



A Division of The Society of The Plastics Industry, Inc.

The Truth About Vinyl

An Analysis and Response to the
Greenpeace Document *No Future For PVC*

Prepared by The Vinyl Institute
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To Thinking People,

For the past 50 years, the vinyl industry has worked hard to develop products that will meet society's needs. From medical products which help save lives to construction products that save energy, vinyl has become an important contributor to modern life.

The men and women who make and sell vinyl products are committed to doing their very best to protect the environment during the manufacture, use and disposal or recycling of vinyl. The result has been beneficial vinyl products with a half century of safe performance.

Now, a misguided and misinformed attack on vinyl has been mounted by Greenpeace with a truly reckless disregard for the truth. Despite the fact that vinyl is probably the most studied plastic in the world, Greenpeace continues to publish what can only be characterized as lies about vinyl and ignores the wealth of information available from independent and industry sources. The vinyl industry has asked that Greenpeace stop its campaign of false and misleading statements about vinyl.

The following information is presented in the interest of fairness and accuracy and in the belief that public policy should be founded on common sense and good science. Thank you for reading it and sharing it with others.

— The Vinyl Institute

Summary of *No Future For PVC*

WHAT GREENPEACE SAID

1. Nearly one half century after the introduction of PVC plastics, increasing awareness of the health hazards associated with this material is mobilizing companies, public officials and consumers to eliminate it from their products, communities and lives. What was once the wave of the future, now has no future.
2. Even the chemical industry has read the writing on the wall. At a meeting of the American Chemical Society in September 1993, industry consultant Ronald Whitfield called on PVC producers to shake their "denial" and prepare for "sea changes" in PVC markets.

THE TRUTH

The obvious point is that PVC has a track record of proven performance over more than a half century. Because of its economy, environmental performance and its usefulness in everything from blood bags to vinyl siding, it continues to grow more popular. In 1993, more than 10 billion pounds of vinyl were produced for use in the United States. If anything, it is becoming more widely used, rather than disappearing. Its positive environmental performance is well documented.

The Cost to Society

In fact, what Ron Whitfield of Charles River Associates gave the ACS were four major findings. They are:

- ▶ Using substitutes for chlorine-based products and processes would cost consumers an additional \$102 billion per year.
- ▶ Investment needed to make the substitutes would approach \$67 billion.
- ▶ The transition to a chlorine-free world would take 10 to 20 years during which time prices for existing products would likely be significantly higher than today.
- ▶ Chlorine-dependent industries (conservatively defined) directly employed almost 400,000 workers in 1990; an additional one million workers are employed in related industries and services.

WHAT GREENPEACE SAID

3. Whitfield was basing his remarks on a study done for the Chlorine Institute by Charles River Associates, where Whitfield is a vice president. In his speech, Whitfield envisioned the use of product bans, taxes, building code changes, labeling and reporting requirements to discourage the production and use of PVC.

4. PVC: A "Decisive Mistake"

Often called "vinyl," PVC is one of the most versatile, and thus pervasive plastics in modern society. It's used in everything from toys to Venetian blinds, from wire insulation to furniture, from construction materials to disposable hospital gloves. PVC is used in the construction, packaging, automotive, furniture, medical and other industries. PVC is everywhere — and so are its dangers.

5. Throughout the production, use and disposal of PVC, dioxin and other toxic compounds are released into the environment where they bio-accumulate in the fatty tissues of animals and humans. Exposure to these compounds has been linked to cancer, immune system disorders, and reproduction and developmental problems.

THE TRUTH

Ron Whitfield warned the ACS that "CRA estimates that a complete chlorine phaseout will be very difficult and costly."

PVC's Safety and Environmental Performance

Vinyl is "everywhere" precisely because of its safety and good environmental performance. Among the environmental reasons for using vinyl materials are these:

- ▶ Vinyl uses less natural resources to make it.
- ▶ Vinyl saves energy in everything from cars that are lighter to windows that conserve fuel. For instance, it takes about half the energy to make PVC sewer pipe as it does to make other plastic pipe and about a third the amount it takes to make cast iron pipe.
- ▶ It is inert.
- ▶ It is recyclable.

This isn't true. The insignificant amounts of dioxin found in production are comparable to the amounts found in grass or soil. They are in amounts so low that they constitute no threat to human health whatsoever.

WHAT GREENPEACE SAID

6. Knowledge of these health hazards has grown tremendously in recent years. Chemists and process engineers increasingly think the growth of chlorine chemistry "represents a decisive mistake in 20th-century industrial development," according to a 1990 report by the German Council of Experts for Environmental Issues, a government think tank. This "would not have occurred had our present knowledge of environmental damage and health risks due to chlorine chemistry then been available," the council said. Fortunately, safe, effective substitutes are readily available for most PVC products. And, as the dangers of PVC become more widely recognized, forward-looking companies, authorities and institutions are phasing out use of this dangerous material.

7. Toward a New, PVC-Free Future

In June 1987, the German town of Bielefeld banned the use of PVC in all public buildings after PVC furniture and wire casings produced high levels of dioxin during a bowling alley fire. Bielefeld achieved 90 percent substitution in construction materials in just two years. Since then, approximately 200 cities and towns across Europe have begun to do the same.

THE TRUTH

Chlorine chemistry — which represents about 60 percent of all chemistry — has made our lives better in thousands of ways and saved millions of lives around the globe. From wonder drugs to water disinfection and pesticides to plastic, people live longer and better because of chlorine chemistry. About 45 percent of all U.S. industries are direct consumers of chlorine and its co-products. More than 1.3 million U.S. jobs are dependent on the use of chlorine chemistry. Chlorine is used in everything from adhesives to zirconium and provides \$31 billion annually in wages and salaries.

PVC Use Continues to Grow

In June 1994, Bielefeld removed the ban after considering the efforts being made to recycle PVC. Many other communities, including Berlin, have rescinded previous actions against vinyl after considering all the environmental evidence. Vinyl in construction uses, like windows and pipe in Germany, is experiencing increases in the 15 to 35 percent range annually.

WHAT GREENPEACE SAID

8. PVC packaging is being phased out of all Austrian supermarkets, the German retail chain Tengelmann and Denmark's largest supermarket chain, Irma.

9. Having chosen environmentally-friendly substitutes over PVC building materials and hospital equipment, the SMZ-Ost Hospital in Vienna is almost entirely PVC-free.

10. International Support for Chlorine Phase Out

Calls for a chlorine-free future are being heard from influential organizations and commissions around the world. Last year the American Public Health Association, the nation's oldest and largest association of public health professionals, passed a resolution calling on American industry to phase out chlorine.

THE TRUTH

PVC packaging is beginning to grow again after being the victim of a campaign of misinformation. In 1993, 631 million pounds of vinyl went into packaging in the U.S., up from 620 million in 1992 and 546 million pounds in 1991. As the environmental aspects are considered — including how replacement materials impact the environment — more people are concluding that vinyl is the most environmentally friendly material.

Hospitals around the world have found that vinyl is the best material to ensure a clean environment. Vinyl floor and wall covering and vinyl upholstery are easy to sanitize and keep clean. Vinyl materials are also known for their role in providing good air quality. One example is the Free University of Amsterdam, an 800-bed hospital that has made a special effort to include more vinyl, not less. Of course, vinyl's use in blood bags, tubing and other medical products make it a vital product in health care.

Changing the Periodic Table?

The idea of trying to eliminate a chemical that is in the periodic table is considered nonsense by most scientists around the world. They think the chlorine-free idea is radical at best and dangerous at worst.

WHAT GREENPEACE SAID

11. Also, in the last two years, several international organizations have passed resolutions calling for zero discharge of the dangerous byproducts of chlorine chemistry. These include: the International Joint Commission, which monitors the health of the Great Lakes in North America; the Oslo and Paris Conventions for the Prevention of Marine Pollution, of which 14 European nations are signatories; the International Whaling Commission, which has 30 signatories, and the Barcelona Convention on the Mediterranean Sea, whose members comprise 21 nations bordering on the Mediterranean Sea.

12. The upcoming release of a report by the U.S. Environmental Protection Agency that shows dioxin is even more hazardous to human health than was previously thought is sure to heighten this movement.

THE TRUTH

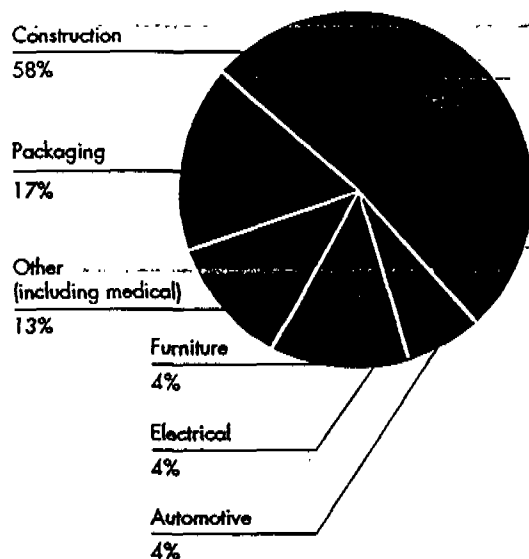
Dr. Elizabeth K. Weisburger, writing in Environmental Health Perspectives, the Journal of the National Institute of Environmental Health Science, makes the point that part of the reason for our longer life span is due to chlorination. She said, "Chlorine and its compounds should not be banned but used safely and properly in situations where their unique properties are necessary." The Michigan Environmental Science Board also took issue with the idea of a chlorine ban, stating that "the presence of chlorine in a chemical compound does not predispose it be a toxic substance destined to cause harm to humans or the environment." It's worth noting that the attack on chlorine and some of its byproducts has nothing to do with vinyl. Vinyl is an inert product with a 50-year history of safe performance. And, the fact is that the use of vinyl is growing around the world. Only one country, Switzerland, has imposed any kind of ban on vinyl products — in this case, vinyl water bottles. Even this action doesn't appear to be linked to environmental concerns as much as to keeping French mineral water out of the Swiss marketplace.

The report of the U.S. Environmental Protection Agency is not yet officially released. It is undergoing an examination from a special committee representing a number of government agencies. There is some doubt about what it will say when released.

WHAT GREENPEACE SAID

13. As the largest source of dioxin and other toxic byproducts of chlorine chemistry, PVC plastic will inevitably be phased out. Those with the foresight to start developing and implementing environmentally-safe substitutes for this material will be strategically positioned to take advantage of the inevitable market changes.

Alternatives to PVC



14. Alternatives to PVC

The above chart shows the major sectors of PVC use in a typical industrialized European country. Below are examples of PVC-free alternatives in each of these sectors.

THE TRUTH

This is patently untrue. And Greenpeace must certainly know it is untrue. For example, the London borough of Lewisham recently voted to proceed with the installation of vinyl windows and doors despite opposition from Greenpeace. In testimony before borough officials, The British Plastic Federation said "the barely detectable levels of dioxin in vinyl manufacturing and its ultimate disposal are no risk to human health, and that there are far greater levels in the U.K. from other sources" such as vehicle exhausts, coal-fired power stations and municipal incinerators. Encouraging people to substitute other less-environmentally good products for vinyl is both hypocritical and damaging to the cause of good environmentalism.

PVC: Proven Performance

PVC use continues to grow each year because of its efficiency, economy and environmental performance. Its use is growing at nearly five percent annually because the marketplace knows the truth about vinyl.

WHAT GREENPEACE SAID

15. Construction: In this sector traditional materials, such as sustainably-harvested wood, metals, concrete, linoleum and ceramics, are the best substitutes for PVC products. When the town of Bielefeld, Germany, phased out PVC in public buildings, it found that alternative materials have actually led to reduced repair costs.
16. Packaging: PVC packaging alternatives include both traditional materials, such as glass and cardboard, and other non-chlorine-based plastics. In Denmark, the supermarket chain Irma has been successfully phasing out PVC packaging in its stores.
17. Furniture: Furniture is another area where traditional materials can be substituted for PVC plastics. In Sweden, IKEA, the world's largest furniture distributor, has been phasing out PVC and phasing in more environmentally-friendly substitutes since 1991.
18. Medical: European hospitals are increasingly rejecting PVC products for those made from safer products, such as plasticiser-free polyethylene. Latex gloves can replace PVC ones and porous glass can replace PVC use in internal tubing.

THE TRUTH

In suggesting alternatives to PVC, Greenpeace ignores the environmental impact of the substitute materials. For example, replacing PVC pipe with cast iron pipe of yesteryear would substantially increase air pollution and energy consumption. As mentioned before, Bielefeld has done away with its ban and reauthorized the use of PVC. (See Response 7.)

The British retailing giant Marks & Spencer did an analysis of packaging material and concluded that vinyl is its plastic of choice because it is a highly "environmentally-friendly" material. Meanwhile, the Green Consumer's Shopping Guide has called PVC "one of the most energy efficient materials."

In Norway, the environmental group Bellona concluded that "a generally reduced use of vinyl plastics will, given today's circumstances, lead to a worsening of the environmental situation."

Vinyl continues to grow in both outdoor furniture and upholstery applications because of its durability and low maintenance. Some new upholstery techniques blend vinyl and leather.

PVC is the material of choice for hospitals because it lends itself to microbiological treatment for easy sterilization and maintenance. It is widely used for flooring, wall covering and upholstery. Medical tubing and blood bags are also made from vinyl.

WHAT GREENPEACE SAID

19. Dioxin Reassessment Spells Disaster For PVC Industry

After a three-year scientific assessment, the U.S. Environmental Protection Agency appears to be about to confirm the public's worst fears concerning the toxicity of dioxin and its effects on human health. The EPA's findings directly implicate PVC, arguably the largest source of dioxin in our environment.

20. In a recently-leaked summary of its assessment (the full report is scheduled to be released this June), the EPA found that dioxin not only may cause increased incidence of cancer, but also causes damage to immune, reproductive and developmental systems.

THE TRUTH

Dioxin Questions Remain

Again, the statement that PVC is "arguably the largest source of dioxin in our environment" is patently false and does a real disservice to the public, which deserves to be treated more intelligently. Every analysis of dioxin shows that major combustion activities like municipal incinerators are the biggest generator of dioxin. General manufacturing, including PVC manufacturing, generates insignificant amounts of dioxin. For example, analysis of air emissions in the Netherlands show municipal waste incinerators emitting 790 grams per year, compared with 51 grams from the metal industries, 16 from wood burning and just 5 from chemical processes of all kinds.

The EPA draft does not say what Greenpeace claims. As the *New York Times* points out, the newest studies "were still not adequate to implicate dioxin and related compounds as a 'known' human carcinogen."

The *Times* said, "Despite the exhaustive work by officials preparing the review, the summary makes clear that science is a long way from knowing how dioxin behaves in humans, a biological process that takes decades."

WHAT GREENPEACE SAID

21. The study also indicated that there is no safe level of dioxin exposure. Thus, any dose, no matter how low, can result in severe health damage. In fact, the EPA also concluded that the levels of dioxin currently found in most adults and children are already high enough to represent significant health threats to the American public.

22. From Factories to Fatty Tissues

Dioxin and dioxin-like compounds are created during the manufacture, use and combustion of chlorine-based chemicals. According to a recent *New York Times* article, about 500 pounds of these chemicals are released into our environment every year.

23. Because these chemicals are more soluble in oils and fats than in water, they tend to bioaccumulate in the fatty tissues of living things. When humans eat fish, for example, any dioxins present in the body fat of the fish are then concentrated in the body fat of those eating it. Even the release of tiny amounts of these chemicals into the environment poses a threat because minute amounts of dioxin in a lake become magnified millions of times by the time they settle in human fat tissues.

THE TRUTH

This is not true. The study did not say that any dose, no matter how low, can result in severe health damage. Based on all the available data, many scientists do not expect dioxin at the levels derived from current sources to cause adverse health effects. Indeed, a recent study of a population of fishermen who ate a large amount of dioxin-contaminated fish over a long period of time and who had elevated levels of dioxin compared to a control group, did not have any health effects attributed to dioxin.

Dioxin and dioxin-like compounds are created in many ways. In nature, dioxin is produced in forest fires, volcanoes and compost piles. Manmade dioxin primarily comes from combustion like incinerators and smelters, motor vehicles and waste treatment facilities. Dioxin has been found to date back thousands of years in ancient human Eskimo tissues.

Dr. Renate Kimbrough of the U.S. EPA said in a 1991 assessment of cancer risk that the health benefits of eating fish outweigh any theoretical risk.

WHAT GREENPEACE SAID

24. The Source of the Problem

EPA identifies waste incineration, smelting, chemical manufacturing and other chlorine-based industrial processes as among the major sources of dioxin in the environment. But what the EPA doesn't recognize is that what these sources of dioxin all have in common is PVC.

25. The largest user of chlorine, the PVC plastics industry consumes about one-third of the 40 million tonnes of chlorine produced globally every year. And with large quantities of dioxins formed at every stage throughout its life cycle, PVC is likely to be the largest source of dioxin in our environment.

THE TRUTH

PVC Manufacturing: Safe and Clean

Read the Greenpeace statement carefully and you'll see that it makes no sense. Smelting, for example, has nothing to do with PVC. Nor do auto emissions. Tests for the New York State Energy Authority showed that the amount of PVC in incinerator waste did not determine dioxin levels. Rather, the temperature and other operating conditions of the incinerator determined how much dioxin the incinerator produced.

Here, for the third time, is a patently false statement about dioxin production. It suggests that vinyl's opponents are following the "Big Lie" technique — that by making a false statement often enough people will accept it as true. The truth is that the manufacture of PVC is closely regulated to minimize its impact on human health and the environment and it is largely a closed process. In fact, one study called it "a classic case of in-process waste minimization."

"PVC is the most stable and least environmentally dispersed end use for the chlorine, which is made as a coproduct of manufacturing caustic soda (sodium hydroxide), a key industrial chemical. PVC is the only major end use that leaves this element in a form essentially more inert than the salt (sodium chloride) from which it is made"

WHAT GREENPEACE SAID

26. PVC Spells "Disaster"

The EPA's findings indicate a public health emergency that cannot be ignored and that requires the eventual elimination of PVC plastic. Addressing the health risks associated with dioxin will require a world-wide phaseout of PVC plastics, as well as a prohibition on the incineration and production of other products containing chlorine.

27. PVC = Toxic Fires

The degree to which PVC is present in modern society means that almost any accidental building fire involves PVC. Add to this equation the amount of toxic fumes and ash generated when PVC burns, and it is clear that the presence of PVC equals toxic fires.

28. Roughly 60 percent of PVC use is in construction. It is present somewhere in the walls, doors, pipes and window frames of almost every building. It also can be found in the floorings, wallpaper, Venetian blinds and furniture that we use to decorate the spaces we work and live in. Thus, PVC — and the danger of toxic fires — is prevalent in virtually everyone's home and office.

THE TRUTH

This kind of inflated rhetoric is intended to scare people. Sound science shows that PVC is environmentally good. The opponents of vinyl simply have no standing in a legitimate environmental debate with such hyperbole.

PVC Passes Fire Test

The fact is that PVC actually stops fires from starting and from spreading because of the inherent flame retardant qualities it gets from its chlorine content. To say that "... the presence of PVC equals toxic fires" is an insult to building officials around the world who have examined all the scientific evidence and determined that PVC material is safe in a wide variety of construction uses. Any fire expert knows that carbon monoxide — produced by virtually all burning materials — is the real killer in fires.

Again, we see a blatant scare technique. PVC is not only safe, it is probably the most tested of all artificial building materials. That's why its use in construction is increasing by about five percent annually and its contribution to new homes far surpasses any other plastic.

WHAT GREENPEACE SAID

29. One danger is hydrogen chloride emitted by smoking PVC even before flames ignite. This gas combines with moisture (in a person's lungs, for example) to form hydrochloric acid, which causes severe burns to humans. This threat to human life is so acute that by the time flames are visible, it can often be too late to save building inhabitants.

30. The best known example of this is the 1977 fire at the Beverly Hills Supper Club, where smoldering PVC-coated wire gave off a wispy — but lethal — smoke. A total of 161 people died without any direct contact with flames, before any wood started burning and before carbon dioxide reached dangerous levels. Four more died of aftereffects, and many survivors suffered serious respiratory injuries.

31. Eliminating PVC from homes, offices and public buildings would greatly reduce the dangers of accidental fires in such places. But the factories that produce or use PVC plastics in production will always be prone to fiery disasters.

THE TRUTH

Tests by the Boston Fire Department and Harvard University show that hydrogen chloride levels in a typical fire seldom exceed 300 parts per million while tests conducted for the Federal Aviation Administration by the Southwest Research Institute showed that animals were able to survive exposures of 10,000 parts per million. In hundreds of autopsies conducted on fire victims in the U.S., not one death has been linked to the presence of PVC.

This is an outrageous statement. An investigation of the cause of the Beverly Hills Supper Club fire by the U.S. National Fire Protection Association found that the fire deaths were attributed to poor fire alarms, exit procedures and to some of the construction materials used. It in no way singled out PVC construction products as contributing to the fire development or resulting fatalities in any manner. And a subsequent jury verdict said that vinyl is not unreasonably hazardous compared with any other common material.

Eliminating PVC from homes, offices and public buildings would increase the dangers of accidental fires. The reason is simple: PVC is 57 percent salt, compared with materials that are 100 percent organic. And the factories that produce or use PVC plastics in production have excellent safety records. If anyone is concerned about fire deaths, they should work to prevent smoking in bed — the leading cause of fire deaths.

WHAT GREENPEACE SAID

32. As recent fires at industrial facilities show, PVC fires are a significant source of dioxins and other hazardous combustion byproducts.

33. When a 1993 fire destroyed a plastics plant near Montreal, 15,000 kilograms of PVC were burned. The resulting ash had high concentrations (18 parts per billion) of dioxins and furans (18 parts per billion).

34. In 1992, a fire at a PVC recycling company in Germany released large amounts of dioxin. Cabbages growing 600 meters away from the plant showed an 88-fold increase in dioxin concentration levels, and even cabbages growing more than 2 kilometers away exceeded the maximum acceptable limit for food (1 nanogram/kilogram).

35. Virtually any building fire will involve PVC, and any PVC fire is a toxic fire. The only way to prevent further injury to our health and environment is to eliminate the use of PVC in buildings.

THE TRUTH

Anti-PVC Rhetoric Fails Truth Test

Since most types of combustion produce dioxin, it's inaccurate to blame any material for dioxin production. After a fire in a PVC recycling warehouse in Langerich, Germany, dioxin levels ranged from 0.1 to 5 ng TE/m². This is comparable to the amount of dioxin found in unrestricted agricultural soil. Twenty-six people were tested for dioxin after exposure to the fire. It was found that the dioxin in their blood did not exceed that of non-exposed subjects. The North Rhine-Westphalia authorities stated publicly that there had been no danger to the public or the environment.

There is no evidence that the Montreal fire produced dioxin at a level that was harmful to human health.

See Response 32.

Again, untrue. Another appeal to emotions in an attempt to scare people away from PVC. The facts prove otherwise. See Response 27.

WHAT GREENPEACE SAID

36. Dioxin and PVC's Toxic Life Cycle

From the factory to our homes, and then to its final destination in a landfill or incinerator, PVC is a hazard to environmental and human health at every stage.

37. Hazards of Production

The first step in making PVC is to combine chlorine and ethylene to make ethylene dichloride (EDC), a toxic gas that causes cancer and birth defects, kidney and liver damage, and internal hemorrhaging and blood clots. When this highly flammable gas explodes, hydrogen chloride and phosgene are generated — two highly toxic gases that can cause Bhopal-type accidents.

THE TRUTH

A Record of Safe Operations

This is just hyperbole. The truth is that PVC is a good product — good for people and good for the environment.

The facts are that like almost all manufacturing processes, the production of PVC involves the use of materials that can be hazardous if improperly handled. In day-to-day operations, however, the PVC industry has amassed an outstanding record of safe operations. Today, the entire PVC production process is essentially a closed one, with most activities taking place within closed vessels. Not only does this maximize production efficiencies, it also reduces environmental emissions and minimizes potential worker exposure to VCM. Extensive studies by the U.S. Centers for Disease Control and several others found no correlation between vinyl manufacturing and cancer and no health hazard to either workers in vinyl manufacturing or to people in the plant communities.

WHAT GREENPEACE SAID

38. In the next step of PVC production, EDC is used to make vinyl chloride monomer (VCM), another extremely toxic and flammable gas that has been linked to a number of health problems, including a special form of liver cancer called angiosarcoma.

39. Substantial amounts of dioxin and dioxin-like compounds are created during PVC production. For example, the production of one pound of EDC generates enough dioxin to exceed the combined daily intake levels (that the U.S. Environmental Protection Agency considers acceptable) for more than 2.8 million adults.

THE TRUTH

In the 1970s, a link was made between extremely high, prolonged exposure levels to VCM among PVC production workers and angiosarcoma. Angiosarcoma has also been linked to thorium dioxide given medically, arsenic given medically and, perhaps, to the use of anabolic steroids. Half of the 37 angiosarcoma cases linked to VCM were identified from 1973 to 1980 and the number of angiosarcoma cases continues to drop due to extensive revisions that were made in the PVC production process after the problem was identified. Not one case of angiosarcoma has been identified in any vinyl production worker whose history began after the introduction of revised production technology in the late 1970s. This problem has been eliminated.

This is an example of scare tactics at their worst. Notice that Greenpeace does not say PVC production emits dioxin, just that it creates dioxin. What Greenpeace fails to say is that virtually all dioxin created in the process is destroyed before the process is finished and not emitted to the environment.

Based on numerous published articles about human exposure to dioxin, virtually everyone has some small amount of dioxin in his or her body. Human fat concentrations have been reported to range from about five and 15 parts of dioxin in 1,000,000,000,000 parts body fat, that is, between five and 15 parts per trillion (ppt). This is equivalent to 0.00000015 grams of dioxin in an individual weighing 150 pounds. Dr. Renate Kimbrough, a former U.S. Environmental Protection Agency official, wrote in 1990 that "... the present exposure of the general population to environmental levels of TCDD (dioxin) and related compounds should not be of concern."

WHAT GREENPEACE SAID

40. PVC production also poses other threats because of the wide range of chemicals that must be added to PVC to make it a marketable commodity. In its normal state, PVC is hard, brittle and unstable. During production, heavy metals (such as lead and cadmium) and the thousands of other dangerous additives needed to make PVC useful can escape into our environment where they wreak havoc on human and environmental health. The most commonly used plasticiser, Di-2-ethylhexylphthalate (DEHP), for example, is suspected of causing cancer in humans.

THE TRUTH

PVC Additives Meet FDA and EPA Standards

Individual additives include stabilizers, colorants, impact modifiers, processing aids and plasticizers. Each typically constitutes a small part of the overall PVC formulation and their use is closely regulated by the EPA, the Food & Drug Administration and the National Sanitation Foundation. The key here is that while Greenpeace says additives "can" escape, the fact is they don't. Plasticizers and stabilizers have been researched at length to determine their potential impact on human health and the environment. There has been much debate over that impact due to the differing methods used to evaluate them.

For instance, while the U.S. National Toxicology Program and the International Agency for Research on Cancer have classified the plasticizer DEHP as a possible human carcinogen, their methods have been criticized for potentially inaccurately ascribing results obtained with rodents to humans. The Specialized Experts Group of the European Commission has concluded that there is no evidence to warrant the classification of DEHP as a carcinogen.

WHAT GREENPEACE SAID

41. Dangerous During Use

These problems don't end when the finished PVC product comes off the assembly line. Once they are in our homes and offices, PVC products can cause "sick building syndrome," which occurs when additives are emitted to the air during normal PVC product use. The emissions can get trapped inside a building and cause health problems for that building's inhabitants. A 1990 study by the Swedish National Testing and Research Institute identified additives in PVC flooring as the source of sick building syndrome in eight out of 24 buildings that were studied.

42. The toxic fumes emitted during the burning of PVC products also make accidental building fires more lethal.

43. The Myth of PVC Recycling

In theory, PVC can be recycled because it belongs to a family of plastics, known as thermoplastics, that can be remelted and reformed. In reality, however, the complex combinations of additives and chemicals in a finished PVC product prevent PVC from being recovered from the waste stream as a single material would be.

THE TRUTH

There is just no evidence of this. In fact, the German Building and Construction Ministry has investigated sick building syndrome and did not identify PVC as a source of the problem.

Again, this false statement is repeated for effect.

Vinyl Recycling Growing Worldwide

We're glad you asked about PVC recycling. Advancements in sortation technology make vinyl recycling easier than ever before. Machines are now able to identify different molecular structures of plastics and can separate them into their various forms quickly and efficiently. A number of applications already exist for recycled vinyl and The University of Toledo estimates potential demand for recycled vinyl at about 500 million pounds per year. In 1994, there were nearly 165 recyclers nationwide processing post-industrial and post-consumer PVC.

WHAT GREENPEACE SAID

44. Moreover, when PVC can be separated, the resulting material is of such low quality that use is limited to the production of items for which there is little market, such as plastic park benches and fence posts. In the United States only 0.2 percent of all post-consumer PVC was recycled in 1992.

45. PVC's Toxic After-Life

Thus the overwhelming majority of PVC products will end up either in landfills or waste incinerators - neither of which constitutes a safe disposal.

46. Under landfill conditions, the reaction of leachate (the liquid that seeps through the landfill) with PVC and many of its additives, creates a toxic threat to ground water and the soil in which we grow our food.

THE TRUTH

You should know what the vinyl industry is doing to encourage recycling. In 1993, 11.9 million pounds of PVC were recycled in the U.S., up from 10 million pounds in 1992. Pilot programs sponsored by The Vinyl Institute, the vinyl industry's trade association, are working with industry members to find additional markets for vinyl. One program sponsored by The Vinyl Institute, the Tool Pool Program, offers feed money to appropriate companies who manufacture a product using recycled PVC. And it should be remembered that a great deal of vinyl goes into products that are long-lived like pipe and siding and only recycled after many years of use.

PVC: A Stable Material

Because vinyl is inert, PVC poses no groundwater hazards or leachate concerns. Research has also found that incinerator scrubbing systems can remove about 99 percent of the hydrogen chloride (HCl) generated by incinerating vinyl plastics and other chlorine-containing compounds and materials. Preliminary research also indicates that the value of the energy recovered by incinerating PVC in a waste-to-energy facility may offset any additional costs incurred to scrub the HCl.

If that were true, why would landfill owners use PVC liners?

WHAT GREENPEACE SAID

47. Incineration of PVC is no less dangerous. Recent reports show a direct relation between the amount of PVC being burned in an incinerator and the amount of dioxin being released by that facility. Other studies show that incineration of PVC also produces at least 75 other potentially dangerous byproducts, including carcinogens such as vinyl chloride, PCBs and chlorobenzene.

THE TRUTH

The NYSERDA study showed that the addition of vinyl (four times the normal level found in municipal solid waste) did not increase the level of dioxin produced during incineration. Rather, it found that incinerator operating conditions, primarily temperature, were the key to controlling dioxin formation. The U.S. EPA was a co-sponsor of the study.

The results of that study were confirmed by work done by Rechem International Research published last fall by the National Society for Clean Air and Environmental Protection in Great Britain.

Dr. John R. Ehrenfeld of the Massachusetts Institute of Technology, whose work was cited by Greenpeace as the source of this statement, told The Vinyl Institute: "For the record, I would say that the Greenpeace report misrepresents what MIT included in its Chlorine study. We do, indeed, refer to work that associates dioxins and furans with the combustion of PVC. We did not do the original studies, but have drawn on the general literature. Our Chlorine study was not written as a scientific, peer-reviewed publication, but as a policy study. The report contains other information concerning dangerous and potentially toxic products from the combustion of PVC, but does not in any way cite or implicate the '... 75 other potentially dangerous by-products ...' as was stated in the Greenpeace document."

Good Science, Common Sense

Because every man, woman and child is affected by policy decisions on our environment, The Vinyl Institute is pledged to work to bring good science and common sense to bear on these issues. We welcome the support and participation of individuals and organizations who share our concern.

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- ★ Operating conditions, not vinyl, govern dioxin formation in incinerators.
 - ★ Vinyl production is a minor contributor to overall dioxin levels; chemical processes equal less than one percent.
 - ★ Amount of dioxins produced by vinyl in fires found to be "insignificant".
-

Vinyl Plastics: Dioxin Production in Perspective

Polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) -- generally known as dioxins -- are created in nature by forest fires, lightning and volcanoes. They are also produced by metal smelting, incinerators, and certain processes involving chlorine and other organic compounds, among others.

Research has shown dioxin to be highly toxic and carcinogenic to some animals. Whether dioxins are carcinogenic in humans remains questionable; the only clearly established effect is a condition called "chloracne," which has been observed after accidental exposure to high levels of 2,3,7,8-TCDD -- the most thoroughly researched and widely publicized form of dioxin. Research work continues, in order to find out whether there are any other effects on humans, including effects on the reproductive and immune system.

Facts at a Glance

- Tests conducted by the New York Energy Research and Development Authority in 1987 showed that the addition of vinyl (four times the normal level in municipal solid waste) *did not* increase the level of dioxin produced during incineration. Incinerator operating conditions, especially temperature levels, control dioxin generation in incinerators, the tests proved.¹ The U.S. EPA was a cosponsor of this research. These findings have since been confirmed by studies conducted for the Association of Plastics Manufacturers in Europe.²
- Data generated in Europe indicate that the vinyl industry there is a minor contributor to dioxin levels. In fact, research conducted in the Netherlands in 1991 concluded that chemical process in general represent about one half of one percent of the total dioxin sources studied. Those sources also included municipal waste incinerators, metal smelting, pesticides, wood combustion, hazardous waste incinerators and fires.³
- Extensive studies of vinyl in accidental fires in Germany showed that the dioxin produced was "completely insignificant" and posed no threat to human health. This included measurements of dioxin levels in firefighters' blood, on vegetables, on the ground and in snow.⁴ A recent review of German fires involving vinyl prompted the author to write: "The PVC fires which have occurred to date do not give us any reason to conclude that dioxin emissions exceed safe levels."⁵

The U.S. Environmental Protection Agency currently is reviewing the science on dioxin. The reassessment may affect many industrial processes. The vinyl industry is encouraging the EPA to use a scientific approach, based on independent peer review of the data, to develop any new policy on dioxin.

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- ★ Millions of pounds of vinyl are being recycled.
- ★ Demand for recycled vinyl far exceeds supply.
- ★ Numerous commercial products contain recycled vinyl.
- ★ Vinyl can be safely incinerated and landfilled.

Vinyl Is A Small, Manageable Part of the Solid Waste Stream

While vinyl is the world's second most widely used plastic material, very little (about two and a half percent) is found in the solid waste stream. Most of that consists of vinyl packaging – bottles, blister packaging and flexible film. Even this amount is relatively small, equaling about five percent of all plastic packaging found in the waste stream, or less than 0.5 percent of the total waste stream.

Facts at a Glance

Recycling

- ✓ Vinyl is recyclable and is being recycled. According to research conducted by R.W. Beck and Associates,¹ approximately 12.3 million pounds of post-consumer vinyl were recycled in the U.S. in 1993, including 6 million pounds of vinyl packaging.
- ✓ The most recent *Directory of Companies Involved in the Recycling of Vinyl Plastics*, published by the Vinyl Institute, lists 170 companies, up from 47 in the first edition.
- ✓ The most recent *Directory of Companies Manufacturing Products from Recycled Vinyl*, published by the Vinyl Institute, lists 57 companies, up from 43 in the first edition.
- ✓ In 1989, the University of Toledo identified nearly 100 potential uses for recycled vinyl, most in non-packaging applications.²
- ✓ The University of Toledo estimated potential demand for recycled vinyl at about 500 million pounds per year – over twice the amount available by recycling *all* vinyl bottles.
- ✓ Recycled vinyl already is used commercially to make packaging (bottles, jar and "blister" packaging), floor tiles, notebook covers, traffic cones, pipe, pond liners, garden hoses, fencing and plastic lumber.
- ✓ The vinyl industry has helped sponsor the development of several automated technologies that separate vinyl packaging from other plastics in the waste stream. These systems are now in commercial use in at least 40 locations throughout the U.S. and Europe.

Incineration

- ✓ In 1987, the New York Energy Research and Development Authority found that the presence or absence of vinyl had no effect on the amount of dioxin produced during the incineration process. Rather, NYSERDA found that incinerator operating conditions (primarily, temperature) were the key to controlling dioxin formation. The U.S. Department of Energy cosponsored this research³.
- ✓ Incinerator scrubbing systems can remove about 99 percent of the hydrogen chloride (HCl) generated by incinerating vinyl plastics and other chlorine-containing compounds and materials.⁴
- ✓ In Europe and Japan, studies show that only about 0.3 percent of all atmospheric acidity can be traced to incineration of vinyl, which in turn represents only 0.02 percent of all acid rain. Power plants and auto exhaust are the main sources⁵.

Landfilling

- ✓ Vinyl products are extremely resistant to the corrosive conditions found in landfills and will not break down or degrade under them. In fact, vinyl is often used to make landfill liners because of its resistance to these conditions.

References, over

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The Economic Impact of the U.S. Vinyl Industry

The vinyl industry and its direct customers employ about 100,000 people in the United States. Thousands more are employed in allied and supplier roles to the vinyl industry in such areas as transportation or contract services, or by companies that depend on vinyl as a raw material.

Contribution to the U.S. Economy

In 1993, Charles River Associates (CRA), Boston, analyzed the contribution that all chlorine-dependent industries, including vinyl, make to the U.S. economy. That study found:

- ✓ Number of vinyl fabrication plants: 2,530
- ✓ Number of states with vinyl production plants: 46
- ✓ Value of sales of vinyl products (1990): more than \$3.8 billion
- ✓ Investment in vinyl fabrication plants: \$8.4 billion
- ✓ Net positive contribution to the U.S. balance of trade: \$206 million

Estimating the Cost to Substitute Vinyl Products

The 1993 Charles River study also examined the costs to substitute alternative materials for vinyl in 14 major markets and applications. Specifically, the study calculated the amount of material needed to maintain the same market share currently held by vinyl in each application. It also estimated (where appropriate) the capital cost to build new capacity or convert existing capacity to produce that material or fabricate end-products from it, and considered any incremental or additional costs to install the material compared to the current cost to install the vinyl product. The study found:

- ✓ Estimated additional investment in new equipment: \$974 million
- ✓ Estimated additional cost to consumers for substitutes: \$6.7 billion per year
- ✓ Estimated total cost of substitution: \$6.9 billion per year

CRA further noted that producing substitute materials, particularly metals and concrete, is energy intensive and can create environmental problems. For instance, ductile iron requires large amounts of coke, which creates problematic environmental emissions, as do steel mills and copper and aluminum smelting. CRA did not include the costs required to modify building codes and other regulations if vinyl products were no longer available, nor did it consider the fact that many of these substitutes lack the performance properties vinyl provides (such as durability, fire resistance, weather resistance, etc.).

Details of the study, over

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* "Assessment of the Economic Benefits of Chlor-Alkali Chemicals to the United States and Canadian Economies," prepared for the Chlorine Institute by Charles River Associates, Boston, April 1993.

Exhibit 3-5. Benefits of Chlorine in PVC Products (U.S. and Canada)

Product Form	Estimated 1990 Consumption (000 tons)	Substitutes ⁽¹⁾	Estimated Investment Required (\$Million)	Estimated Incremental Cost of Substitution (\$Million/Year)	Estimated Total Cost of Substitution (\$Million/Year)
Pipe and Fittings					
Pressure water	700	Ductile iron, copper, HDPE	273	1,587	1,642
Sewer/drains	375	Ductile iron, HDPE, RCP	114	590	613
Duct and conduit	285	Aluminum, steel	24	483	487
Drain/waste/vent	300	Ductile iron, ABS	158	774	806
Irrigation	100	HDPE, AL, ABS	36	106	114
Fittings and other	160	From above	55	322	333
Fabricated Products					
Flooring, textiles, and other calendered	515	Ceramics, carpet, nylon, paper, HDPE, PET	147	1,486	1,515
Siding and accessories	410	Aluminum	9	266	267
Wire and cable	230	LDPE, TPO	4	51	51
Windows and other extrusions	305	Aluminum	7	198	199
Adhesives	60	Polyurethanes	0	224	224
Films and sheet	210	LLDPE, HDPE, TPO	88	36	54
Plastic bottles	120	PET-G	0	39	39
Other	430	Miscellaneous plastics	59	535	547
TOTAL	4,200		974	6,697	6,891

(1) HDPE = high-density polyethylene; RCP = reinforced concrete pipe; ABS = acrylonitrile butadiene styrene; PET = polyethylene terephthalate; LDPE = low-density polyethylene; TPO = thermoplastic olefins; LLDPE = linear low-density polyethylene; PET-G = polyethylene terephthalate-G.

SOURCE: Charles River Associates, 1993.



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Vinyl Plastics: Part of Everyday Life

Vinyl (polyvinyl chloride, or PVC), is the second largest volume plastic produced in the world. U.S. production alone currently exceeds 10 billion pounds annually; over 40 billion pounds are produced worldwide each year. Applications are found in virtually every industry, including health care, communications, aerospace, automotive, retailing, textiles, construction, durable goods and agriculture.

Major Uses for Vinyl

- **Construction** — house siding; water distribution, irrigation and sewer pipe; wire and cable insulation; electrical conduit; floor and wall coverings; window frames; gutters and downspouts; single-ply roofing; landfill liners; piping used in food processing, chemical processing and other manufacturing; fire-sprinkler piping; fencing.
- **Consumer goods** — toys, sporting goods, footwear, credit cards, swimming pool liners, patio furniture, garden hoses, upholstery fabric, shower curtains.
- **Medical products** — surgical gloves, blood bags, IV bags, tubing, heart catheters, single-dose medication packaging.
- **Automotive** — body side moldings, windshield system components, interior upholstery, under-the-hood wiring, under-the-car abrasion coatings, floor mats; adhesives and sealants; other components such as dashboards and arm rests.
- **Electronics/appliances** — keyboards; component housings; jacketing for electrical cords; fiber optics; floppy disk jackets; various parts and components in phone systems, power tools, refrigerators, washers, air conditioners, computers.
- **Packaging** — rigid bottles, flexible meat wrap, shrink wrap, blister packaging, tamper-evident shrink bands, bottle cap liners.

Facts at a Glance

- ✓ Over 50 percent of all vinyl produced is used by the construction industry, and more vinyl is used in construction than any other plastic. Hence, vinyl is often referred to as the "infrastructure plastic."
- ✓ Vinyl products were first introduced over 50 years ago, making it one of the most time-tested synthetic materials in use today. (The first major use was as a rubber insulation replacement for wiring on U.S. ships during World War II.)
- ✓ PVC water pipe economically delivers pure water to even the most remote location; PVC irrigation pipe helps increase crop yields; PVC sewer pipe helps insure the integrity of waste water handling systems.
- ✓ Vinyl medical goods and pharmaceutical packaging provide a higher, safer standard of health care.
- ✓ Vinyl's inherent flame retardance has made it the dominant material for many electrical uses, and has helped make electrical service safer and more dependable.
- ✓ Vinyl's durability and comparative low cost helps make housing more affordable.
- ✓ Vinyl packaging helps reduce food spoilage and waste, and is virtually unreplaceable in meat wrap.

Usage by market share, over

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-
- ★ Used in hundreds of products, by nearly every industry.
 - ★ Largest use for vinyl is in construction.
 - ★ One of the most time-tested synthetic materials in us today.
 - ★ Critical to many quality-of-life products.
-

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1993 U.S. Vinyl Production By Market
(in millions of pounds)

Pipe, fittings, conduit	4,490	Transportation	120
Siding and panels	1,130	Furniture	89
Electrical/electronics	530	Wall coverings	61
Packaging	494	Toys	41
Windows, other profiles	432	Lighting fixtures	31
Flooring	408	Resellers, compounders	440
Housewares	201	Exports	1,340
Vapor barriers, pool liners	164	Other	290
Appliances	148		

TOTAL 10,409

(Source: Modern Plastics, January 1994)



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- ★ Vinyl comes from salt, an inexpensive, renewable natural resource.
- ★ Vinyl products often consume less energy, generate fewer environmentally damaging emissions and save more energy in use than competitive products.
- ★ Vinyl products save additional resources because of their long-lasting durability.

Vinyl Plastics: An Environmental Profile

Vinyl has become one of the most widely used materials in part because of its cost-efficiencies and economic use of natural resources. These efficiencies begin when vinyl is produced, and continue throughout its lifecycle, encompassing such elements as raw material usage, energy used in processing, energy used in distribution and transportation, durability (time before the product must be disposed of or replaced), maintenance requirements, and disposal costs.

Facts at a Glance

- ✓ Vinyl is only partially derived from nonrenewable petroleum feedstocks. The balance (over 50 percent) comes from salt. Worldwide vinyl production represents less than 0.3 percent of all annual oil and gas consumption, and about 10 percent of annual salt consumption¹
- ✓ Vinyl compares favorably to other packaging materials. In 1992, a lifecycle assessment comparison of specific packages made from glass, paperboard, paper and selected plastics concluded:²
 - Vinyl was the material with the lowest production energy and carbon dioxide emissions, and the lowest fossil fuel and raw material requirements of the plastics studied.
 - The vinyl chloride monomer (VCM) production process (the precursor step to vinyl production) is a classic case of in-process waste-minimization since virtually all material used to make it is recycled back into the process.
- ✓ Vinyl compares favorably to other materials used in the transportation and construction industries. A 1991 study of the energy consumed by various materials used in these markets found:³
 - Vinyl is one of three plastic materials with the lowest energy requirements of twelve major plastics used, and saves more than 34 million BTUs per 1,000 pounds manufactured compared to the highest energy-consuming plastic.
 - The use of vinyl in the transportation market saves an estimated 10 trillion BTUs per year -- the equivalent of 1.7 million barrels of oil, or ten billion cubic feet of natural gas.
 - The use of vinyl in eight major building and construction applications saves an estimated 260 trillion BTUs per year -- the equivalent of 44.2 million barrels of oil, or 260 billion cubic feet of natural gas.
 - Together, the use of vinyl in the transportation and construction markets alone saves 270 trillion BTUs per year -- enough to meet the annual energy requirements of nearly 2.7 million households.
- ✓ Additional resources are saved because of the durability of vinyl. Some PVC pipe installations, for instance, have been in use for nearly 50 years and do not yet need to be replaced. By reducing the frequency with which a product must be replaced, vinyl further reduces raw material consumption, and as well as demolition scrap destined for landfills.

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cc: SCOT

Ron McCready

File 2.06

July 7, 1994

TO: Jeff Van

RE: Follow Up Item from June 21/22 Outreach Meeting

You may recall that at the last Outreach Committee meeting you asked the VI to prepare a one-page backgrounder on the June 9 Greenpeace press release that I circulated to the group. Following is a background piece developed for CCC's internal use -- it is not a press release. I hope that this puts the two reports used by Greenpeace to develop their press release into the proper perspective.

If you have any questions, let me know.

Regards,

Meredith

Meredith N. Scheck
Assistant Director