

COMMENTS ON RECOMMENDED HEALTH STANDARDS
for
MANUFACTURE OF SYNTHETIC POLYMER FROM VINYL CHLORIDE
by
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

These comments will consider five aspects of the recommendation:

- recognized health impacts of vinyl chloride
- reductions in exposure already achieved
- need for further research and developments
- residual monomer in polymer
- economic impact of the vinyl industry

Health Impacts

Vinyl chloride is recognized now as a cancer suspect agent because of two factors: Dr. Maltoni's (1) confirmation of angiosarcoma of the liver in rats exposed to vinyl chloride levels of 250 ppm and (2) the discovery of angiosarcoma of the liver in vinyl chloride workers exposed for some 15-20 years to earlier higher levels under the old 500 ppm ceiling with excursions above this. We are very much aware of the difficulty of establishing a threshold limit value for carcinogens because of the uncertain latency period and the variability of individual response to a particular chemical. Dr. Maltoni's work at 50 ppm exposure in rats showed no tumors at this level. Dow Chemical Company's statement at the February 15 OSHA hearings stated that their experience with a maximum worker exposure of 50 ppm for extended periods showed no liver abnormalities. We are also aware of the extreme difficulty in achieving "zero exposure" when dealing with a gas under pressure and of the ease with which one may be misled as to actual

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exposure because of analytical difficulties at the lower levels. On the basis of available data we believe that the 50 ppm threshold limit value (TWA) chosen by the Kentucky Department of Labor represents the best balance at this time of exposure level to health risk. Dr. Maltoni has 300 rats exposed at the 50 ppm level and there are 600 rats exposed at this level in the program sponsored by the Manufacturing Chemists Association. These experiments will answer the objection raised by NIOSH that Dr. Maltoni's original work at 50 ppm contained too few animals to be statistically significant.

In order to reduce the calculated risk even further we suggest a work practice that recognizes the uncertainties inherent in our previous analysis. This work practice depends on an accurate continuous monitoring and warning system which is currently going into operation in our plants. We believe the work practice would define three levels of exposure and response:

- greater than 50 ppm require air fed respirators (AFR), evacuation, or for short periods of time, cartridge respirators.
- A continuous alarm should sound at 50 ppm.
- greater than 30 ppm and less than 50 ppm would be signalled by intermittent alarm.
- less than 50 ppm requires no breathing apparatus.

We have implemented the majority of work practice initially recommended by NIOSH.

Current Reductions of Exposure

The developments of effective work site monitoring for VCM required nearly

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six months to review current technology, test available prototypes and begin installation of the automatic monitoring system. We use two types of instruments for successful operation. The stationary automatic organic vapor analyzer (OVA) monitors fixed locations and operates the alarm and is restricted to only vinyl chloride areas. The portable OVA is not as sensitive but is used to find leaks when the monitor indicates a concentration rise. Areas in which other monomers are also used require a gas chromatograph to identify the individual components.

This sophisticated system has made possible the reduction in all our plants to a level under 50 ppm. Excursions above 50 ppm are now 1% or less of the total readings which number from 200-300 per floor. The rapid reduction of exposure level, primarily through leak detection and containment, demonstrates that work practices based on improved operating procedures represent the direction that future plant operations must take.

Research and Development

Major programs on containment and polymer purification are under way in three significant areas:

- elimination of reactor entry for cleaning
- large reactors and computer control
- removal of residual monomer from polymer

These programs address very difficult technical problems. Containment by keeping the reactors closed reduces ambient levels and also removes people from an activity of potential exposure. Containment also reduces the need for ventilation and the problems associated with vinyl chloride removal from air streams. No known practical methods exist today for decontamination of large quantities of air from multiple sources containing small

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quantities of vinyl chloride. By the same token no technology exists today for the decontamination of polyvinyl chloride residues and wastes which contain vinyl chloride. Computer control will assist in minimizing exposure. The stripping of vinyl chloride monomer from the finished polymer, while difficult for some types of polymers, reduces the problem of residual monomer in storage and product use.

We believe that a control plan should be used and must take into account the uncertain time for finding technical answers as opposed to the quicker improvement of improved work practices and operating procedures. The new technical solutions will also require further time and significant expenditure to design and put the new technology in place.

Residual Monomer in Polymer

The proposal to label polymer with the percent monomer contained represents a distinct departure from the way labeling and warning was handled in the first fourteen chemicals classed as carcinogens. Those which caused only animal cancer were excluded from labeling requirements if the carcinogen content was 1.0 percent or less and those known to cause human cancer were excluded at 0.1 percent or less. On that basis, no label should be required at residual monomer levels of 0.1 percent (1000 ppm).

Economic Impact

Considerable variability in exposure levels within the industry and ability to control them may indicate the desirability to establish exposure levels which are programmed downward over a specific time span. This would allow the necessary time for equipment and technologic improvements which are the

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long range and desirable solutions to containment and polymer purity. Vinyl chloride and polyvinyl chloride producers employ 14,000 people. Dislocations in the PVC industry will immediately affect compounders and processors who employ 51,000 people. Their products enter major industries such as construction, automobiles, aircraft, refrigerators, wall covering and upholstery.

The impact in the final users is difficult to assess. A very rough estimate using data from a study by Arthur D. Little on the organic chemical industry indicates some 845,000 jobs downstream.

We believe the actual total would be much greater than this estimate.

In our view, the health standards recommended by NIOSH if adopted would shut down the PVC industry and downstream manufacturers.

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