Esch, 1976, Journal of the American Medical Association, Vol. 235, No. 4, pages 393-397, "Polyvinyl Chloride Toxicity In Fires.

Hydrogen Chloride Toxicity In Fire Fighters" found that " However a wide variety of other toxic gases such as phosgene (75445), benzene (71432), toluene (108883), xylene (1330207), naphthalene (91203), and vinyl-chloride (75014) are present." But concluded that " The toxic effects of these gases are small when compared to the toxicity of hydrogen-chloride. The synergistic effects of these gases is unknown. Similarly, Bjerre a 1984, "Health Hazard Assessment of Phosgene Formation in Gases of Combustion of Poly Vinyl Chloride Using a Simplified Method of Mathematical Modeling", Annals of Occupational Hygiene 28 (1). 1984. 49-60. Found that, "Under extreme conditions with respect to composition, temperature and cooling rate of the combustion gases, dangerous concentrations of phosgene may have been reached within a fraction of a minute." , but also concluded that the rate of phosgene formation for PVC combustion was slow without catalysis.

It is surprising that the issue has not been revisited for CPVC. In PVC there is essentially at least one hydrogen for every carbon and for every chlorine so that the thermodynamically favored reaction of chlorine with hydrogen with the formation of hydrogen chloride is going to dominate the less favored reaction of chlorine with carbon. In pipe-grade CPVC, the chlorine content is much greater and the ratio of hydrogen to chlorine is far less than the stoichiometric one-to-one of PVC. The EIR recognizes this, " This is due to the chemistry of CPVC, specifically the fact that the polymer contains such a high percentage of chlorine that there is little for atmospheric oxygen to react with in a fire." (P. 55) With oxygen from air, heat from neighboring burning material, and carbon from soot or char as a catalyst, phosgene formation may be more significant.

HCD should query industry as to whether it has conducted such tests of CPVC itself. Has HCD inspected laboratory tests or field studies of CPVC in a fire? Although CPVC is less flammable than PVC, CPVC may have an even greater potential for toxic smoke generation than PVC.

Fire Propagation

The statement of the fire safety problem in EIR.is clear, "It has been suggested that this could result in a faster rate of fire spread, if CPVC pipe passing through a wall were to melt or slump due to a fire on one side of the wall and leave an opening.(P. 53) Unfortunately EIR never gets around to answering the question. Does HCD have laboratory tests of CPVC potable water pipe performance in fire rated walls?

The draft EIR addresses fire propagation with speculation. The statement, "the metals used for potable water pipe are excellent conductors of heat and can contribute to the spread of fires through barriers." (P. 91) is unsubstantiated. The circumstances in which copper with water in it would be exposed to heat of sufficient intensity that it would breach a fire rated wall by conduction of heat along the pipe would probably have long ago caused a CPVC pipe to melt away from the wall and breach the fire ratings by allowing heat and flames to pass through. Does HCD have a comparison between CPVC and copper during a fire test? The reference cited to Parker addresses DWV not potable water. Because DWV is normally empty it will heat faster and the vertical vents would probably transfer heat differently than smaller diameter horizontal potable water pipe. This line of reasoning is another example of EIR's double standard of proof for metal and plastic.

7. Economic and Social Effects

The EIR refers to HCD's "goals of providing Californians with safe, affordable, and decent housing." (P. 71) These goals are laudable and widely shared, but the EIR appears to be using affordability of housing built with plastic pipe as a contributing motivation for approval of the project. The EIR claims the virtue of affordability and consumer choice for plastic pipe in construction but does not present quantitative, objective analysis to show to what extent this may be true.

Throughout the document, the authors make it clear that they favor the use of CPVC pipe, generally considering it preferable to copper. The promotional tone of the EIR reflects this favoritism and the document cumulates in a casual and almost colloquial statement of overriding considerations. The EIR states; " Even if new information comes to light in the future which might indicate some minor impacts of CPVC, it is now thought that the environmental, economic, and social advantages of approving CPVC would very likely override any newly discovered adverse attributes of CPVC." (P. 111)

What do the EIR preparers consider to be "minor impacts of CPVC"? Are potential leaching, air quality impacts from solvent use, worker health and safety impacts considered minor? The EIR should identify what "minor" verses "substantial" impacts are. The reader can surely see the difficulty HCD had with sifting through data and quantifying effect, but the implication of HCD performing some sort of balancing between "impacts" and "advantages" requires more quantification. In the socioeconomics section, HCD should show exactly how much or how little the proposed CPVC code change would benefit housing.

A. No Significant Difference in Cost

HCD's EIR perpetuates the myth that CPVC plastic pipe is a boon to affordable housing. The origin of this myth may be simply B.F. Goodrich marketing promotion, or it may be the common perception that anything plastic must be cheaper than anything metal. Considering the resources available to the Department of Housing and Community Development, it is surprising that the EIR does not contain real data on cost developed by HCD.

Instead, the EIR relies on a report comparing CPVC and copper (Kennedy and Jenks, 1995, HCD-251) to conclude that CPVC would have a lower installed cost than copper (DEIR, p. 105). Kennedy and Jenks does not provide the basis for its cost estimates and it appears that HCD has not attempted to obtain the actual bases for this analysis or to conduct its own independent review.

Does HCD's conclusion reflect the additional costs associated with the installation of CPVC pipe apparently not included in Kennedy and Jenks. According to Dickens (Appendix B of comments submitted by the California Pipe Trades Council on the 1989 plastic pipe EIR, Nov. 13, 1989, see Attachment F), there are additional costs associated with plastic pipe that must be factored into any economic analysis comparing copper and CPVC pipe:

Labor will be required to flush the plastic pipe system as recommended in the DEIR. However, the Kennedy and Jenks analysis does not take this cost into account in its economic analysis. If labor for only two trips to the project site for flushing is included, an additional cost per building of $192.00 will be added to the total cost of the plastic plumbing pipe system (Dickens, p. 6-7). This is a conservative estimate since labor costs have increased since this analysis was prepared in 1989.

The DEIR does not estimate the cost of the ventilation required when gluing CPVC pipes together. A survey of existing ventilation methods suggests that a system sufficient to satisfy the DEIR's recommendation would add as much as $100 to the cost of installing a plastic system. (Dickens, p. 9.)

In order to control fire in buildings plumbed with plastic systems, special fire-stopping mechanisms must be placed in fire walls where plastic pipe penetrates. Special inspections will be required while construction proceeds since the evidence of installation of such mechanisms will not be visible after construction is complete. These inspections will cost a minimum of $150 for each unit in a multi-story building (Dickens, p.9.). This amount also applies to single family units and probably has increased since 1989. This is also a conservative estimate of the increased cost for fire safety mitigation, since it does not include the cost of the fire-stopping systems themselves or the increase costs of the special installation methods required for such systems.

Currently, the costs of CPVC are not significantly lower than copper. Dickens presented an analysis comparing the material costs of the copper and CPVC (Attachment F, Dickens, Appendix A, p.15-16), which showed CPVC to be more expensive than copper at that time. The cost of CPVC resin has dropped; the cost of copper fluctuates with a world market and both CPVC and copper are going to be at a cost disadvantage to the definitely cheaper polybutylene (PB) or PEX pipe. This analysis was updated using 1997 costs of copper and CPVC (see Attachment G). The updated analysis shows that there is only a $57.00 material savings by using CPVC.

If the EIR is going to present a favorable discussion of CPVC over copper piping based on affordability, then it must present a table showing a cost comparison for installing the two different materials. The cost comparison must incorporate (and clearly specify) all proper installation procedures for each material from beginning to end (including inspections, fire blocking material, etc.).

True life-cycle cost will depend on the installed life of the plumbing system. In the EIR, the claimed estimated life span of CPVC is not based on any supportable data. The DEIR states that: "CPVC has an estimated service life of 75 years, although this is only an estimate since CPVC has only been in use for about half of that time." (DEIR, p.105). What is the source of this estimated service life? Is it just someone's assumption or is it based on field studies or laboratory simulated aging studies? Does any pipe manufacturer, such as B.F.Goodrich or the extruders using B.F.Goodrich resin, offer a 75-year warranty for the product? Does B.F.Goodrich publish information on the conditions that may shorten pipe life? Simply put, if there is no data to support the 75 year estimate, a more conservative figure should be used. The EIR must substantiate its 75-year life span projection.

B. Construction Cost Savings Do Not Mean Savings to the Consumer

Even if CPVC were significantly cheaper than copper, this would not produce "affordable" housing for California citizens. The EIR states that allowing CPVC will further the goal of providing affordable housing, but the EIR does not show how reducing the cost of plumbing materials and installation actually effects cost of a house when it is sold. According to Dickens:

> "When any amount of a good can be produced at a fixed cost that cost will determine the goods price. However, when the quantity of a good that can be produced is limited, the price will be determined by the demand for the good. The cost of producing it will be irrelevant to the selling price. It seems reasonable to assume that in many urban areas in California all land within normal commuting distance of the central city has been developed and the quantity of housing available to those who wish to work in the central city is essentially fixed. In such an environment the price of housing, even the price of a new house constructed on an old lot, will be unaffected by the cost of building the new housing. Rather, any reduction in construction costs will simply increase the value of land. Only in rural areas or in urban fringe areas (where housing costs are relatively low) is it likely that the cost of building new housing will affect the price of housing.
>
> The same should be true for rent. In fully developed urban areas (where rents are highest) rent is probably unaffected by the cost of constructing new rental housing and is determined only by the demand for housing. Again, savings on construction costs will only increase the value of land" (Dickens, p. 9-10).

If there are any cost savings with CPVC pipe, they will benefit the contractor or home builder and not the consumer. Indeed the consumer will have very little choice over what plumbing materials are installed in anything other than custom homes. Another myth is that putting plastic pipe in the marketplace will add to consumer choice. According to the DEIR: "Allowing consumers to choose pipe with the longest life span in their home's location is consistent with the general public policy goal of providing California families with safe, decent, and affordable housing (DEIR, p.106). This statement is totally misleading because consumers do not get the choice of what plumbing material is used when a house is newly constructed. The contractors/developers get the choice of what building materials to use. EIR text referring to housing affordability because of use of CPVC piping should be removed from the EIR.

C. Mechanical Failure and the Consumer

Arguably mechanical failure of potable water plumbing systems would lead to direct impacts on the physical environment, but we choose to discuss it under the heading of socioeconomics because it is a component related to consumer issues.

At several places in the EIR, great emphasis is placed on problems with copper corrosion where aggressive water is used for potable water. Replacement of copper by plastic is the sole approach contemplated by the EIR. The EIR should also include, however, a broader range of options to reduce copper corrosion. The relevance of this should be obvious because even with adoption of the proposed code change, there will be literally millions of homes with copper plumbing already throughout the state. Whatever legitimate consumer or environmental problems are associated with copper, they will not disappear with HCD's action.

For this reason the EIR needs to take a broader look at the issues of corrosion that it identified. Rather than simply pointing to copper corrosion as one of HCD's motivations for the project, the EIR should identify alternatives including water treatment and the costs associated with them. The EIR should address the potential community wide impact on funding for water treatment for newer homes being built with plastic versus older homes built with metal. HCD obviously views plastic pipe as a quick fix for aggressive water, but what about existing structures?

CPVC has been around for a long time as a plastic, but the aggressive development of CPVC piping for industrial and residential use began in the 1980s with B.F.Goodrich's establishment in the marketplace. The EIR authors seem to think that CPVC has an extensive track record, but present very little information on the actual extent of long-term installations. Citation of a few demonstration homes plumbed many years ago is hardly relevant. Citation of the "other 49 states" doesn't really show the basis for comparison of the extent of consumer testing of CPVC compared with far more broadly used metal. B.F.Goodrich should be a source of this information, but HCD will need to objectively review anything provided to be able to discern fact from marketing.

This information is relevant because the dramatically different extent of the installed base of copper and CPVC affects all of the statistics that HCD quotes in the EIR. Any listing of worker injuries is statistically meaningless without showing the extent of the population generating the statistic.

HCD needs to present information on failures of CPVC systems – either based on actual failures in the field or known limitations to CPVC. The EIR dwells at great length on copper corrosion (e.g. pp. 89 – 91), but never presents information about CPVC. B.F.Goodrich, HCD's primary source of information, could have provided an objective description of CPVC limitations, special installation requirements, and known problems in the field. HCD could have presented this information side-by-side in EIR, and the public at least would have seen that there is a significant potential for failure due to incompatible materials, incorrect installation, and exposure to high temperatures. B.F.Goodrich's installation guide for its product includes some of these known limitations (Attachment C).

CPVC's parent material PVC is not suited to hot water service because it loses strength at elevated temperatures. The process of post-chlorination of PVC to produce CPVC pipe progressively raises the softening temperature and brings the resin into the range of thermal performance suitable for hot water service in residential installations. The EIR should disclose that CPVC pipe is operating at the extreme high end of its rated temperature range and that this leaves no margin of safety for even momentary heat exposure such as from a malfunctioning water heater or from a homeowner attempting to thaw a frozen pipe. Some of the installation restrictions seek to limit the potential for damage, but these only underscore the fact that the hot water connection is the weak link in a CPVC system.

The EIR should note that CPVC will be subject to less reliability when installed in cold weather. Cold weather can affect the CPVC assembly because the solvent cements must be used in a narrow temperature range — well above freezing. The solvent cement manufacturers warn against cementing pipes below 40^0 F and there are low temperatures cements manufactured presumably with a different mix of solvents. If the joint is too cold it will not set properly, the joint may be mechanically deformed before it sets, and the solvent will eat deeper into the pipe and produce a weaker joint. If solvent cement freezes, the consistency will change and subsequent use may produce weak joints.

There is a long list of incompatible materials, materials whose chemical composition is capable of attacking CPVC resin and altering its mechanical performance either through softening or through swelling and subsequent stress cracking. The EIR should disclose that long term exposure of a CPVC plumbing system to potentially incompatible materials will result in failure. There is very little experience with a solvent welded thermoplastic piping system in a home that operates under pressure. The thermal resistance and mechanical strength of CPVC depend critically on its mass of incorporated chlorine and is sensitive to the effect of absorbing any foreign substance. Chemically, CPVC is resistant to aqueous acids or alkalies, but is highly susceptible to attack by organic solvents and oils. If exposed to these materials, the pipe system will weaken and fail. The joints are most susceptible because the connection is only formed by the mingled pipe surfaces softened by the solvent.

B.F.Goodrich acknowledges a short list of obviously incompatible materials (Attachment C), but there are undoubtedly more. Home construction relies on sealants, adhesives, surface coatings, insulating foams, plastic fixtures, etc. Substances not normally thought of as solvents will attack CPVC such as vinyl plasticizers used to make flexible PVC products. If in contact with CPVC piping, the PVC plasticizers could migrate into the CPVC and weaken the pipe. The exposure could occur from vinyl-coated pipe hangers or from contact with other materials. Other oils or adhesives such as the binder on fiberglass insulation and water vapor barriers may slowly degrade CPVC.

Interestingly, HCD has access the information on incompatibility and failure from environmental exposure of CPVC to chemicals. On page 62, the EIR discusses permeation and mentions the failure of several homes in Florida where CPVC pipe was exposed to a termiticide. HCD reassures the reader without evidence that the termiticide could not have permeated the pipe and that the only problem was that the pipe failed. HCD's careful consideration of the limitations stated by B.F. Goodrich (Attachment C) is needed. Does HCD have information of sources of chemical damage to CPVC not included in the list in Attachment C?

The problem in Florida is associated with several commonly used termiticides, notably chlorpyrifos (Dursban), but may also be related to exposure to the petroleum based carrier as well as to the active ingredient. The same chemicals are registered for use throughout the United States and the same slab on grade construction is used extensively in California.

- HCD should list which chemicals are known to be incompatible with CPVC
  - a) What chemicals are considered incompatible with CPVC plastic pipe?
  - b) What kind of effects can these incompatible chemicals have on CPVC?
  - c) Are any of these chemicals found in common household materials?
  - d) What kind of remediation can be done when the pipe system is found in contact with incompatible materials or to have been exposed? Should the homeowner wait for failure or would damage stop when the incompatible material is removed?

e) What measures will HCD implement to make sure that this problem is minimized?

8. Solid Waste

The EIR makes several assumptions about future recycling of CPVC piping from the waste stream that are not supported by factual information. The DEIR must provide supporting information for the conclusion of no significant impact by providing background information on plastic recycling from the waste stream. Specifically, the EIR must provide information on the following issues:

a) The DEIR must estimate the potential waste stream created by allowing CPVC in California by projecting the amount of material that would eventually be added to the waste stream (in pounds per day or tons per year). This issue cannot be cast aside as speculative simply because the estimated useful life of CPVC is "more than half a century".

b) The EIR states that because PVC is currently recycled, CPVC will also be recycled. The EIR should provide information regarding the amount and type of current PVC recycling. How is it separated from the waste stream (source separated or extracted from a mixed waste stream)? Are recyclers spread throughout the state or is the plastic shipped to few regional recyclers?

c) What is the market for recycled PVC? Can recycled PVC compete with virgin PVC resin and is the recycled PVC market artificially supported by industry or government sponsored recycling programs? Would the recycled market be the same for CPVC resin?

d) According to the Lead Agency, CPVC has been in use everywhere else in the world except for California. If this is the case, there must be some information regarding the market and recycling methods of CPVC. What portion of CPVC is recycled from the waste stream in other states (or countries) that currently allow its use? How does the price of recycled CPVC compare to the price of virgin CPVC (which will be the ultimate factor driving the recycling of CPVC)? What kinds of products are made out of the recycled CPVC (other than those already listed in the EIR).

e) The DEIR should examine the effect on CPVC use on recycling of demolition debris and interference with AB 939 waste reduction goals.

f) What effect will recycling CPVC have on the constituents of plastic pipe? Will recycled resin be usable for pipe? Will the properties of thermal stabilizers and the high extrusion temperatures needed for CPVC result in CPVC mixed with PVC making it difficult to recycle PVC itself? HCD should refer to industry literature for this.

In preparing the DEIR, it appears that the authors overlooked information regarding plastic recycling contained in two of the sources listed in the EIR's bibliography. In reviewing these sources published by the California Integrated Waste Management Board (CIWMB), several pieces of information regarding the current state of plastics recycling came to light:

- The U.S. EPA estimates that 19.3 million tons of plastic waste were generated in the U.S. in 1993. Of that amount, only 0.7 million tons were diverted from disposal, only 3.5 percent of the amount generated. In California, the plastic waste diversion rate was 2.9 percent in 1990 (Integrated Waste Management Board, 1996, HCD-109, p.1). The plastics recycling industry is relatively immature compared to other materials such as glass, paper and aluminum which are recycled at rate of 22 percent, 34 percent and 26 percent respectively.

- While there has been some success with recycling plastic materials such as PET and HDPE, there has been less success with PVC. According to the California Integrated Waste Management Board:

  "Markets for recycled PET are currently the largest and most developed. However, the vast quantities of HDPE used in consumer products will support increasingly large markets for HDPE. Other common resins - such as polystyrene, LDPE, polypropylene, and PVC - continue to face collection, separation, and contamination problems that curtail the development of markets" (Integrated Waste Management Board, 1992, HCD-107, p.52).

- Postconsumer plastic recycling, however, still is experiencing significant growing pains because of several barriers:

  - ☐ Expensive technologies are necessary to clean and separate the different plastic wastes. Although increasing progress is being made in separation and reprocessing technologies, most solutions are costly.
  - ☐ Labor costs are high because many plastics must be manually separated.
  - ☐ The market for recycled resins is limited by seasonal fluctuations that lead to an unstable supply, sharp fluctuations in prices for virgin resins, volatile foreign markets, and uneven quality of collected plastic waste because there are no widely accepted standards.
  - ☐ "Transportation costs generally are high for plastics due to their low weight and high volume. The amount that any given container can haul is limited without first incurring the cost of compressing and baling" (Integrated Waste Management Board, 1992, HCD-107, p. 2).

While the information contained in these two references does not necessarily indicate the state of plastics recycling "more than half a century" from now when the DEIR predicts CPVC will begin to enter the waste steam in appreciable quantities, it does indicate the current state of plastics recycling and the difficulties that must be overcome before a strong and comprehensive plastics recycling industry exists. These two documents do not necessarily support the EIR's conclusion of no significant impact because CPVC piping will be recycled.

First the EIR must tell the public how much CPVC waste is expected to enter the waste stream, then the EIR must discuss the practicality of recovery of most of the CPVC in the waste stream through recycling before a conclusion of no impact can be supported.

If California's 1990 plastic waste diversion rate was 2.9 percent, that means that roughly 97% of plastic wastes generated were disposed of in landfills. The widespread use of a material that is difficult to recycle and will most likely be landfilled is not consistent with the goals of AB 939 which directs cities and counties to reduce the waste stream to landfills by 50% by the year 2000. AB 939 also presents a waste management hierarchy which places source reduction above recycling. Since copper piping is a proven product for potable water systems and there exists a proven market for recycled copper piping, HCD must address the CPVC piping and its consistency with the waste management goals established by AB 939.

9. The Effects of Leaching on the Physical Environment

The potential impacts of water leaching on the physical environment are not addressed in the DEIR. Cumulatively, solvents, organotins, or other substances leaching from CPVC pipe will pass into the wastewater and reach the environment.

While the DEIR addresses in detail the leaching impacts of copper piping on the physical environment, it completely ignores the leaching impacts of CPVC piping. There is no discussion of the potential of leachates from CPVC to impact the physical environment. At a minimum the following issues should be addressed for each of the potential contaminants leached from CPVC:

- the amounts of the leached contaminants should be estimated;
- the potential toxicity of the contaminants on the aquatic environment;
- the sensitivity of receiving environments, such as rivers, bays, estuaries and the ocean (any water bodies where sewage treatment plants discharge);
- Any water quality standards relevant to these contaminants should be discussed;
- the estimated amount of contaminant discharge should be compared to existing standards;
- Relevant studies that address the impacts of these contaminants on the physical environment should be presented;

The following impacts should be addressed as stated above.

Organotin leaching impact on environment has not been addressed. The potential for organotins leaching into the water discharge system into the sensitive marine habitats, such as the South Bay, has not been addressed. The DEIR claims that CPVC is required to reduce impacts of copper leaching on the South Bay, but does not address the impact of exchanging one leachate for another.

1. The potential impact of dibutyltin and monobutyltin on marine organisms has been completely ignored.
2. There has been no attempt to estimate the amount of loading of organotins into sensitive environments such as the South Bay. The DEIR goes into great detail regarding the amount of loading of copper pipe leachates on the South Bay but does not even attempt to address organotin loading.

Consider that each household constructed with CPVC pipe will include approximately one pound of organotin compounds in the pipe matrix. This organotin material will become a permanent part of the aquatic environment – that is to say it as the potential to leach small but steady amounts of organotin into the water system. Even assuming the low levels of organotin posture late in EIR, the cumulative leaching could be substantial. The EIR should contain at least an estimate of this quantitative impact. Does the high chlorine residual of the disinfection process result in greater organotin leaching? What is the effect of this amount of tin on the aquatic environment of the South Bay?

Potential dioxin impacts on the environment have not been addressed in the DEIR. Dioxins or more specifically dibenzofurans were found in pipe tested (see attachment P). Although this test does not demonstrate leachability in raises an issue that should be addressed in EIR. Additionally the potential of chlorinated vinyl in pipe manufacture or in the waste stream may also be a source of dioxins (see attachment A).

As with the organotin case above, there has been no attempt to estimate the amount of loading of dioxins into sensitive environments such as the South Bay. This is particularly important since the U.S. EPA is expected to reverse the Water Resources Control Board's decision not to list dioxin as a high priority pollutant for the San Francisco Bay under the Clean Water Act (See Attachment H: Inside Cal/EPA, July 10, 1998, p.8).

10. Energy, Manufacturing and the Environment

The EIR addresses energy on pp. 50-51 with the observation that CPVC is made from LPG gas and salt. This over simplification misses some of the energy and environmental costs associated with the production of CPVC resin and its extrusion into pipe products. Chlorine makes up the majority of CPVC by weight as it is manufactured by the chlor-alkali process from electrolysis of concentrated brine. Production of the brine through electrolysis itself and processing chlorine are all highly energy intensive. For completeness in its discussion of LPG energy impacts, the EIR should note the electrical and other energy requirements of the chlor-alkali side of the product. Further energy is required to produce PVC monomer, to complete the chlorination process and later to manufacture the pipe directly. The EIR analysis only addresses the energy content of a petrochemical raw material and not the total energy cost of the product.

The EIR briefly addresses the waste and environmental impact of CPVC manufacture (P. 52). Probably the most significant environmental impact comes from the earlier stages of chlorine and PVC monomer manufacture. These impacts have been the subject of substantial environmental concern from public interest groups and have been associated with some of the most significant incidence of toxic contamination in the U.S. While these precursor impacts are broadly disseminated and perhaps the CPVC component of PVC manufacture is small, for completeness, EIR should acknowledge these life-cycle environmental effects.

Further in the discussion of energy, EIR notes, "In order to achieve a reasonable level of energy efficiency, many residences have plastic insulation installed on copper pipes." (P. 52) Is it HCD's interpretation of the California energy conservation regulations that CPVC pipes used for hot water will not need to be insulated? Are all available insulation materials compatible with CPVC?

Thomas S. Reid, Professional Experience

General Expertise

Thomas S. Reid has directed his firm and participated in much of its technical work since its inception in 1972. He has managed the performance of work on over 400 environmental impact assessments and other technical studies. Many of these studies involved industrial, energy, or waste management projects that had significant issues regarding air pollution, air toxics, water quality, public health, public safety, or risk of upset.

Mr. Reid is well versed in the physical aspects of environmental analysis and conservation planning. He has expertise in the areas of air and water chemistry, noise assessment, engineering aspects of projects and computer modeling in impact assessment. Applied skills include aerial photo interpretation, geographic information systems (GIS), CAD-assisted mapping, data processing and interpretation, and statistics. His work in air quality modeling, monitoring and impact assessment has special expertise for fugitive dust, fine particulate, crystalline silica and asbestos.

Education:

B.S. Chemistry, Yale University, New Haven, CT, 1969.
Graduate study in Biology, Stanford University, Stanford, CA, 1969-1973.
National Science Foundation Graduate Fellowship, 1969-1972.

Membership:

Association of Environmental Professionals, 1974
American Chemical Society, 1976
Air and Waste Management Association, 1986

Professional experience in assessment of Industrial, Energy and Waste Management Projects

- Oil Transshipment and Refining
- LNG Transshipment/regasification
- Oil and Gas Pipelines
- Petroleum Extraction and Enhanced Recovery
- Underground Natural Gas Storage
- High-voltage Transmission Lines
- Water Supply Systems
- Processing and Warehousing Facilities
- Cyanide Manufacturing
- Lumber Mills
- Steel Rolling Plants
- Research and Development Laboratories
- Bioengineering Laboratories
- Aggregate Quarries and Riverbed Mining
- Underground Mineral Mining
- Wind Energy Facilities
- Geothermal Energy Plants
- Biomass Energy Plants
- Waste to Energy Plants
- Coal-fired Energy Plants
- Petroleum Coke-fired Energy Plants
- Tank Farms
- Communication Towers
- Sanitary Landfills
- Industrial Waste Disposal Sites
- Wastewater Treatment Programs
- Transfer Stations/materials Recovery
- Construction Waste Recycling
- Franchise Collection
- Green Waste Composting
- Hazardous Waste Collection, Treatment and Disposal

Comments of

California Pipe Trades Council
California Firefighters Association
California Legislative Conference of the Plumbing, Heating and Piping Industry
Mechanical Contractors Association of Northern California
Richard Cuffe, Greg Baker, Ron Morgan and Sam Gill

on the

DRAFT
ENVIRONMENTAL IMPACT REPORT
FOR
CHLORINATED POLYVINYL CHLORIDE (CPVC) PIPE
USE FOR POTABLE WATER PIPING IN RESIDENTIAL BUILDINGS

ATTACHMENTS TO THE COMMENTS
OF
THOMAS REID ASSOCIATES

August 29, 1998

List of Attachments to Comments from Thomas Reid Associates on the 1998 CPVC EIR

A) Gesellschaft fur Arbeitsplatz und Umweltanalytik "Orientational air studies for PCDF/D during the extrusion of C-PVC"

B) BF Goodrich " Patents: No. 5,591,497, No. 5,194,471, No. 4,377,459"

C) Excerpts from BF Goodrich "Flowguard Gold" FG-2G re: Cold Weather Considerations and Chemical Compatibility of FlowGuard Gold CPVC Products

D) USEPA letter to Unibell PVC Pipe Association re: vinyl chloride contamination of a Kansas public water supply, April 1, 1993

E) European Council of Vinyl Manufacturers website: www.pvc.org, "Question and Answer Page"

F) Dickens, "Costs of Plastic Pipe Not Considered or Inadequately Analyzed in the Draft Environmental Impact Report on Plastic Plumbing Pipe"

G) Thomas Reid Associates, "Material Cost Comparison: CPVC vs. Copper Plumbing" August 21, 1998

H) Inside Cal/EPA "EPA Region IX Poised to Reverse Water Board Decision on Dioxin" July 10, 1998

I) Thomas Reid Associates, "Solvent Content of Cement and Primer Comparison" August 21, 1998

J) Ron Coiner Deposition, BF Goodrich vs. Village in the Lake in the Hills, Sept. 3, 1997

K) Ron Coiner Deposition, BF Goodrich vs. Village in the Lake in the Hills, March 24, 1998

L) NSF International, NSF Tetrahydrofuran Task Group, "Minutes for the July 10, 1997 Task Group Meeting" July 25, 1997

M) British Standards Institute, "Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of water, Part 4. Method of Test - The GCMS identification of water leachable organic substances" 1998

N) Seinen, et al, "Toxicity of Organotin Compounds. II. Comparative in Vivo and in Vitro Studies with Various Organotin and Organolead Compounds in Different Animal Species with Special Emphasis on Lymphocyte Cyctotoxicity" April 4, 1977

O) 1998 Testing Results, Anresco Incorporated

P) 1998 Testing Results, Quanterra Environmental Services

Q) 1998 Testing Results, West Coast Analytical Service, Inc.

R) 1998 Testing Results, TRI/Environmental, Inc.

8/26/98