An Industry View

PVC: Hindsight in Perspective

by Ralph L. Harding, Jr.

In early 1974 B.F. Goodrich announced publicly that it suspected vinyl chloride of having contributed to the deaths of three workers at its Louisville plant from angiosarcoma, a rare type of liver cancer. Industrial health specialists around the world immediately rushed to their libraries to scour the scientific literature for past articles on the health effects of vinyl chloride inhalation. They found little to indicate a problem.

There was a 1949 study of 73 workers in a Russian plastics fabricating factory in which the authors found evidence of "more or less marked hepatitis." Polyvinyl chloride was not produced there, but PVC was plasticized with, among other chemicals, polychlorinated biphenyls. There were additional animal experiments performed from the mid-fifties onward, notably at Dow Chemical in 1961.

In retrospect it is agreed by government, industry, and the medical profession that, knowing what we do today about vinyl chloride, we should have paid more attention to the relatively scanty and incomplete information available 15 or so years ago. That we did not do so is indeed a tragedy, and the temptation to irrationally assess blame for this failure has proven too strong for some critics of the industrial health system in this country. As would be expected, the vinyl chloride industry itself has been the prime target of this criticism, which has extended to speculation that the industry had previous knowledge of the hazards of VC and that it purposely withheld this information from government officials, its employees, and the general public.

This is quite curious, in light of the fact that, as the record clearly demonstrates, the majority of the medical research on VC conducted to date (and essentially all of it conducted before 1974) was industry sponsored, that it was a member of the industry who made the first tenuous connection between VC exposure and angiosarcoma in humans, and that this information was announced publicly. In fact, were it not for the actions taken by industry from 1970 onward, we might still today know next to nothing about the health effects of VC inhalation.

Let us take a brief look at the record. In 1966 a reversible disease of the bones of the fingers called acroosteolysis was discovered among some heavily exposed PVC reactor cleaners. Prompt industrial hygiene efforts by the PVC industry quickly eliminated this problem. However, it was felt that additional research into the cause of this disease was needed. Accordingly, Dr. P.L. Viola began a series of VC inhalation experiments, employing exposure levels as high as 30,000 ppm. Dr. Viola produced cancers of the skin, lung, and bones in the test animals. His findings were reported publicly at the Tenth International Cancer Congress in Houston in 1970 and were published in a leading medical journal in 1971. While some scientific critics questioned the purity of the vinyl chloride used in the experiments and the unrealistically high levels of exposure employed, this was, nonetheless, the first time that VC exposure had been linked with cancer. Then what happened? The federal government did nothing. Organized labor did nothing. The so-called "independent" scientific community did nothing. The news media completely ignored the story.

The only group that took action was the industry. Acting independently, both the European manufacturers of VC and PVC resin and their American counterparts (acting through the Manufacturing Chemists Association) began planning sophisticated animal inhalation research projects and epidemiological studies of workers who had been exposed.

In the United States, both research projects—the animal work at Bio-Test Laboratories and the workers study at Tabershaw-Cooper and Associates—were announced publicly. A condition of the research was that the results,

Ralph L. Harding, Jr. is president of the Society of the Plastics Industry, Inc.

whatever they might show, would also be made public. The press ignored the story.

In April 1972 the MCA revised its Data Sheet on vinyl chloride to state: "Recent research studies reported from Italy indicate that repeated, long-term, high-level exposures of rats to vinyl chloride monomer vapor can result in the development of malignant tumors." For an industry supposedly seeking to suppress such information, the American PVC industry was certainly acting in a strange fashion.

In January 1973 a technical delegation from the U.S. PVC industry learned that animal studies being conducted in Europe by Dr. Cesare Maltoni had detected a variety of tumors in test animals subjected to concentrations as low as 250 ppm. At that time, no American studies had yet been launched, and the information obtained from the Europeans helped the U.S. industry in the design of its research efforts.

Dr. Maltoni, in a public meeting in April 1973 in Italy, revealed some of his preliminary results. Members of the U.S. government were present at the meeting.

The American industry felt it important that what limited information existed should be called to the attention of the National Institute of Occupational Safety and Health. Accordingly, after obtaining the concurrence of the European sponsors of the work, a meeting with representatives of NIOSH was requested and held in July 1973. There are disagreements over the precise information relayed at this meeting; however, the fact remains that the industry asked for the meeting because it felt an obligation to keep the government informed. Angiosarcoma of the liver was apparently not discussed specifically at the July meeting. However, it was mentioned among other types of cancer by Dr. Maltoni in April, though it had not yet been discovered in human VC workers. NIOSH showed interest in the studies going on and requested that the industry keep it informed as the research progressed.

The rest of the story is well-known. Six months later an astute doctor at B.F. Goodrich identified three cases of angiosarcoma among PVC reactor cleaners. The public announcement of this finding brought a variety of government agencies immediately into the case. Dr. Maltoni's research now became of prime importance, as did the industry-sponsored animal work at Bio-Test Laboratories, which eventually confirmed Dr. Maltoni's findings.

If the media felt that the industry was trying to hide what was going on, it was only because the media itself ignored, first, Dr. Viola's reports, and, second, the announcement of the American research efforts. It might also appear in hindsight that both the industry and government failed to appreciate the significance of Viola's and Maltoni's preliminary findings, and that the research efforts were undertaken at a somewhat leisurely pace. It cannot be emphasized too strongly, however, that at the time there was no established link between exposure to VC and cancer in humans. The epidemiological research was undertaken to determine if such a link existed, but events proceeded faster than the research.

It is high time that the fallacious issue of what the industry knew and when, and who it told, should be laid to rest forever. The essential question, and the only one worthy of the nation's attention, is whether any segment of the American public is currently in danger from exposure to excessive amounts of VC. It is our firm conviction, based on all the available evidence, that the threat to the American people, whatever it might have been in the past, has been eliminated. We further believe that additional research will prove conclusively that neither PVC-fabricating employees nor people living in the vicinity of VC processing plants are or have been in danger from vinyl chloride exposure.

Over a period of less than 20 months, plant exposure levels have been reduced a hundredfold or more, and the same is largely true of emissions into the environment. New and better PVC packaging resins have been developed, thus essentially eliminating the possibility of monomer migration into food. This effort has or will eventually cost the industry—and indirectly the nation—hundreds of millions of dollars and the expenditure of many thousands of man-hours of work by trained professionals in a score of different fields.

Never before in occupational health history has an industry labored so arduously, rapidly, and successfully to eliminate a recognized hazard. This is the record on which we feel we deserve to be judged. □