W. G. Wilcox

VC — file

Comments made by Glenn E. Schweitzer - EPA

Mr. Schweitzer spoke at the October 31 SPE meeting in New York City. Some of the highlights were as follows:

Within 4 - 6 months EPA aims to define better available control technology relative to minimizing VC emissions.

EPA expects to have a final standard by September, 1975.

EPA expects that it may take 1 - 3 years beyond 1975 for industry to cut emissions by 75% from PVC plants and 95% from VC plants. After 3 years EPA expects emissions around PVC plants to be no higher than 90 ppb.

In answer to a question, Schweitzer said he had not seen any data on incineration or combustion products of VC. We should send him appropriate data.

Schweitzer stated that there is a minor problem of VC in water effluent streams because VC bubbles out of water in a few hours.

Schweitzer stated land fills are no problem because there should not be any leaching in a proper land fill.

Schweitzer stated that EPA did not have any information with respect to degradation products of vinyl chloride. His reference was to degradation of airborne VC. He stated that the industry was remiss in not studying such a problem.

He mentioned that the Government had a contract with the Research Triangle in North Carolina to study accumulation of vinyl chloride in fish.

The Cincinnati office of EPA is studying the migration of VC out of pipe into potable water. They are also studying potable water samples taken from reservoirs lined with PVC.

Schweitzer stated that the industry must start now (he did not say on what) and let Government thereby endorse their positive steps. Example - industry must clarify health risk. An example - industry had not sponsored any work on lower levels of VC exposure to animals.

Industry must monitor and know what they are doing with respect to their neighbors, i.e., industry is responsible for knowing the effect on health of people outside of the plants

Government will continue to focus on the plastics industry. He referred to a recent meeting at Pinehurst, North Carolina.

EPA plans to study emissions from a few fabricating plants.

Note: See Glenn Schweitzer's official talk attached.

SOCIETY OF PLASTICS ENGINEERS, INC.

Palisades Section * Vinyl Plastics Division

New York City

October 31, 1974

VINYL CHLORIDE: THE TIP OF THE ICEBERG?

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VINYL CHLORIDE: THE TIP OF THE ICEBERG?

CHEMICALS, INDUSTRY, AND THE ENVIRONMENT

About 20,000 chemical substances are commercially produced and used in the United States, with 500-700 new substances entering commerce annually. They find a wide variety of uses as industrial chemicals, in consumer products, and in specialized uses such as drugs, food additives, and pesticides. We estimate that about ten percent of U.S. industry is directly involved in introducing chemical changes into its products.

The problems resulting from the presence in the environment of some chemical substances are all too well known. Others are believed to pose a latent health or environmental threat, while the effects associated with many of the remaining chemicals, acting individually or synergistically, are almost completely unknown. However, it seems clear that the problems associated with the presence of many chemical substances in the environment will undoubtedly continue to grow in number, severity, and complexity in the years ahead.

Some of the hazards associated with chemical substances have been recognized and are controlled by the Government, e.g. pesticides and drugs. Other aspects of the problem have only recently been identified, and appropriate regulatory measures do not yet exist. Still other pieces of the problem have yet to be identified. Many gaps remain in understanding why, how, and when a substance can have a negative impact on health or the environment, and how best to control or prevent such hazards.

Thus, our concern is two-fold: Identification and assessment of the risks associated with the manufacture, distribution, use, and disposal of chemicals which could adversely affect health and environmental quality; and practical steps, including regulatory actions as appropriate, to prevent or mitigate the problems posed by such chemicals. In addressing these concerns we must, of course, maintain an appreciation of the role of these chemicals in our economy and of the societal benefits that chemicals have brought to all of us.

THE CASE OF VINYL CHLORIDE: BETTER LATE THAN NEVER?

The Emergence of the Problem

In January 1974, the B. F. Goodrich Company, the largest U.S. producer of PVC resin, notified the National Institute of Occupational Safety and Health that four workers from its PVC polymerization plant in Louisville, Kentucky, apparently had died from a rare cancer, angiosarcoma of the liver. All four

workers had been closely associated for many years with the production of PVC resins. The rarity of the tumor and the clustering of deaths at a single plant raised suspicions that an occupational disease related to vinyl chloride exposure had been found. Since that time, at least 10 additional cases of this tumor, which developed in U.S. PVC polymerization workers since 1961, have been confirmed. This tumor has also been reported in a number of workers at European polymerization and monomer plants, one worker at a U.S. PVC fabrication plant, two workers at European fabrication plants, and two residents in the general population near U.S. fabrication plants.

Concurrently, toxicological data from animal studies became available which further strengthened the suspicion of vinyl chloride as the etiological agent in the formation of the liver cancer. A broad spectrum of cancers was reported by Professor Cesare Maltoni of Italy in different animal species at various exposure levels. His inhalation studies of rats exposed to 50 ppm at repeated intervals approximating occupational exposures have produced angiosarcomas of the liver and abdomen as well as tumors of the kidney and skin. In mice exposed to vinyl chloride the same tumors have been observed, with the addition of lung tumors. Animal studies sponsored by U.S. industry have confirmed Maltoni's observations at 50 ppm. Recent epidemiological studies also suggest the possibility of multiple cancers attributable to exposure to vinyl chloride.

Meanwhile, statements by industry and Government officials indicated that the material loss to the environment during the PVC polymerization process may be about six percent, with more than 75 percent of the losses being vinyl chloride air emissions. Also, it soon came to light that vinyl chloride was being used as a propellant in aerosol sprays, and we were becoming more aware of railroad accidents involving vinyl chloride tank cars.

This series of events finally stimulated a broad range of corrective actions by Government and industry -- actions that should have been taken many years ago. Given the long history of PVC production which in the past resulted in much higher levels of exposure to workers and to the general population than are encountered today -- together with the long latency period between exposure and the development of angiosarcoma -- we obviously are very concerned that many of the consequences of the somewhat reckless handling of vinyl chloride in the past will continue to be uncovered for some years to come.

The Fabrication Process

Many of you may be particularly concerned with the possibility of a vinyl chloride hazard associated with PVC fabrication activities. Initially, the Government's primary concern and investigative activities centered on the polymerization process. Only very recently, with the reports of angiosarcoma among former fabricators, has attention been directed to the more than 8,000 fabrication plants. A first step obviously is reliable monitoring -- and I emphasize reliable -- to determine existing levels. I regret to report that at present we do not have good

formation which would enable us to provide guidance on the likely hazard, if any, in or around fabrication plants. Since the only source of vinyl chloride at most of these plants is the unreacted monomer that may be present in the PVC resin, we would not expect the air emissions to be high. At the same time, however, these facilities are often in metropolitan areas which could result in exposure to very large numbers of people.

At the outset the major concerns of the Environmental Protection Agency with regard to fabrication activities related to other chemicals. For example, information is not readily available indicating whether any substantial risk might be involved from the ingestion or inhalation of PVC particulate. Also, a large number of chemicals are used in PVC products as antioxidants, antistatics, colorants, fillers, plasticizers, and stabilizers, and many of them can reach man through a variety of routes. The health effects of some of these chemicals are reasonably well known; the effects of others have yet to be explored. Several of them are particularly good candidates for more detailed investigations, e.g. cadmium, barium.

Disposal of Products Containing PVC

Hydrogen chloride is the major toxic material released when PVC is burned. On the order of 32,000 tons of PVC are burned annually, releasing approximately 18,500 tons per year of HCl as air emissions. At the same time much more HCl is probably now emitted to the atmosphere from coal-burning power plants than from municipal incinerators. However, there still could be a hazard in the immediate vicinity of an incinerator as a direct result of its HCl emissions.

HCl can also be major factor related to corrosion during incineration at certain temperatures. Specifically, incinerators with heat exchangers will have corrosion problems on the fire side of the exchange equipment when the combustion gases contact the outer metal surface. Also, about 95 percent of our incinerators have some type of air pollution control equipment that is exposed to the high chloride environment resulting from refuse combustion. The cooling and precipitating water from the scrubbers that contacts the flue gas contains large quantities of chloride and is extremely corrosive to the structure.

It is highly unlikely that large quantities of vinyl chloride will be emitted during incineration of PVC. There is no evidence that PVC will chemically revert to vinyl chloride. Some small amounts of entrapped monomer might conceivably survive incineration, but these quantities would be very low.

Other air, water, or soil contaminants could result during disposal of PVC products. The types of additives of particular concern are: antioxidants -- phenols, amines, phosphates, and sulfur compounds; antistatics -- amine derivatives, quaternary ammonium salts, phosphate esters, polyethylene glycolesters; colorants -- salts or oxides of metals, aluminum, copper, and inorganic pigments; fillers --

silica, glass, calcium carbonate, metallic oxides, carbon, cellulose fillers, asbestos; plasticizers -- phthalates, organic phosphates; stabilizers -- lead salts of acids, barium, cadmium, calcium, zinc, alkyl tin compounds.

Recommendations of the EPA Task Force

Last month the EPA Vinyl Chloride Task Force, which had been established in February, submitted its Report to the Administrator. This Report included the results of our initial monitoring program at ten PVC resin and two monomer plants, preliminary analyses of the health effects of vinyl chloride, studies on the fate and environmental effects of vinyl chloride, and investigations of industrial practices. Upon receipt of the Report, Mr. Train announced that he had accepted the recommendation for the Agency to establish an air pollution emission standard for monomer and PVC resin plants and concurrently to investigate further the need for a standard applicable to fabrication plants. The eighteen other recommendations for Agency action are currently in various stages of implementation.

The process of setting an air emission standard under the Clean Air Act will involve several months of additional monitoring and other investigations, data collection, public hearings, and other regulatory steps as required by the Act. An environmental impact statement will be prepared, and public hearings held, to insure full public participation in the development of this standard. The current timetable is to promulgate the standard within about one year.

Initial estimates indicate that using available control technology emissions could be reduced by about 75 percent from PVC resin plants and 90 percent from monomer plants, with a concomitant cumulative increase in the cost of PVC resin of about four percent. Also, it is estimated that the available control technology, which includes a variety of control measures applicable to the multiple emission points within the plants, could be in place from within several months to two years after promulgation of appropriate regulations.

With regard to fabrication plants, monitoring of the vinyl chloride levels in the ambient air near five plants is planned as an early step to determining the need for an air emission standard.

I do not plan to list the other recommendations set forth in the Task Force Report. However, recent activities directed to carrying out several of the recommendations may be of interest.

Studies are currently in progress to determine the amount of vinyl chloride migrating out of PVC products used in water distribution systems, such as PVC pipe or storage tank liners. In laboratory experiments, 3/4 inch PVC pipe simulating household installations is being used. Also, water samples from a reservoir that had recently installed a new PVC liner are being analyzed.

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Toxicological Testing

Until recently, the efforts of U.S. industry to clarify the chronic toxicity of vinyl chloride were nearly negligible, despite the commercial importance of this chemical. The studies to date have not been adequate, in terms of direction, scope, or quality. Even the additional toxicological studies which have been proposed calling for animal exposures down to 1 ppm may not be sufficient.

Testing for Persistence and Environmental Effects

A related area is industry's responsibility to clarify the environmental fate and effects of the chemicals it manufactures, and in this case the behavior of vinyl chloride in water and air (including degradation products) and the fate and effects of products containing PVC in soil and water. The research by EPA should help structure such tests, but the primary responsibility rests with industry.

Testing for Levels of Unreacted Monomer

In view of the likelihood that FDA will limit the levels of unreacted monomer allowed in PVC food packaging, industry has recently accelerated efforts to analyze the levels of vinyl chloride that are present in PVC resin used for food packaging and in the packaging itself. This procedure should be extended to other types of products as well. It is particularly important that the manufacturers of resin, who in general are well equipped to carry out the necessary sampling and analysis, advise their customers (i.e., the fabricators) of the quality of the resin in terms of unreacted monomer in addition to the usual quality criteria. The fabricators in turn have a responsibility to be aware of the levels of unreacted monomer that persist in the products that eventually reach the marketplace.

LESSONS LEARNED FROM THE VINYL CHLORIDE EXPERIENCE

Many environmentalists are convinced that the problems of vinyl chloride are but the tip of a chemical iceberg -- an iceberg of problems that will continue to float to the surface during the decades ahead.

It certainly appears that except for continuing concern over spills and accidents, Government and industry have been rather complacent with regard to the potential environmental threat from the high volume industrial chemicals. This complacency is in large measure attributable to the relative absence of visible and uncontrolled dangers from exposure to the chemicals during their long histories. In addition, since each of these chemicals is manufactured by a number of companies, firms may lack incentive to invest individual company resources to clarify the safety aspects of their usage. Clearly, the experience with vinyl chloride -- the twenty-second leading chemical in terms of production -- underscores the problems that can result from such complacency. Despite the

In a few years the emission stacks and effluent pipes will be largely plugged, and hopefully sensible land disposal of hazardous wastes will be required. At the same time, however, more people will be exposed to more chemicals in more situations -- exposure from contaminants, non-point sources, direct product contact, and generally unattributable buildup of chemicals in the environment. I am confident that society can develop the necessary precautionary measures that will limit exposure to chemicals when necessary, but not unnecessarily curtail commercial activities.

There is, of course, a danger that society will not act responsibly in anticipating and remedying toxic chemical problems through its governmental and other institutions, with the inevitable outcome of endless legal confrontations. The entire approach to toxic substances could become bogged down in the courts -- which would be a tragedy for us all.

The iceberg is emerging.

With increasing frequency we are being awakened to the latent health hazard from chemicals that have not been adequately tested or analyzed. We are becoming more and more concerned not only with the problems of today but with those that will only be recognized tomorrow. Preventive actions are the key; corrective actions can only be inadequate and disruptive.

We have met the future, and it is now.