

VINYL CHLORIDE
PROPOSED STANDARD 1910.93g
(m) TRANSPORTATION LOADING AND UNLOADING

Transportation loading and unloading have been given special consideration in the proposed standard as a particularly hazardous operation requiring fresh-air masks. These operations, when proper equipment is available and procedures are well defined, can be handled on a performance basis; i. e., the maximum or time-weighted average exposure should not exceed the standard. The need for including these operations in a regulated area is questionable if it is a part-time operation.

Union Carbide Corporation receives vinyl chloride at South Charleston, West Virginia in 48,000-gallon tank cars shipped from Freeport, Texas. Due to the size of the car only five tank cars are unloaded per week in an open area used for unloading various chemical tank cars. Monitoring this operation on three consecutive car unloadings yielded the following results:

Date	Operation	Time Required minutes	Sample Time minutes	Concentration ppm
June 28, 1974	Hookup Car	20	20	4
	Disconnect Car	15	15	15
July 2, 1974	Hookup Car	19	19	6
	Disconnect Car	8	8	<1
July 3, 1974	Hookup Car	22	22	8
	Disconnect Car	5	5	<1

Attached is a brief description of the Union Carbide Corporation system at South Charleston, West Virginia. Note that despite having a very sophisticated system, exposures are not non-detectable.

RNWheelerJr/ra
July 5, 1974
Attachments (2)

UCC 092722

DESCRIPTION OF PROCESS FOR RECEIVING, STORING, AND DISTRIBUTING
VINYL CHLORIDE MONOMER

Vinyl chloride monomer is received by railroad tank car into a storage area located outside the boundaries of the plant proper. It is unloaded into a refrigerated sphere from which it is pumped to the consuming units.

Unloading is accomplished by equalizing the pressures in the tank car and the storage sphere and then applying vaporized vinyl chloride to the vapor space in the tank car. This provides positive suction pressure on the pump which transfers vinyl chloride to the storage sphere. After all the liquid has been removed from the tank car, a compressor pumps vinyl chloride vapors from the car to a condenser and the condensed liquid is then pumped to the sphere. The vapor pressure in the car is reduced to 5 psig, and the car is then returned to the vinyl chloride supplier for refilling.

The vinyl chloride in the sphere is maintained under its own vapor pressure (maximum of 29 psig) at a maximum temperature of 15°C by the use of refrigeration, with vinyl chloride serving as the refrigerant.

Transfer pumps and piping transfer vinyl chloride to the consuming units as required.

RNWheelerJr/ra

July 5, 1974

UCC 092723

SPECIAL FEATURES PROVIDED TO MINIMIZE
EXPOSURE OF PERSONNEL

General

1. The receiving and storage area is remote from the consuming units.
2. A high degree of automation is employed, so that there is little need for operators to be near the tank car or the sphere while unloading proceeds.
3. Nitrogen is not employed as a pressurizing medium, so there is very little venting to rid the system of inert gas during unloading or loading by the supplier.
4. Safety valve discharges and other vent streams are piped to a remote, elevated location for discharge.
5. All pumps handling vinyl chloride are provided with mechanical seals to minimize leakage.
6. Vent and drain valves not required for normal operation are maintained in closed position and plugged with pipe plugs.

Tank Cars

7. The tank cars are provided with dip tubes for top discharge only. The dip tubes are provided with excess-flow check valves; if the flow exceeds a pre-established value, the valve automatically closes.
8. The tank cars are provided with a tape liquid-level device, which eliminates the need for venting vinyl chloride in determining the liquid level in the car.

UCC 092724

SPECIAL FEATURES PROVIDED TO MINIMIZE
EXPOSURE OF PERSONNEL

(cont'd.)

2.

Sphere

9. The sphere is located in a separately diked area, with sufficient capacity to contain the entire contents of the sphere.
10. Lines leading into the sphere are provided with check valves, and discharge lines from the sphere are provided with excess-flow check valves.
11. The sphere and associated piping is insulated for 15°C maximum temperature; the insulation is such that it will not decompose if subjected to fire.
12. The sphere is provided with water spray protection.
13. The sphere is equipped with a refrigerated vent condenser (-20°C) through which inert gases are vented to the atmosphere.

Scavenging System

14. A scavenger compressor system is provided to remove vinyl chloride from lines or hoses which must be disconnected during loading or unloading operations. When scavenging is completed, such lines or hoses are purged with nitrogen to a remote vent stack.

RNWheelerJr/ra

July 5, 1974

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VINYL CHLORIDE MONOMER THRESHOLD
ODOR CONCENTRATION IN AIR

The vinyl chloride monomer threshold odor concentration in air is an extremely critical value in attempting to evaluate employee vinyl chloride exposure in the early years of the polyvinyl chloride industry. Measurements of employee exposure to vinyl chloride were not made and, as a result, subjective judgments of employee exposure must be made based on whether the employee could smell vinyl chloride or not in the work place air. Based on a value for the threshold odor concentration of 260 ppm cited in the literature of the Manufacturing Chemists Association, the employee who could smell vinyl chloride in his workplace air was being exposed to more than 260 ppm.

The Union Carbide Corporation Plant Laboratory at South Charleston, West Virginia has investigated the threshold odor concentration of vinyl chloride monomer in air and has concluded that the threshold odor concentration is not 260 ppm but is approximately 2,000 ppm for a normal untrained person. This information indicates that the employee who smelled vinyl chloride in his workplace air was exposed to more than 2,000 ppm instead of more than 260 ppm as was previously believed.

UCC 092726

2.

The Laboratory report, showing the results of the Union Carbide Corporation study of vinyl chloride monomer threshold odor concentration in air, is attached.

RNWheelerJr/ra

July 5, 1974

Attachment

UCC 092727