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PREPARED FOR

PRESENTATION AT

DEPARTMENT OF LABOR HEARINGS ON VINYL CHLORIDE OCCUPATIONAL EXPOSURE STANDARD, JUNE 25, 1974

My name is Roger W. Strassburg. I am director of environmental affairs for The B.F.Goodrich Company. I received my doctorate in the field of organic chemistry from the University of Minnesota in 1950. I have held positions with The B.F.Goodrich Company during the past twenty-three years in research, technical management, research and development administration and general administration.

I want to tell you about some of the major objections to portions of the proposed standard which would require that air-fed respirators and self-contained air supplies be worn by workers in an environment where the level of vinyl chloride is detectable.

Since a "no-detectable" level of vinyl chloride isn't feasible, the requirement I just mentioned would mean the full-time use of air-fed respirators and self-contained air supplies by all employees for their full work turns throughout the vinyl monomer and polymer industry.

This is impractical and even hazardous for reasons I will explain in a moment.

However, employees may use air-supplied protective devices while they are cleaning reactors or unloading vinyl monomer from tank cars into storage facilities. In addition, these devices should be available for emergency use if there is a major emission of vinyl chloride in the work atmosphere.

The proposed standard would sanction only four types of respirators. These are:

(1) a positive pressure full facepiece self-contained breathing apparatus

(2) a pressure-demand full facepiece self-contained breathing apparatus operating in the pressure-demand mode;

(3) a combination type "C" pressure-demand full facepiece respirator operating in the pressure-demand mode and a pressure-demand self-contained breathing apparatus operating in the pressure-demand mode; or

(4) a combination type "C" continuous flow respirator and a pressure-demand self-contained breathing apparatus operating in the pressure-demand mode.

These four types of respirators allow only self-contained air supplies. However, in checking with other industries, we have learned that hose-supplied, air-fed respirators can be used in confined areas, such as in handling radioactive material, welding and spray painting. The hose is usually no longer than 25 feet and generally there is no traffic in the work area.

In our industry, workers who clean polymerizer vessels, or polys, also fit this type of activity and the hose, as opposed to a cumbersome air tank, makes it easier to enter the vessel.

With an air tank, the operator would have to enter the vessel and have the tank passed down to him, reversing the procedure when coming out. The hose-supplied system has its place, as in this application, but it is not generally applicable to entire plants.

Self-contained air supplies, or tanks, also have limitations in general use. They are heavy, weighing about 30 pounds. Some workers cannot wear them at all and many workers commonly experience fatigue after wearing them a short while.

Furthermore, the 30 pound self-contained air supply lasts only 30-45 minutes. Frequent recharging with high-pressure equipment, at least 12-16 times a day for each employee, would be necessary. To our knowledge, no plants are equipped to recharge hundreds of air tanks each day. Even if the equipment were available, the logistics of this exchange process, especially in the larger plants, are almost insurmountable.

Like air hose, there is a place for self-contained air supply as an effective means of providing respiratory protection for employees,

for example in unloading tank cars, where the use of self-contained air supply would be intermittent. Smaller air packs are also effective for some emergency escape situations.

The regular use of masks, whether full-face or half-face, regardless of the air source, presents a different set of problems.

This is true despite the fact masks of all types have undergone extensive research.

Yet, there still is no "ideal" mask.

We have learned from employers in other industries that the continuous use of masks by employees causes many problems. These include headaches, irritation behind the ears, ingrown hair, inflamed facial glands and edema of the scalp.

Full-face masks are designed primarily to be used where both eye and respirator protection is needed. Eye irritation is not a problem in the vinyl industry.

In fact, the use of full-face masks with air-fed respirators results in drying of the eyes and fogging of the face plate or eye glasses. This could be a safety hazard. Furthermore, full-face masks are difficult to fit properly over eye glasses.

The larger skin contact of a full-face mask also increases the possibility of various skin irritations or aggravation of existing facial problems.

Half-face masks have slightly lower respirator efficiency than full-face masks. Where the use of air-fed respiratory protection is required, this slight reduction in efficiency can largely be overcome through the use of air tanks or air-fed hose while eliminating most of the problems associated with full-face masks.

In a carefully monitored manufacturing plant, assuming a feasible level of exposure is established, employees would be alerted by an alarm system when this level is exceeded and appropriate respiratory equipment would be utilized.

This typical situation would involve an excursion above predetermined levels. In these instances, following established safety procedures, employees would be alerted to the higher-than-normal level and required to wear half-face masks with canister protection. This procedure would provide readily available protection for all employees during the time it takes to find and correct the problem.

With the permission of my colleagues at SPI, I now want to tell about the results of some experimental work we have done at B.F.Goodrich on canisters.

Canisters, properly maintained, we have learned through experimental work, will last approximately 11 hours at levels up to 100 ppm when tested at 32 liters per minute, the normal breathing rate. An experimental flow chamber to test various types of adsorbents was set up to measure the adsorption-desorption characteristics of vinyl chloride monomer at flow rates of 32 and 64 liters per minute as specified by NIOSH.

Calibrated flow meters were used to produce concentrations of vinyl chloride monomer from below 1 ppm to 10,000 ppm within the NIOSH specified flow limits. Detection of vinyl chloride monomer in the air stream was accomplished with a calibrated, commercially available flame ionization detector. Independent calibration was accomplished by the use of commercially prepared samples and gas chromatography.

In a typical experiment, a stream of vinyl chloride monomer in air at a particular flow rate was passed through a canister in such a way that the entire stream passed through. The sampling probe from the flame ionization detector was placed at the exit of the canister. In this continuous monitoring mode, initial vinyl chloride monomer breakthrough was accurately determined from the recorder output of the detector.

CANISTER DATA
* 64 liters/minute

Concentration	Breakthrough Time		
25 ppm	T_o= 8.3 hrs.	T_1= 8.7 hrs.	T_5= 9.4 hrs.
100 ppm	T_o= 5.6 hrs.	T_1= 5.7 hrs.	T_5= 6.0 hrs.
1000 ppm	T_o= 1.6 hrs.	T_1= 1.7 hrs.	T_5= 1.8 hrs.

* Experiment at three normal breathing rates

The canister's greater capacity offsets the current lack of an indicator to signal exhaustion of the canister. Prospects are good that a reliable indicator for canisters will be developed in the near future. Canister suppliers and at least one university are working diligently to provide a color indicator that will tell employees when it is time to change their individual canisters. Until such time as indicators are developed, there would be no objection to any requirement that any canister which has been used at all be changed at the end of each work shift.

In summary, we believe respiratory protection with canisters is necessary only when exposure exceeds the established level, but remains well below emergency conditions.

However, there are certain types of operations, as we indicated, that require either air-fed hose, such as in cleaning polys, or air tanks, as in the case of tank car unloading and emergency situations.

In establishing permanent standards, SPI urges that OSHA allow management the necessary flexibility to select and utilize the most appropriate respiratory equipment for the protection of our employees.

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