

Appendix I

Chronology of Important VCM-PVC Developments

- 1949 Article in Russian medical journal finds evidence of hepatitis among workers in a Russian plastics fabricating plant. Discovery is linked to exposure to a polychlorobiphenyl (PCB) plasticizer, and not to vinyl chloride.
- 1961 Dow Chemical Company reports that long term exposure of animals to VCM at levels down to 100 ppm resulted in slight liver injuries, and recommends reducing worker exposure to 50 ppm.
- 1962 On the basis of research conducted at Yale University, American Conference of Governmental Industrial Hygienists (ACGIH) adopts 500 ppm as an appropriate standard.
- 1966 Reversible disease of the bones of the fingers called acroosteolysis discovered among some heavily exposed PVC reactor cleaners.
- 1968 Research by the Dow Chemical Company shows slight alterations in liver function among workmen exposed to concentrations of VCM 300 ppm. *el me*
- February 1970 Research on acroosteolysis sponsored by the Manufacturing Chemists Association (MCA) at the University of Michigan unable to pinpoint cause of this disease and recommends further animal experimentation.
- May 1970 At the 10th International Cancer Congress in Houston, Texas, Dr. P. L. Viola of the Regina Elean Institute for Cancer Research in Rome, Italy, and a medical director of a major European PVC producer, reports producing cancers (but not angiosarcoma) in test animals at extremely high exposure levels (10,000 to 30,000 ppm).
- 1971 Medical paper on Viola's findings published in Journal of Cancer Research.
- 1971 Because of Viola's findings, major European PVC manufacturers launch sophisticated animal inhalation and worker studies.
- May 1971 Newly formed Federal Occupational Safety and Health Administration (OSHA) adopts ACGIH recommended standard of 500 ppm for VCM.
- May 1972 Seventeen U.S. VCM and PVC manufacturers agree to sponsor animal and worker studies on VCM in this country. Studies are to be administered by MCA.

April 1972 MCA Chemical Safety Data Sheet on vinyl chloride revised to include information on Viola research results.

Early 1973 Study of European vinyl chloride workers shows no increase in incidence of cancer of any type.

January 1973 A technical delegation from the U.S. PVC industry learns that the animal studies being conducted in Italy by Dr. Cesare Maltoni under European industry sponsorship have detected a variety of tumors in test animals subjected to concentrations of VCM as low as 250 ppm.

February 1973 MCA announces publicly that a contract has been signed with Industrial Bio-Test Laboratories, Inc. to conduct animal exposure studies with VCM. The contract stipulates that final results will be made public.

April 1973 Dr. Maltoni announces publicly at a medical meeting in Italy the preliminary results of his research, including the development of angiosarcoma in some of the test animals. Representatives from the U.S. Government are present.

May 17, 1973 FDA releases proposal to ban use of PVC containers for alcoholic foods. Treasury Department's Bureau of Alcohol, Tobacco and Firearms bans the use of PVC bottles for alcoholic beverages.

June 1973 MCA announces publicly that a contract has been signed with Tabershaw-Cooper Associates, Inc., to conduct a mortality study of present and past U.S. vinyl chloride workers. The contract stipulates that the final results will be made public.

June 1973 MCA requests a meeting with the National Institute of Occupational Safety and Health (NIOSH) to brief the agency on the status and background of VCM research.

July 17, 1973 U.S. and European industry representatives meet with NIOSH to review ongoing research projects, including Dr. Maltoni's study. NIOSH requests that the industry keep it informed as the research progresses.

January 22, 1974 The B. F. Goodrich Company announces publicly that the deaths of three workers in its Louisville polymerization plant may have been due to heavy vinyl chloride exposure.

February 15, 1974 OSHA holds informal "fact-finding" hearing on vinyl chloride. Dr. Maltoni and MCA, among others, testify at the hearing on their research results.

February 1974 Environmental Protection Agency (EPA) establishes "task force" to investigate VC emissions into the atmosphere.

OCC 6246

OSHA sets Temporary Emergency Standard for exposure to vinyl

April 10, 1974 MCA reports to OSHA, NIOSH and the Environmental Protection Agency (EPA) that preliminary results of the Industrial Bio-Test Laboratories animal exposure study show angiosarcoma was produced in mice at 50 ppm. These results are announced publicly on April 16.

May 7, 1974 MCA publicly announces the preliminary results of the Tabershaw-Cooper worker survey, which shows that workers exposed to VCM have overall cancer death rates comparable to those of other U.S. industrial groups.

May 9, 1974 OSHA proposes that the permanent vinyl chloride standard be set at "no detectable level."

June 1974 Dr. Maltoni reports producing angiosarcoma in test animals at 50 ppm, thus confirming the Industrial Bio-Test results.

June 11, 1974 EPA announces that preliminary monitoring results show "no scientific evidence to indicate that these emissions pose an imminent hazard to people living near these plants...". EPA says it will, nonetheless, propose regulations to reduce VC emission by 75-90 percent.

June 25, 1974 OSHA begins two weeks of public hearings on proposed vinyl chloride standard.

August 26, 1974 OSHA economic impact study on proposed standard, done by Foster D. Snell, Inc., concludes that proposed "no detectable level" is infeasible with existing technology.

August 1974 Dr. Peter F. Infante of the Ohio Department of Health announces to the press that he has found increased rates of birth defects in three towns in Ohio with PVC installations.

October 1, 1974 OSHA announces permanent standard on VCM. It is set at 1 ppm as averaged over an 8 hour working day, with peak exposure levels not to exceed 5 ppm as measured over any 15 minute period. Effective date of standard is set for January 1, 1975.

October 1, 1974 The Society of the Plastics Industry, Inc. (SPI) and companies in the PVC industry petition the Court of Appeals in New York for judicial review of the standard.

December 13, 1974 Following oral argument on the petition, a three judge panel of the Court of Appeals grants a stay of the effective date of the standards, pending the outcome of the case.

January 31, 1975 Court of Appeals upholds OSHA standards on VCM, sets April 1, 1975 as new effective date of standards.

April 1, 1975 OSHA standards on vinyl chloride go into effect.

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May 1, 1975 U.S. Supreme Court upholds OSHA standards on vinyl chloride.

July 1, 1975 Health Research Group petitions FDA to ban completely all PVC food packaging materials.

July 19, 1975 U.S. Center for Disease Control (CDC) reports in "Morbidity and Mortality" that its research has not been able to "establish any association between (birth defect) cases and vinyl chloride exposure."

September 3, 1975 FDA proposes series of regulations on PVC food packaging materials.

December 16, 1975 EPA announces its proposed regulations on emissions of vinyl chloride into the atmosphere.

December 19, 1975 SPI submits 125-page set of comments and more than 700 pages of data to FDA to prove that manufacturing processes for PVC have been dramatically improved so that there is now no reasonable possibility of vinyl chloride migration from PVC food packaging materials.

February 3, 1976 Health Research Group releases to the press a study by Dr. Infante et al on increased rates of still births and miscarriages among wives of workers heavily exposed to VCM.

February 3, 1976 EPA holds public hearing on its proposed vinyl chloride emission standards.

March 5, 1976 The New York Times reports that the CDC is undertaking a second study of birth defects in a community with a PVC facility. The community to be studied is Charleston, West Virginia.

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