

Shortly before World War Two, the B.F. Goodrich Company pioneered the development of a synthetic organic chemical known as vinyl chloride. Vinyl Chloride, or VC as it is often called is the parent chemical for many products in our society such as wrapping films, electrical insulation, flexible gaskets, pipe, and a variety of other industrial and consumer products.

Vinyl Chloride, is a gas at normal temperatures and pressures, but is a liquid under pressure, and this is how it is normally handled. Most Vinyl Chloride is used in the production of Polyvinyl Chloride or PVC as it is commonly known.

Early in 1974, B.F. Goodrich reported to the National Institute for Occupational Safety and Health that the deaths of some employees over a period of time may have been occupationally related. Further research and testing showed the causes of death to be angiosarcoma of the liver.

Angiosarcoma is a cancerous tumor of the liver and testing in animals has shown that it can be caused by chronic exposure to high levels of Vinyl Chloride gas in the atmosphere. Any damage incurred, however, is not readily apparent, and may take years to

*we knew the cause
of death when we
notified NIOSH*

low level

latent period

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notice. The symptoms of angiosarcoma are few and are hard to detect. They may be confused with other diseases due to the rare and uncommon nature of the disease. Some patients have reported a sense of feeling bad, while in a few cases intestinal bleeding occurs.

Vinyl Chloride is not the only cause of angiosarcoma, but with tests showing VC to be one of perhaps several causes, many steps such as this are being taken to warn you of the dangerous connection between Vinyl Chloride and angiosarcoma.

Remember, it is Vinyl Chloride that we are concerned about, not Polyvinyl Chloride, which is usually a solid, while Vinyl Chloride is a liquid or a gas.

Vinyl Chloride is also an anesthetic and ~~was once used~~ as a surgical anesthetic. This property plus the fact that VC has a pleasant odor adds to the danger of not recognizing a dangerous concentration of Vinyl Chloride gas.

Two other possible physical hazards that may result from contact with or breathing a Vinyl Chloride are ^{osteolysis} a disease known as the "Hand Problem" and portal fibrosis.

The "Hand Problem" generally can be detected by a numbness and cold feeling in your

permanent std is below idr threshold

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fingers. In more serious cases, some deformity of the hand or fingers may result. However, this disease is both reversible and easily preventable. The wearing of protective clothing especially gloves, to prevent direct contact with ~~the~~ Vinyl Chloride is very important in PREVENTION of the "Hand Problem."

Portal fibrosis is a non-cancerous disease of the liver about which little is known. However, we believe that the same techniques used to prevent over-exposure to Vinyl Chloride to prevent angiosarcoma will be effective against portal fibrosis.

The symptoms of portal fibrosis are also hard to detect and are similar to angiosarcoma in that a general feeling of "not feeling well" is often the only symptom.

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The manufacturing process for Vinyl Chloride and Polyvinyl Chloride are both complicated chemical reactions which take place inside closed vessels. To the naked eye, the process is a series of tanks, pipes, and towers such as you see here.

A simple flow chart of the production of Polyvinyl Chloride looks like this.

From a tank car loaded with Vinyl Chloride, the VC liquid is piped under pressure to a storage sphere. From the storage sphere, the Vinyl Chloride is piped into a polymerization reactor where catalysts, stabilizers, emulsifiers, ~~and additives~~ *are added* ~~are piped into the reactor.~~ After an ap

propriate time the polymerized material is piped to a secondary tank where unpolymerized Vinyl Chloride is ^{RECOVERED FOR RE-USE.} ~~pipel back to a reactor.~~

The material which is now Polyvinyl Chloride is then concentrated, dried, and packaged.

The end product ^(MAY BE ANY) ~~consists of~~ *can be* of three different materials: a PVC resin, a powder with the texture of refined sugar; a PVC paste, a very fine powder with the texture of processed flour; ^{OR} ~~and~~ a PVC latex, a stable suspension of PVC in liquid, *on dispersion* ~~APPEARING MUCH LIKE MILK.~~

In a PVC plant, the points of greatest probable exposure to Vinyl Chloride are these:

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1. Connections to tank cars
2. Any valve or pipe connection
3. Any filter, or pump or handling equip
4. The reactor itself, especially when being opened for cleaning.

Some areas of your plant will be known as regulated areas. These are areas where an amount of Vinyl Chloride exceeding one part per million parts of air has been measured. The entrance to these areas shall be marked with this sign:

CC
only

~~CANCER-SUSPECT AGENT AREA~~

~~AUTHORIZED PERSONNEL ONLY~~

Only individuals specifically designated to enter a regulated will be allowed to ^{access} ~~to~~.

This authorization will be issued to you by your plant supervision.

Any hazardous operation or where an emergency currently exists will have ^{a similar} ~~this~~ sign posted ^{and may be entered by authorized personnel only} ~~and may be entered by authorized personnel only~~

This is
our
prime
sign

~~CANCER-SUSPECT AGENT IN THIS AREA~~

~~PROTECTIVE EQUIPMENT REQUIRED~~

~~AUTHORIZED PERSONNEL ONLY~~

~~Again, only authorized people may enter such an area.~~

Containers of Polyvinyl Chloride resin waste from reactors or other waste contaminated with Vinyl Chloride will be labeled:

regulated area - exposure greater than 1 ppm averaged over 8 hour period

re-write

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CONTAMINATED WITH

VINYL CHLORIDE

CANCER-SUSPECT AGENT

Containers of Polyvinyl Chloride will

be ~~legibly~~ labeled:

POLYVINYL CHLORIDE

CONTAINS

~~POLY~~VINYL CHLORIDE

VINYL CHLORIDE IS A CANCER-SUSPECT AGENT,

and, containers of Vinyl Chloride will be
labeled:

VINYL CHLORIDE

EXTREMELY FLAMMABLE GAS UNDER PRESSURE

CANCER-SUSPECT AGENT

As in all chemical plants, the possibility

of a explosion is always present. Extensive

safeguards have been taken to prevent this

from happening. However, there are specific

emergency procedures which you must follow in

the event of an explosion, fire, or other

disaster. Your plant representatives will

cover the specific emergency procedures for

your plant with you at the end of this program.

*during a separate training
session.*

*because PVC may contain
small amounts of
VCL.*

*expand
See MCA
Safety booklet*

20258006

Before me you see three types of respirators. During your work around areas of potential vinyl chloride exposure you may be required to wear one or all of these at various times depending on the levels of vinyl chloride present in the air.

During 1975 you are required to wear a air line respirator like this when the concentration of vinyl chloride gas reaches a level of twenty five parts of vinyl chloride to one million parts of air. A red flashing light such as this one here will alert you to a 25 parts per million danger. You then must plug in your mask to an air supply line as you see here.

As you put on your mask you must take care to get a good seal completely around your face. By placing your chin in the face piece first and then tightening the straps you can get a good seal. The seal can be easily checked by pinching the air hose shut and breathing in. If the face piece collapses then a good seal has been achieved. Once your mask is on you may need to make some small adjustment to the air flow for your own comfort.

In 1976 this type of mask will be required to be worn in areas where the level of vinyl chloride is one part per million parts of

See
evaluation for
new for

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air. However, during 1975 a canister mask such as the one shown here may be worn in areas where the vinyl chloride level is less than twenty-five parts per million parts of air. However, you are not required to wear one by law during 1975.

This air-pak type of mask will be worn by selected personnel in areas where the level of vinyl chloride exceeds 100 parts per million parts of air. When this level is reached, an alarm will sound and you must leave the area unless you are specifically designated to stay.

As just demonstrated, a proper air seal for all three of these masks is necessary for safe use, as is proper cleaning of the mask. Usage and cleaning details for masks will be covered by a plant representative.

Three alarm systems will be in operation in all plants. At a level of ten parts per million of air a yellow flashing light will come on. You are not required to take any action at this point. However, when the red flashing light comes on, a level of 25 parts per million of air has been reached. At this point you must put on the air line mask. When an alarm sounds at 100 parts of vinyl chloride per million of air you will either leave the area or, if you are specifically

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designated to stay, you must put on an air-pak type of respirator.

In addition to a respirator you may be required to wear protective clothing such as seen here. Protective clothing is especially

necessary when entering a poly tank for *a solid change, or one that has* cleaning. The clothing prevents direct *not been cleaned by HRC* contact with any remaining vinyl chloride

during cleaning and protects your from contracting the "hand problem" disease.

A program of area and personal air monitoring will be used to check the levels of vinyl chloride in the areas where you work.

Requirements for personal monitoring ^{no ceiling - job class} are ~~this~~ ^{these}: If you work in an area where the levels of vinyl chloride have been shown to be between one-half and one part per million parts of air, you will be monitored every three months. ~~This type of area is called an action area.~~

If the place where you work exceeds one part of vinyl chloride per million parts of air you will be monitored every month. This type of area is known as a regulated area. Access to a regulated area will be controlled and only authorized individuals may enter a regulated area.

A Bendix Micronair II system will be used for your personal monitoring. A small battery pump is hooked on your belt or placed in a pocket. Air is then drawn through a short length of plastic tubing to ~~sample tube containing~~ ^{sample tube containing} a ~~container with~~ charcoal. After four hours ~~the sample tube is collected and~~ the charcoal is analyzed at the plant

laboratory by a chromatograph to determine the amount of vinyl chloride present. This monitoring will help determine the amounts of vinyl chloride you have been exposed to.

1. below $\frac{1}{2}$ ppm no monitoring required
2. $\frac{1}{2}$ - 1 ppm

The results of monitoring will be reported to you whenever your exposure is found to be above 1 ppm

regulated area any area where exposure is expected to be above 1 ppm

the sample tube is collected and

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The area monitoring will be done by a
Bendix ~~Total Hydrocarbon~~ Analyzer. There
are ^{to} TWELVE ,
will be at some date connected to

