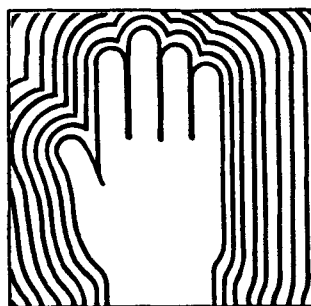


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"The Best Available Evidence"

By George Clack

An overview of OSHA's vinyl chloride standard—where it came from and what will happen when it goes into effect.

Some of us blame the company, some blame the union, some don't know who to blame.

Kathy Kaelin, president of the Youngstown Rubber Workers' local in Youngstown, says polyvinyl chloride plants in Youngstown employ about 100 workers.

Eight workers in the plant which opened angiosarcoma of the liver—a rare form of liver cancer that cannot be diagnosed until it is incurable. B. F. Goodrich itself set off the worldwide vinyl chloride alarm last January with its announced discovery of the first angiosarcoma deaths among vinyl chloride workers.

"We had our suspicions," Kaelin remembers, "A few years back it seemed like too many of our people were dying. You have to remember, though, that we didn't see them apart right in front of us. They'd just go away, and months later we might hear that he and so died of cancer. I guess we weren't smart enough to do something about it, but, of course, hindsight is always 20/20."

Black Diamond, West Virginia, spent 17 years in the vinyl chloride plant and in Falls, Texas, people to grasp the hell out of it. You can't breathe the stuff, it doesn't turn you green or choke you or anything. And the guys who died were just names pulled out of old medical records. Nobody knew them.

Until the B. F. Goodrich announcement, vinyl chloride seemed to be plastics industry and to government agencies, as well as to the people breathing it. Relatively "safe" substance, as industrial chemicals go. Today, after extensive searches through medical records and examinations of living workers, the

A newly convicted killer—the vinyl chloride molecule.

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number of cases stands at 16 in this country and 26 world-wide—extraordinarily high figures when one considers that just over 100 cases of angiosarcoma of the liver had previously been reported in medical literature. All the quoted figures may be too low, in fact, since angiosarcoma is so rare that it may often go undiagnosed. Four of the first 10 U.S. cases among vinyl chloride workers were discovered only upon re-examining slides of pathologic tissue taken during autopsies. Beyond sheer numbers, though, the deaths have raised disturbing questions about a whole modern life style that depends so heavily on products derived from synthetic chemicals.

Because of its versatility and relative cheapness, polyvinyl chloride, or PVC, is used in about 55 percent of plastic products. Chances are you ride to work on a vinyl seat, walk across vinyl-tiled floors on shoe soles of PVC, eat sandwiches wrapped in PVC film from a vinyl tablecloth, and relax to the sounds of PVC records. The week-old infant in his mother's arms is likely to suck on a vinyl pacifier. In its early days, during World War II, vinyl chloride gas (VC) was even used for a brief time as an anesthetic during surgery.

Are these finished PVC products dangerous? Aerosol propellants using VC gas—mainly hair sprays and pesticides—have been banned by various government agencies, but so far no one has discovered harmful effects from unreacted VC gas leaching out of finished PVC products. Researchers from the Food and Drug Administration, the Environmental Protection Agency, the National Cancer Institute, and the Consumer Product Safety Commission are following the problem closely, however, and the National Institute for Occupational Safety and Health (NIOSH) is conducting an experiment in which PVC pellets are placed in closed chambers and monitored for escaping VC. In an interview with CBS News, Ralph Harding, president of the Society of the Plastics Industry, remarked about these products: "Nothing in these days is totally certain without a great deal of detailed study and there hasn't been time for that, but I know in our case, we're going right ahead and using all these products with no concern, no fear, in the case of our own family."

After a year now of intensive study by individual companies, OSHA and NIOSH, and union-financed researchers, the problems of controlling VC exposures in the workplace

are far more clear-cut. There are three basic steps in the production of finished vinyl products. At the first stage VC, or the "monomer," is produced through a closed process, usually involving a reaction between ethylene and chlorine. VC monomer is then shipped as a liquified compressed gas to the plants that manufacture PVC resin. There, batches of VC are "polymerized" by mixing with catalysts in giant vats or reactors. After drying, the resulting PVC resins are "compounded"—a process in which stabilizers, lubricants, and plasticizers are added. Before being bagged for shipment to fabricating plants, the resins may be converted to PVC pellets. The final step—the fabrication end of the industry—covers a huge range of processes in which the PVC is turned into finished products. In the United States, there are 15 monomer plants employing 940 workers, 36 PVC plants with 5,600 workers, and about 7,500 fabrication plants with approximately 350,000 employees.

At each stage of the process, there are certain trouble spots where VC is likely to escape into the air. Both monomer and polymerization plants face the problem of controlling random leaks that occur from pump seals, compressors, valves, gaskets, and storage tanks within the vast closed systems. Both must also deal with reducing emissions that occur in quality control sampling. During loading or unloading of the VC monomer for shipment between plants, tank car loaders may be exposed to as much as 200 parts per million (ppm) of VC in air.

When the commercial process for manufacturing PVC plastics was first introduced in the late 1930's, the prime worry was keeping concentrations of the volatile VC gas low enough to avoid explosions and fires. As a result, production facilities are usually spread out over plant sites of several acres. VC in the air, then, is not confined to a small area, but low levels often can be found over the entire plant. Most monomer plants, which are usually open-air facilities, have lower concentrations than polymerization plants.

The highest exposures in the polymerization plants are experienced by the workers who climb down into the reactors to chip out PVC residue, in some plants with a hammer and chisel. VC concentrations as high as 1,600 ppm have been reported in the reactors in the past, and exposure levels can still reach 500 ppm for reactor cleaners. Fourteen of the 16 U.S. deaths have occurred among men who at one time or another

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