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With the advent of the Occupational Safety and Health Administration, industry in the United States entered a new era of awareness about possible harmful effects from excessive exposure to chemicals.

This does not mean industry was negligent prior to OSHA. In fact, many companies have had excellent programs in this area for years. Others, however, did not. Furthermore, the long-term subtle effects of some chemicals in this relatively young industry are only now coming to light.

Nevertheless, once industry becomes aware of a problem, it has an obligation to take action for the future.

Vinyl Chloride fits into this category. Because it is so widely used, this chemical has received much attention lately. While one can argue the details of the proposed standards (see February, 1975 issue) everyone recognizes that the primary goal is to protect the worker from any serious health hazard.

In the following paragraphs Uniroyal discloses the program being implemented in its plants that manufacture and process vinyl chloride. This does not imply that this is a perfect program or the best in the industry, of which Uniroyal represents only a small segment. What is intended is a picture of how industry has developed a program by following five basic steps:

- (1) Recognition of a hazard.
- (2) Careful monitoring to locate sources of exposure.
- (3) Reducing exposure to lowest possible extent.

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- (4) Frequent monitoring to insure that the plant is operating under optimum conditions.
- (5) Careful physical exams with special emphasis on tests believed to be indicative of possible exposure effects.

All of the above recognize that we are still learning and that further changes may be necessary from time to time.

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The Uniroyal program began almost immediately after B.F. Goodrich announced that vinyl chloride might be the cause of angiosarcoma, a rare liver cancer found in some of its employees.

At first, all areas of Uniroyal's vinyl chloride plants underwent extensive monitoring with a continuous infrared monitor equipped with a chart recorder. Once a source of exposure was identified, technicians and engineers immediately tried to reduce or eliminate emissions.

In some instances, the solution was simply fixing or replacing a leaky valve. Other spots required better ventilation, such as removing wall sections or installing fans to increase circulation.

Major engineering changes have taken place in cleaning the vessels where vinyl chloride is converted into polyvinyl chloride. Traditionally, this has been the area of highest concentration of fumes.

Since some vinyl chloride escapes polymerization, steps have been taken to reduce these vapors before the vessel is opened. The insides are steamed down, washed out and aired with high-pressure water hoses and vacuum pumps.

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Even with improved cleaning techniques, however, some PVC sticks to walls and pipes inside the vessel. A tank cleaner then climbs inside the reactor and scrapes off those deposits, which can retain some unreacted gas. During this operation, workers use respirators to protect themselves from the sweet-smelling fumes.

Under the new standard, workers exposed to vapor levels above the allowable limit must be supplied with a respirator. Until 1976, however, they may choose not to wear that device as long as the level doesn't exceed 25 ppm. Vessel cleaners, for instance, are breathing fresh, clean air from outside the building while chipping away at a reactor's inside surfaces.

Other protective equipment includes coveralls and gloves, which reduce skin contact.

Meanwhile, the plants continue to monitor for employee exposure to vinyl chloride. This involves taking numerous air samples.

Several workers carry small plastic bags into which a pump pushes air from wherever the employee works. These samples are then injected into a gas chromatograph, which measures the amount of vinyl chloride in each bag. From this information a "job profile" can be put together, indicating typical exposure levels for each job.

Other employees, carrying sensitive instant reading instruments make a daily check at selected points around the plant. These devices instantly indicate any vapors present and are used to detect leaks or faulty operations.

Another instrument, a portable gas analyzer, is set up at various locations to take continuous readings. It produces a graph showing fluctuations in the vapor level.

All vapor levels are recorded and posted for employees to read.

Furthermore, all employees and recent retirees from these plants underwent medical examinations. This evaluation consisted of a personal medical questionnaire, physical exam and five blood tests designed to spot abnormal liver conditions.

Roughly 12 percent showed signs of a liver abnormality.

"You would find almost the same percentage if you tested the general population," explains Dr. J. Dexter Forbes, Uniroyal's corporate medical director. "Liver test abnormalities can be caused by many things, including too much liquor days and weeks before."

Most of these employees passed a second screening held two weeks later. Those who did not went through more elaborate tests conducted by the plant physician. A few still had persistent and unexplained abnormalities. They went through an extensive medical examination by a private liver specialist, who found a variety of causes-- but not related to vinyl chloride.

"After more than a year, we haven't found a single case of angiosarcoma among our employees," adds Dr. Forbes. "That also includes former employees whose medical records were examined for cause of death."

This entire medical surveillance program has become a way of life for vinyl chloride workers, who must be rechecked at least once a year.

This program, of course, goes considerably beyond what is normally necessary simply because vinyl chloride is a gas that permeates the entire plant. Most of the materials used in the rubber and plastics industry are not so volatile. If they are not inhaled as mists or dusts and are kept off the skin, there is no exposure. A good shower at the end of the workday is further insurance against exposure.

In conclusion, each process must be looked at carefully and proper work practices established in recognition of each material's specific chemical, physical and toxic properties.

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