

Conflicting views on vinyl chloride coalesce

**Industry decries OSHA's
n -detectable level rule
as unnecessarily harsh;
both labor and ACS
support proposed standard**

Mere mentioning of the words vinyl chloride to Occupational Safety and Health Administration officials who presided over public hearings on the agency's proposed permanent workplace standard for the chemical may well lead to mutterings that enough is enough. In nine days, the officials listened to 35 hours of direct testimony by 44 panels of witnesses—and many additional hours in question and answer sessions—and received 89 written submissions for the hearing record. Much of the data presented OSHA is conflicting. All this is of little comfort to the officials as OSHA has until Oct. 5 to come up with its final version of a permanent standard.

It's likely that OSHA may well pick some middle ground standard—tougher than that proposed by industry, softer than that initially proposed by the Government—which, if either labor or industry is unhappy about it, may well be challenged in the courts anyway.

Data presented at the hearings tended to coalesce, in effect, into two positions: that of industry and that of Government-labor-ACS. For instance, a spokesman for the Society of the Plastics Industry maintained that OSHA's proposed work-place standard—which, among other things, calls for a no-detectable level of vinyl chloride—"is not technologically feasible and, if adopted, would shut down the industry." In contrast, Peter Bommarito, president of the United Rubber Workers, said that the "OSHA proposal comes closer to the ideal standard than any yet proposed or promulgated for any workplace hazard."

However, Dr. Daniel P. Boyd, director of the office of standards development for OSHA, although emphasizing that the proposed standard is just that—a proposal—said that "it represents our best judgment based on the information available on May 10... our present judgment is that vinyl chloride is a carcinogenic agent." Dr. Boyd pointed out that in protecting employees from a carcinogenic material, "We are operating in the area of many-unknowns.

For example, we do not know the mechanism by which a chemical carcinogen operates or whether a safe level of exposure can be set." Much of the testimony presented at the hearing dealt with industry's, labor's, and research workers' effort to resolve the latter question.

The initial impetus for the vinyl chloride industry came during World War II when it was used as a substitute for natural rubber. According to Dr. Irving J. Selikoff, professor of medicine at City University of New York's Mount Sinai School of Medicine, "This immediately points to a problem of current vinyl chloride-polyvinyl chloride investigations; the industry is a relatively young one, and the late effects of toxic exposure have only begun to appear; most of our experience is still ahead of us." He told the hearings that clinical field studies are being conducted that include examinations of more than 1200 vinyl chloride-PVC polymerization workers. Although all the results are not yet in, he reported that studies of 354 current and former workers at Goodyear's plant in Niagara Falls, N.Y., "demonstrated a significant prevalence of liver abnormalities, peripheral vascular changes, and lung abnormalities."

Information on deaths from two plants, one which produces monomer and the other polymer, was presented by Dr. John M. Peters of the Harvard School of Public Health. He said that studies on 161 deceased white males showed "a 50% excess of deaths due to cancer." There was a "60% excess of lung cancer (13 cases with 7.9 expected) and a 320% excess of brain cancer (five cases with 1.2 expected) with the

number of liver cancer cases being 10 times those expected in a similar unexposed population. He stressed that these studies, though preliminary, show that multiple cancer sites are involved and cancer is increasing over time in the population. Dr. Peters agreed with Dr. Selikoff in that he said, "I do not believe we will know the full cancer-causing potential of vinyl chloride for several years. At this point the only way to assure an end to this serious hazard is to eliminate the exposure."

The vinyl chloride-PVC industry, in general, took the opposite view. Harry E. Connors, vice president of Diamond Shamrock Chemical, told the hearings, "In our judgment the cases of worker illness recently discovered in industry are the delayed result of conditions that were common many years ago but are no longer present in today's plants." Dr. Richard W. McBurney, corporate medical director of Diamond Shamrock Chemical, pointed out that "during the early years of PVC production attention was given to vinyl chloride vapors only because of the anesthetic qualities and the explosion hazard. Since the explosion hazard occurs at upward of 30,000 p.p.m. and the anesthetic effect at 1000 to 5000 p.p.m. the vinyl chloride levels in work areas were undoubtedly quite high."

Dr. Carl U. Dernehl, associate medical director of Union Carbide, told the hearing of a health survey conducted by SPI covering 16 plants employing 2372 persons whose current work permits exposure to vinyl chloride, plus 471 who had worked with it in the past. He said that the study identified 1402 men who were exposed to vinyl

SPI's vinyl chloride rules would differ sharply from OSHA's

- A no-detectable level for employee exposure as determined by a sampling and analytical technique capable of detecting vinyl chloride concentrations of 1 p.p.m. with an accuracy of 1 p.p.m. $\pm 50\%$. This would apply to monomer, polymer, and fabricating operations.

- Labeling for regulated areas and vinyl chloride-polyvinyl chloride containers with the warning to include the words "cancer suspect agent."

- Use of air-supplied respirators in cases of emergency and when vinyl chloride concentrations rise above detectable levels.

- For polyvinyl chloride resin plants, a ceiling of 40 p.p.m. of vinyl chloride this year, 25 p.p.m. in 1975. For vinyl chloride plants, a ceiling of 25 p.p.m. this year, 10 p.p.m. in 1975. PVC fabricating plants would be excluded from the standard.

- Labeling should provide those who need the information with methods for dealing with the problem; it should not be a basis for panic because of a disease characterization.

- Use of air-supplied respirators is impractical except for short periods of time. Air-supplied breathing apparatus also should be allowed.

chloride at least 10 years ago, of which 416 had a latent period of more than 20 years. Also identified were 787 men exposed continuously to vinyl chloride for more than 10 years, with 104 being exposed for more than 20 years. Dr. Denehl said, "Examinations of these men have failed to show the existence of abnormal liver function tests in greater proportion than would be found in a control population. There is no case of angiosarcoma of the liver among these men even though their exposure time is sufficient for the disease to have occurred and exposures are believed to have been in excess of 50 p.p.m." He concluded that "these data fail to support the need for an exposure level as drastic as that proposed in the standard."

The SPI survey's findings were supported by Diamond Shamrock, Dow Chemical, B. F. Goodrich, Tenneco Chemicals, and Firestone. All reported that despite extensive surveys of their current and former vinyl chloride-PVC workers, no further cases of or deaths due to liver cancer have been found, other than the 13 previously reported to OSHA.

Industry also felt that the proposed standard was too far-reaching. According to Anton Vitton, president of B. F. Goodrich Chemical, "The production of vinyl chloride, its polymerization into PVC resin, and the processing of PVC resin into semifinished or finished products is treated in the proposed standard as one industrial health problem." However, he contended, "Each is an entirely different operation posing its own problems, permitting and requiring different solutions."

Of particular concern to many industry witnesses was the inclusion of PVC processors and fabricators, such as phonograph record makers, under the proposed standard. Monitoring data on vinyl chloride exposure in processing plants were presented by several witnesses, including Philip J. Weaver, director of industrial affairs for B. F. Goodrich. In a conclusion that agreed with those of other witnesses, he said, "Our data does not support this concept of inclusion of processor operations" under the proposed standard since "we find no detectable levels of vinyl chloride in most of the processing work places."

In addition to urging that fabricators and processors not be included under the permanent standard, the Society of the Plastics Industry proposed that in vinyl chloride and PVC plants there be a stepped reduction in worker exposure.

This is in sharp contrast to the American Chemical Society position presented at the hearings by Dr. Stephen T. Quigley, head of the Society's department of chemistry and public affairs, and Howard H. Fawcett, chairman of the ACS Committee on Chemical Safety. ACS, in essence, supports the OSHA proposed standard, asking



PVC fabricators should not be included under the exposure standard, SPI urges

only that the standard be defined as a minimum practical level capable of detection by a recommended method rather than as a no-detectable level.

SPI's proposed standard drew sharp criticism from Anthony Mazzocchi, citizenship-legislative director of the Oil, Chemical and Atomic Workers International Union. He said, "It will be a tragedy if OSHA adopts the so-called 'common denominator' kind of standard that SPI sponsored. Under this approach a standard is adopted that everybody can meet. But those plants that can go further are under no incentive, at that time, to do anything more."

Most companies at the hearing said that although it would be difficult, they could live with SPI's proposed standard. Two companies, however, reported that they are already operating at much lower levels. Dr. V. K. Rowe, Dow director of toxicological research in health and environmental affairs, said that the company, "is generally operating within an eight-hour time-weighted average (TWA) concentration of 10 p.p.m.; however, brief malfunctions and other temporary situations occasionally result in short-term excursions in excess of 10 p.p.m." And Air Products and Chemicals' John T. Barr reported that his company has an eight-hour TWA in the 20- to 25-p.p.m. range for workers in its polymerization building and even lower levels for those in other job locations. Tenneco Chemicals, however, estimated that it would have to spend in excess of \$10 million to reach the exposure levels recommended by SPI.

Vinyl chloride-PVC industry witnesses contended throughout the hearings that meeting the proposed standard was just not technologically feasible, unless workers wore air-supplied respiratory equipment all the time. However, Calgon Corp., which was moved from 20th to last on the witness list, declared that technology was available to remove vinyl chloride from the air. William Lovett of the company's activated carbon division said that the monomer can readily be adsorbed on activated carbon in con-

centrations ranging from 1 p.p.m. to more than 30% by volume in air. He said laboratory results show that 100% removal of vinyl chloride from air or nitrogen streams is technically possible using dual beds.

Earlier in the hearing Tenneco Chemicals testified that it has included carbon adsorption to recover the monomer from two small process streams, neither of which contains air, in plans for its new PVC plant in Pasadena, Tex. However, it pointed out that it considers this activated carbon method to be "wholly impractical" where large volumes of air and small concentrations of vinyl chloride are involved.

Mr. Bommarito expressed the belief that the standard can be met, saying that where "engineering controls may not be applicable, personal protective equipment can be used." He added that especially in newer plants the problem is "characterized by the will, not the ability, to do the job." He concluded that "the medical facts are in and the problem is now in the social and political arena."

International U.S. reactor design loses out in U.K.

U.S. reactor design has lost out in its bid for the next generation of nuclear power stations in the U.K. The British government has opted instead for the steam-generating heavy-water reactor (SGHWR) system. The immediate plan is to build three twin-reactor stations with an overall capacity of about 4000 Mw. of electricity. The first of these stations should be operating by 1982.

The decision, taken by Eric Varley, U.K. Secretary of State for Energy, bucks the trend in other countries, where planned nuclear power programs center on U.S. designs for light-water reactor (LWR) systems, either General Electric's boiling-water reactor (BWR) or Westinghouse's pressurized-water reactor (PWR). Indeed, at public hearings before the Energy Resources Subcommittee of the House of Commons Select Committee on Science and Technology last December, both Arthur Hawkins, chairman of the Central Electricity Generating Board, which supplies power to England and Wales, and Sir Arnold Weinstock, managing director of British General Electric, which has a 50% stake in U.K. National Nuclear Corp., came out strongly in favor of LWR's, primarily because the technology is already proven and can be fairly quickly brought into operation without major design and development effort (C&EN, Feb. 18, page 11).

Mr. Varley cites a number of reasons for deciding on the SGHWR route. "In the government's judgment, it will provide power reliably and we can proceed