



PPG INDUSTRIES, INC. CHEMICAL DIVISION - U.S. P. O. BOX 1000 LAKE CHARLES, LA. 70602

December 6, 1985

Mr. John T. Barr
Air Products and Chemicals
Corporate Environmental
P. O. Box 538
Allentown, PA 18105

Dear John,

I circulated the VCM storage guidelines and got a few comments and typo corrections. A copy is attached. Do you have a copy of PPG's VCM Manual? If not, Roy Stack in Pittsburgh, telephone (412)434-2403, can send you one. I sent some comments to Mark Tawney of BFG a few years ago after they made the presentation at VCSA on the spill from the sphere. A copy of my letter is attached.

If you have any questions on this, please give me a call at (318)491-4810.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Ben D. Reynolds', with a stylized flourish at the end.

Ben D. Reynolds

BDR/hl

attachment

File BARRLTR.BDR

SL 089316

- PB Manual - 1 page - 1/10/82
Handling & Operations
1982

PPG INDUSTRIES, INC. CHEMICAL DIVISION - U.S. P. O. BOX 1000 LAKE CHARLES, LA. 70602

January 10, 1983

Mr. Mark D. Tawney
The B. F. Goodrich Company
Chemical Group
6100 Oak Tree Boulevard
Cleveland, OH 44131

Dear Mr. Tawney:

I appreciate you sending me a copy of your "Vinyl Chloride Storage Tank Safety Standard". I have forwarded a copy to our Superintendent of Loss Prevention and Industrial Engineering. At the present time PPG does not have a written standard for VCM storage vessels, except for some guidelines written in 1978 for storage of large quantities of refrigerated flammable. These guidelines were developed prior to design and construction of our low temperature VCM storage facility which was started up in 1981. We have, however, addressed most of the items in your safety standard either as a result of insurance or code requirements, or as indicated by past experience.

Some other safety/reliability items worth considering are:

1. No threaded connections should be attached to the tank.
2. Each vessel opening should be a minimum of 1½" pipe size and have a flanged valve attached directly to the vessel.
3. Thermowells should be welded on to flanges, i.e. no wells simply screwed into drilled and tapped flanges or screwed into threaded couplings on the vessel.
4. The only three-way, two-port, full-bore, transflow valve we have approved for installation beneath relief valves is a KTM Model #E03162L/FS-32GJ-15-S. The other valves we have looked at either had reduced port openings or could isolate the vessel from the relief valves in certain positions.
5. We bench test safety relief valves on storage vessels every two years.
6. We feel proof-testing of critical instrumentation on storage vessels is very important. Critical alarms (high level, high pressure, etc.) are tested every 6 months. Vapor detectors are tested and calibrated every 3 - 4 months.

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Tawney, Mark D.
Page 2

7. We experienced a lot of problems with the Continental rupture discs beneath the SRV's on our low-temperature VCM tanks. They supplied high pressure vacuum supports with the low pressure discs. The membrane would rupture at the correct pressure, but the vacuum support would not go, even at twice the rated pressure. We feel confident this problem has been resolved for us, but it would be worth checking if you have any Continental discs in the 2 - 15 psig range.

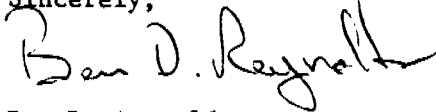
You may be interested in some British publications which pertain to storage of VCM or other flammable liquids.

1. "Guides to Safe Practice for Chemicals - Precautions Against Fire and Explosion - Vinyl Chloride", The Chemical Industry Safety and Health Council of the Chemical Industries Assoc. Ltd., Alembic House, 93 Albert Embankment, London, SE1 7TU. (1978)
2. "Guide for the Storage and Use of Highly Flammable Liquids", Chemical Industry Safety and Health Council of the Chemical Industries Assoc. Ltd - (address same as above). (November, 1977)

If you have any further questions or comments please feel free to call me
(A.C. 318-491-~~4930~~)

4810

Sincerely,



Ben D. Reynolds

SL 089318

Section 8

SHIPPING, LABELING AND HANDLING

8.1 Storage

8.1.1 General

Vinyl chloride storage areas should always be selected to comply with all applicable local codes and regulations, especially those involving occupational health, environmental control, hazardous materials and fire prevention. Organizations such as The National Fire Protection Association, The National Board of Fire Underwriters and the Factory Insurance Association can be consulted about proper site selection.

8.1.2 Conditions of Storage

(A) Vinyl chloride is a very volatile, toxic and flammable gas at normal atmospheric conditions. Vinyl chloride may be stored for reasonable periods of time (one year) without danger from the hazardous decomposition or polymerization of vinyl chloride when kept in contact with ferrous materials and in the absence of air, oxygen, water, light or excessive heat.

Containers and vessels used for handling vinyl chloride at ambient temperatures are usually under pressure. Nitrogen blanketing may be employed to increase the storage pressure in order to facilitate tank pumping operations. Refrigeration can be used to maintain the storage temperature within an acceptable range - below 50° and preferably between 0°C and 20°C.

Vinyl chloride, properly stored, uninhibited either under refrigeration or at normal atmospheric temperature, should be checked regularly for the presence of polymers.

(B) All piping, instrument leads, storage tanks, relief devices and other equipment employed to handle vinyl chloride should be constructed of recommended materials. (See Section 7.2) This equipment should be designed to withstand a full vacuum, if practical, or a working pressure of at least 100-150 psi conforming to the ASME code for unfired pressure vessels or any code applying to the locale of planned storage. Vapor recompression or refrigerated storage tanks can be designed, however, for lower operating pressures.

Shut-off valves and control valves should be of steel or a suitable alloy not containing copper, and these valves should be designed for working pressures of at least 150 psi. All welded construction is recommended to insure a

CAST IRON
SHOULD NOT BE
USED BECAUSE
FRACTURE COULD
RESULT IN A
MAJOR SPILL

8.1 Storage (continued)

8.1.2 Conditions of Storage (continued)

leakproof integrity. Wherever possible, all liquid inlet lines should enter the bottom or extend to the bottom of the storage vessels. This contributes to the guarding against the accumulation of static electricity. All equipment should be properly grounded and bonded with resistance to ground never exceeding 25 ohms. The stand leg should have an opening in it near the top of the tank to act as a vacuum breaker and to help prevent blowback. All electrical wiring, lighting and equipment should comply with NEC requirements. Vinyl chloride tanks should be painted with white or other heat reflective paint.

(C) All storage areas should have installed an appropriate water spray system or automatic sprinkling system or other special fire extinguishing systems which are suitable for use with Class B fires. Portable fire extinguishers of the carbon dioxide or dry chemical type should be readily accessible to personnel in these areas. (See Section 5)

Why not say Class 1, Group D, div. 1

Diking and/or draining to a safe location should be provided in all storage areas to completely confine and dispose of the liquid in the event of a major spill or vessel rupture.

8.1.3 Isolation

Vinyl chloride storage areas should be selected and constructed in accordance with local codes or authorities having jurisdiction. Such highly volatile and flammable materials should be stored outside of buildings. Preferably, vinyl chloride storage tanks should be segregated away from major process units. Process units such as furnaces or reactors, which have a higher than average fire or explosion risk potential, should be situated as far from such storage tanks as practical. All potential ignition sources should be eliminated from such storage areas. Cylinders containing vinyl chloride should be stored in a vertical position, outside of buildings and in an isolated and well ventilated area. It is best to store cylinders in the open, but provision should be made to shield them from the sun's direct rays and to prevent the accumulation of dirt, snow, water or ice on their valves or safety devices. Vinyl chloride storage areas should be restricted to authorized personnel only and are often classified as "regulated areas" per OSHA.

8.1 Storage (continued)

8.1.4 Regulatory Aspects

(A) 20 CFR 1910.1017 outlines the scope, application and specific requirements of the Occupational Safety and Health Standard for Vinyl Chloride.

Specific sections of this standard provide for personnel exposure limits, regulating areas to authorized individuals, environmental monitoring, respiratory protection, labeling, etc. A vinyl chloride program must be established and comply with all the requirements of 29 CFR 1919.1017.

(B) 40 CFR Part 61 "The National Emission Standards for Hazardous Air Pollutants" outlines the rules and regulations governing vinyl chloride emissions that have been established by the Environmental Protection Agency. The provisions of this standard should be complied with by the owner or operator of a vinyl chloride plant.

8.1.5 Compatible and Dangerously Reactive Materials

Vessels used for vinyl chloride should be only used for vinyl chloride. They must be purged with a dry inert gas until free of oxygen ($<1,000$ ppm) prior to filling. VCM is generally non-corrosive at normal atmospheric temperatures when dry (moisture free). However, mild to appreciable corrosion has been reported when vinyl chloride is wet even at ordinary temperatures. This may be due to the presence of impurities. In contact with water at elevated temperatures vinyl chloride accelerates corrosion of iron and steel. Acetylene as an impurity in vinyl chloride may form an explosive compound (acetylide) when exposed to copper or copper alloys.

8.2 Labeling and Identification

The statements and items listed below summarize the major labeling requirements; however, they are not necessarily complete or comprehensive. It is recommended that the Federal Code of Regulations be consulted for the specific details and labeling requirements of the Department of Transportation, OSHA and the Coast Guard.

8.2.1 Department of Transportation Requirements - Coast Guard.

8.2.1.1 Cylinder by Water, Land or Air

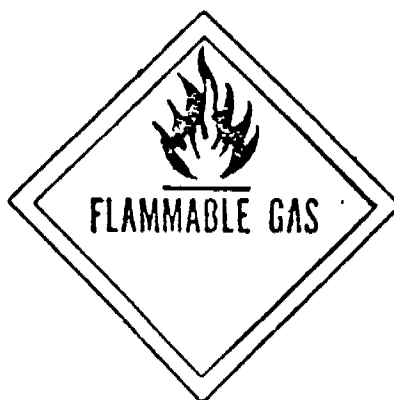
49 CFR 172.101 - Each container and overpacked cylinder containing vinyl chloride (including tank cars) shall carry a label "Flammable Gas" and a name "Vinyl Chloride" as shown on the outside of any shipping container and on any shipping papers.

8.2 Labeling and Identification (continued)

49 CFR 172-417 - Small cylinders should have a four-inch "Flammable Gas" label which is red in color and has black printing and cylinder marked with "Vinyl Chloride".

§172.417 FLAMMABLE GAS label.

(a) Except for size and color, the FLAMMABLE GAS label must be as follows:



(b) In addition to complying with §172.407, the FLAMMABLE GAS label must be red. The printing and symbol must be black.

49 CFR 173-306 - Exceptions from Department of Labor labeling requirements.

49 CFR 172.400 - General labeling requirements, placement of labels.

49 CFR 172.326 - Any portable tank (cylinder) containing more than 1,000 pounds of vinyl chloride must be marked in letters two inches or more in size with the shipping name "Vinyl Chloride" and have the Flammable Gas label affixed.

Any truck moving the portable vinyl chloride containing tank must be placarded on the two sides as well as front and rear with "Flammable Gas" placard. (Paragraph 172.515 and Appendix B)

The square on the point placard should be made from tagboard and have a size 10 3/4" by 10 3/4". It should withstand thirty days open weather exposure. The letters on this placard should be red in color with white lettering.

8.2 Labeling and Identification (continued)

8.2.1.2 Barge in Bulk

46 CFR 151.45-2 (e) Cargo Signs and Cards. Warning signs shall be displayed on the vessel, port and starboard facing outward without obstructions at all times except when the vessel is gas free

46 CFR 151.45-7 Shipping Papers. Each barge carrying dangerous cargo shall have on board a bill of lading manifest or shipping document giving the shipper, loading point location and the kind, grade and approximate quantity by compartment of each cargo in the barge

46 CFR 151.50-34 (h) The words "Cancer-Suspect Agent" must be added to the warning signs required by 46 CFR 151.45.2 (e).

8.2.1.3 Ship in Bulk

46 CFR 35.30-1 (b) General Safety Rules. A sign shall be displayed to warn persons approaching the gangway while a vessel is moored or anchored unless it is empty and gas-freed. The sign shall state in letters not less than two inches high substantially as follows:

WARNING

NO OPEN LIGHTS

NO SMOKING

NO VISITORS

46 CFR 151.45-2 (e) 3 A cargo Information Card for each cargo regulated by this subchapter shall be carried on the bridge or in the pilot house of the towing vessel readily available for use by the person in charge of the watch

46 CFR 40.15-1 (b) and (c) The words "Cancer-Suspect Agent" must be added to the warning sign required by 46 CFR 35.30-1 (b). Signs bearing the legend:

Cancer-Suspect Agent in This Area

Protective Equipment Required

Authorized Personnel Only

must be posted whenever hazardous operations, such as tank cleaning, are in progress.

8.2.1.4 Portable Tanks. Portable tanks are not authorized for use with vinyl chloride.

8.2 Labeling and Identification (continued)

8.2.2 MCA Recommended Label

8.2.2.1 The Manufacturing Chemists Association recommends that all containers of vinyl chloride should bear a label as shown. The text of the label is designed for the product as shipped for industrial use. It should be used in addition to or in combination with any specific wording required by law. Since individual statutes, regulations or ordinances may require that particular information be included in a label, that certain information be displayed in a particular manner, or that a specific label be affixed to a container, the use of this label will not necessarily insure compliance with such laws.

VINYL CHLORIDE

**DANGER! EXTREMELY FLAMMABLE LIQUID AND GAS
UNDER PRESSURE**

HARMFUL IF INHALED

**MAY POLYMERIZE VIOLENTLY UNDER FIRE
CONDITIONS OR LOSS OR REMOVAL
OF INHIBITOR**

Keep away from heat, sparks, and open flame.

Keep container closed.

Use with adequate ventilation.

Avoid breathing vapor.

Avoid contact with skin.

Keep cylinder out of sun and away from heat.

Container should be grounded when being emptied.

Never drop cylinder.

FIRST AID: If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.

In case of:

Fire — Use water spray, dry chemical, or CO₂.

Spill or Leak — For small spills, evacuate area and permit to evaporate. For large spills or leaks, evacuate area. Dike or flush to ground and let evaporate. Do not flush to sewer because of explosion hazard.

MCA Chemical Safety Data Sheet SD-56 available

8.2 Labeling and Identification (continued)

8.2.3 OSHA Labeling Requirements

8.2.3.1 The Occupational Safety and Health Administration (OSHA) is authorized by the Occupational Safety and Health Act of 1970 to establish occupational safety and health standards.

29 CFR Part 1910.1017 lists all the requirements for the control of employee exposure to vinyl chloride. The requirements of this health standard include environmental monitoring, the establishment of regulated areas, training and use of specific signs and labels.

8.2.3.2 Entrances to regulated areas* shall be prominently posted with legible signs bearing the legend:

Cancer-Suspect Agent Area

Authorized Personnel Only

8.2.3.3 Areas containing hazardous operations or where an emergency** currently exists shall be posted with legible signs bearing the legend:

Cancer-Suspect Agent in This Area

Protective Equipment Required

Authorized Personnel Only

8.2.3.4 Containers of polyvinyl chloride resin waste from reactors or other waste contaminated with vinyl chloride shall be legibly labeled:

Contaminated with Vinyl Chloride

Cancer-Suspect Agent

8.2.3.5 Containers of polyvinyl chloride shall be legibly labeled:

Polyvinyl Chloride (or Trade Name)

Contains

Vinyl Chloride

Vinyl Chloride is a Cancer-Suspect Agent

*Regulated areas means any area where vinyl chloride concentrations may be in excess of the permissible exposure limit.

**Emergency means any occurrence such as, but not limited to, equipment failure or operation of a relief device which is likely to or does result in massive release of vinyl chloride.

8.2 Labeling and Identification (continued)

8.2.3 OSHA Labeling Requirements (continued)

8.2.3.6 Vinyl chloride shall be legibly labeled either

Vinyl Chloride

Extremely Flammable Gas Under Pressure

Cancer-Suspect Agent

or in accordance with 49 CFR Parts 170-189 with the additional legend applied near the label or placard

Cancer-Suspect Agent

8.2.3.7 No statement shall appear on or near any required sign, label or instructions which contradicts or detracts from the effect of any required warning, informations or instructions.

All transportation equipment (tank trucks, tank cars, barges or ships) not subject to labels as specified above shall be labeled in accordance with the requirements set forth in applicable Department of Transportation and United States Coast Guard regulations.

Department of Transportation Requirements - Each container of vinyl chloride including tank cars shall carry an identifying label.

The proper shipping name, Vinyl Chloride, as shown in the commodity list (172.101) must be used and shown on the outside shipping container per paragraph 172.300.

Unless excepted each individual container must bear the FLAMMABLE GAS label as described in paragraph 172-417.

Department of Transportation 172.328 requires that tank motor vehicles transporting vinyl chloride shall be marked on both sides and at the front and rear with letters at least four inches high with words "Vinyl Chloride". The words "Flammable Gas" must be displayed on other motor vehicles transporting 1,000 pounds or more gross weight per paragraph 177.823 (a).

Each railroad car must bear the "Flammable Gas" placard per paragraph 177.823 (a).

Paragraph 173.29 (f) specifies that an "Empty" label must be applied to containers which have been emptied and on which the old label has not been removed, obliterated or destroyed. It must be so placed on the container to completely cover the old label.

8.2 Labeling and Identification (continued)

8.2.3 OSHA Labeling Requirements (continued)

8.2.3.7 Paragraph 172.510 (c) specifies that a "Flammable Gas-Empty" placard shall replace or cover the "Flammable Gas" placard on the railroad tank car which has been emptied. *Shaw m.*

The labels used should also conform with all other Federal, State and Local regulations relating to vinyl chloride such as the Federal Insecticide, Fungicide and Rodenticide Act; The Federal Hazardous Substances Act; The Federal Food, Drug and Cosmetic Act and other similar state and local legislations. *Shaw m.*

8.2.3.8 The Manufacturing Chemists Association also provides cards (Chem-Cards) containing information concerning the material as well as suggestions for safety precautions and emergency procedures. A copy of such a card is shown. These are of particular value accompanying bulk shipments.

VINYL CHLORIDE

Compressed, liquefied gas; sweet odor. Gas is heavier than air.

HAZARDS (CANCER SUSPECT AGENT)

FIRE

Extremely flammable. May be ignited by heat, sparks or open flame. Burning releases hydrogen chloride gas which is extremely irritating and corrosive. Fire may cause violent rupture of tank.

EXPOSURE

Vapor harmful. Liquid may cause skin or eye injury similar to frostbite.

IN CASE OF ACCIDENT

IF THIS HAPPENS



For assistance, phone
CHEMTREC
toll free, day or night
800-424-9300

DO THIS



SPILL or LEAK

Shut off ignition. No smoking or flares. Keep people away. Keep upwind. Shut off leak if without risk. Wear self-contained breathing apparatus and full protective clothing. Flush area with water spray. Run-off to sewer may create explosion hazard; notify authorities.

FIRE

Do not put out fire until leak has been shut off. On small fire use dry chemical or CO₂. On large fire use water spray. Wear self-contained breathing apparatus. Tanks in massive flame contact may rupture violently unless cooled by straight streams of water. Use unmanned monitor nozzle. Apply from side. Keep clear of tank ends. Otherwise, withdraw from area and let fire burn.

EXPOSURE

Remove to fresh air. If unconscious, call a physician. If not breathing, apply artificial respiration, oxygen. In case of contact with liquid, thaw frosted parts with water. In case of exposure to gas from fire, administer oxygen if breathing is difficult.

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8.3 Non-Bulk Containers

8.3.1 General

In many of the specific steps involved in the handling, loading, sampling and process of vinyl chloride, there are points of potential employee exposure to vinyl chloride monomer. Each facility working with vinyl chloride should identify what potential exposure points may exist and perhaps be peculiar to their individual plant operations. When necessary, engineering, work practice and personnel protective controls must be provided as outlined by the OSHA vinyl chloride standard to control employee exposures to, at or below the permissible exposure limit.

8.3.2 Cylinders

8.3.2.1 Cylinders should not be filled except with or by the consent of the owner and then only in strict accordance with the applicable Department of Transportation and OSHA regulations.

8.3.2.2 Areas where cylinders are connected or stored should have sufficient ventilation to prevent vinyl chloride concentrations from exceeding the OSHA permissible exposure limit.

8.3.2.3 Valve protection caps must always be kept securely in place except when the vinyl chloride containers are connected to piping, apparatus or equipment. As soon as the cylinder is disconnected the protective cap must be replaced. Empty vinyl chloride cylinders must be securely closed and capped. Air must not be allowed to enter the vessel.

8.3.2.4 Full or partly emptied cylinders should not be returned without permission of the supplier. Such cylinders must be shipped as full vinyl chloride cylinders and correspondingly handled, labeled and tagged.

8.3.2.5 In shipping vinyl chloride cylinders, the bill of lading should give cylinder identification number. For each cylinder shipped, show the name of the consignee and indicate whether the cylinder is empty or full.

8.3.2.6 Department of Transportation approved cylinders containing vinyl chloride shall be legibly labeled in accordance with the requirements of OSHA and the Department of Transportation. (See Section 8.2)

8.3.2.7 Magnets or slings should never be used to unload cylinders. When transporting by crane or derrick a suitable platform, cradle or boot should be used.

8.3.2.8 Care should be exercised not to drop cylinders or otherwise handle them roughly.

8.3 Non-Bulk Containers (continued)

8.3.2.9 Cylinders may be moved by tilting and rolling them on their bottom edge. Dragging and sliding them should be avoided.

8.3.2.10 When cylinders are transported by hand truck, they should be held securely in position by means of a locking clamp, chain or other suitable holding device.

8.3.2.11 Cylinders should never be used as rollers for moving any object or material.

8.3.2.12 Avoid disturbing the fusible plug. The safety device should be tagged in order to differentiate it from the discharge connection.

8.3.2.13 Check valves must be installed in feed lines from the cylinder to prevent the reactants from entering the cylinder.

8.3.2.14 Cylinders should be provided with pressure regulators as recommended by the supplier.

8.3.3 Sample (Bomb) Cylinders

Where applicable, the recommendations set forth for cylinders in the preceding section also apply to sample bombs.

8.3.3.1 Stainless steel sample pressure bombs meeting the requirements of Department of Transportation regulation 3B-400 should be used to take quality control vinyl chloride monomer samples. Samples must be taken in bombs that are dedicated to vinyl chloride service. A closed loop sampling system which is designed to include the sample container is preferred in order to minimize the venting of vinyl chloride to the atmosphere.

8.3.3.2 Person(s) directly involved in the collection or analysis of vinyl chloride samples for quality control purposes should wear NIOSH/MESA approved respiratory protection consistent with the requirements of the OSHA vinyl chloride standard. The type of respiratory device utilized should reflect actual or reasonably anticipated vinyl chloride exposure levels.

8.3.3.3 All quality control testing and analyzing should be performed in a laboratory equipped with a chemical laboratory hood having a capture velocity adequate to collect vinyl chloride vapors under conditions prevailing in the laboratory. The discharge from the laboratory hood and from the analytical test instruments shall be designed so that vinyl chloride vapors do not re-enter a nonregulated area.

8.3.3.4 All quality control sampling containers (bombs) should be routinely inspected to assure the integrity of the valves and for leakage.

8.4 Bulk Transport

8.4.1 General

In many handling and unloading steps there are potential points of exposure to vinyl chloride monomer. Consult with the technical service staff of the supplier regarding where monomer unloading exposure points may be in your plant. Check also for other exposure points that are peculiar to individual plant operations.

Design of bulk transport facilities varies and unloading procedures are usually specified by the supplier. Complete understanding between the supplier and the user with regard to equipment and procedures is essential to safety of the transfer operation.

Loading or unloading bulk containers should be considered a hazardous operation and OSHA regulations regarding signs, barricades and respirator use followed.

7
see 8.4.2

1. EPA does not approve control devices. The control device used must meet the emission levels.

2. Allow no vehicular traffic in the area during transfer. If this cannot be done, minimize and control traffic by temporary road blocks.

3. If a sample is required before transfer for testing purposes, a stainless steel sample bomb meeting the Department of Transportation's requirements and dedicated to vinyl chloride service should be used. A closed loop sampling system is preferred. The operator taking the sample must use a suitable respirator and appropriate personal protective equipment during the period of sampling.

Bulk containers delivered with defective valves or other equipment should be held pending instructions from the owner. Only such actions should be taken that will provide for control of immediate safety problems such as obvious leaks and spills.

8.4 Bulk Transport (continued)

8.4.1 General (continued)

In these cases remove sources of ignition. Keep people away. Control the leak by plugs, valves or patches to the extent that the immediate hazard is controlled. Personnel potentially exposed to vinyl chloride vapor should wear NIOSH/MESA approved air supplied respirators.

8.4.2 Miscellaneous Items

Where access to the top of the tank car or truck is needed, the spot should be provided with stairs and a platform of non-combustible construction. Overhead piping and equipment should be counterbalanced for ease of handling.

An emergency shower and eye bath should be directly accessible and within twenty-five feet of the loading or unloading spot.

Fittings - The packing and lubricant for valves and piping must be of a material recommended for vinyl chloride handling.

inconsistent

*see
previous
page*

Pumps and compressors must be equipped with double mechanical seals on packing glands. Space between the seals must be vented to an EPA-approved control device or purged with a pressurized fluid so that there is no external leakage of vinyl chloride.

Unloading or loading piping should be provided with excess flow check valves to control spills in the event of a line break. All unloading or loading piping must be attached to an EPA-approved control system to limit atmosphere emissions to 0.13 FT³ at STP for each disconnect.

The use of slip gauges is forbidden unless EPA-approved control devices are provided to control the emissions.

8.4.3 Tank Trucks

8.4.3.1 Tank trucks should be visually inspected for leaks and to confirm the contents before they are allowed to enter the plant. Unloading or loading should be performed only during daylight unless the working areas are adequately lighted.

8.4.3.2 The tank truck pad should provide two feet clearance on each side of the truck and four feet at each end. The pad should be sloped to drain spills away from the truck and exposed structures. Tank truck wheels should be blocked and brakes set to prevent movement during loading or unloading and the engine stopped. If the tractor must be separated from the trailer, this must be done before making any connections and place an adequate brace under the front end.

8.4 Bulk Transport (continued)

8.4.3.3 Static electricity is often generated by the tank truck in transit or it may be generated by the loading or unloading operation. All piping, tanks and structures should be electrically bonded by conductors that are adequate for power or lightning protection before any work is initiated. (See NFPA #77).

8.4.3.4 All sampling must be done with EPA-approved systems to minimize vinyl chloride emissions to the atmosphere.

8.4.3.5 Unloading or loading operations should conform to the owner or operators instructions. On completion of the operation, loading or unloading hoses must be evacuated as noted previously and wheel blocks removed.

8.4.3.6 The truck engine should be started and the truck removed only after all connections are severed and the absence of flammable gases confirmed by test.

8.4.4 Tank Cars

Tank cars are the most commonly used bulk container for vinyl chloride shipment. All are unloaded from the top through one or both of the liquid eductor tubes. A third valve provides access to the vapor space of the car for purposes of padding or pressurizing the car to prime the unloading pump. Sampling slip gauging and unloading hose emissions are subject to the same EPA limitations noted for tank trucks.

8.4.4.1 Shippers and/or owners instructions should always be followed and all caution markings on both sides of the tank and dome should be read and observed. If inspection shows the car has faulty equipment or is leaking, the shipper should be contacted for instructions. Shippers' plants and procedures vary; thus, instructions should be obtained regarding loading or unloading a vinyl chloride tank car.

8.4.4.2 The car unloading track should be level and the engine crew should accurately spot the car at the unloading lines.

8.4.4.3 The tank car brakes must be set and the wheels blocked prior to hookup of the pipelines. Unless the car is protected by a closed locked switch, derails should be placed approximately one car length from each end of the car.

8.4.4.4 Caution signs and warning lights prescribed by Department of Transportation regulations must be placed at the derails on the track to warn persons or trains approaching the car from open end or ends of the siding. These must remain in place until the car is ready to be moved.

8.4 Bulk Transport (continued)

8.4.4.5 The contents of the car should be verified by checking the car number with the shipping papers. Many companies also sample the contents for analysis. Failure to verify the car contents can lead to serious and hazardous mixing of reactive chemicals.

8.4.4.6 Typical Unloading Situation

Tank cars of vinyl chloride are filled with liquid up to no more than 86% of the water weight capacity of the tank. Vinyl chloride vapor occupies the space above the liquid. Air or oxygen must not be introduced during unloading or storage to prevent formation of a flammable mixture or premature polymerization. Purge all lines thoroughly with nitrogen before hooking up. Use nitrogen with a maximum of ten ppm oxygen. Nitrogen purging can be minimized by sealing the line and alternately pressurizing with nitrogen and bleeding off the nitrogen to a remote recovery system or incinerator.

Remove the threaded pipe plugs on the liquid and gas valves cautiously and connect the liquid unloading line and the vapor padding line. The vapor pressure is needed to prime the centrifugal forwarding pump, if one is used. To reduce pressure drop, locate the pump as close to the tank car as possible. Some installations have a compressor on the vapor line from the storage tank in addition to the pump. In warm climates, a compressor may be used alone without a pump, but in cold weather a pump is usually needed - with or without the compressor - to facilitate unloading. The vapor pressure used for padding should not exceed 225 psig. Never apply heat to accelerate the unloading of a vinyl chloride tank car.

To obtain flexibility in the unloading system, either stainless steel hose or steel pipe with flexible joints can be used. The flows of vinyl chloride from the tank car should be regulated by a valve in the transfer line. If the discharge rate suddenly becomes too great, an excess flow check valve in the tank car will close. To re-open this valve, close the unloading connection valve until the pressure is equalized.

Start unloading by slowly opening the vapor padding connection valve to the car. If it is necessary to discontinue unloading for any reason, close all valves tightly and disconnect all unloading connections.

The lines leading from the unloading connection valve and the padding connection valve should be purged with nitrogen so that the vinyl chloride monomer vapor in those lines is transferred to the recovery system.

Check inventory in the bulk storage vessel to ensure that it can hold the contents of the tank car.

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8.4 Bulk Transport (continued)

8.4.4.6 Check the storage tank frequently to determine when the tank car is almost empty. Completely unload the tank car; it should not be used for storage.

A pressure gauge on the unloading line is the best way to indicate when all the liquid has been emptied from the car.

After the car is emptied, stop the transfer pump. Close the padding connection valve and then the unloading connection valve at the top of the car. After this, close all other valves in the vinyl chloride line.

The lines leading from the unloading connection valve and the padding connection valve should be purged so the vinyl chloride monomer vapor in those lines is transferred to the recovery system.

Check the vinyl chloride monomer concentration to make sure there are no invisible leaks from valves. Wear respiratory protection if there is any leakage. Take care of leaks as recommended.

Do not allow tank car to stand with unloading connections attached after unloading has been completed. Remove all lines from the car and disconnect grounding wires.

See Note
P. A-42

Reverse the "Flammable Gas" placard on the car so that it reads "Flammable Gas-Empty".

IMPORTANT Leave at least 5-10 psig of vinyl chloride vapor pressure in the empty tank car being returned after closing and sealing all openings. The pressure is necessary to prevent air from entering the car.

8.5 Shipping

8.5.1 Department of Transportation Classification and Regulations

Vinyl chloride is classified by the United States Department of Transportation as a flammable gas. When shipped by rail, water or highway it must be packaged in authorized containers and shippers must comply with Department of Transportation regulations regarding packaging, loading, handling, labeling, marking and placarding. (R. M. Graziano's Tariff No. 31, 1977 is a source of condensed Department of Transportation Regulations for Hazardous Materials.)

8.5 Shipping (continued)

8.5.2 Shipping Containers - Type and Size Title 49 CFR Transportation Part 173.304

Cylinders - 4B150, 4BA225, 4BW225, 3A150, 3AA150,
DOT-25 and 3E-1800.

Cylinders with brazed seams are not permitted.

Maximum filling density - 84%.

Title 49 CFR Transportation Part 173.315
Requirements for Compressed Gases in Cargo Tanks
MC-330 and 331.

Maximum filling density - 84%.

Title 49 CFR Transportation Part 173.314
Requirements for Compressed Gases in Tank Cars
DOT 106A500X

Maximum filling density - 84%.

DOT 105-200W

Maximum filling density - 87%.

DOT 112A340W

Maximum filling density - 86%.

DOT 114A340W

Maximum filling density - 86%.

8.6 Transportation Emergencies

8.6.1 Assistance Available

8.6.1.1 CHEMTREC (CHEMical Transportation Emergency Center)

This center, located in Washington, D. C. at the offices of the Manufacturing Chemists Association, is manned 24 hours per day, seven days a week, and provides by telephone immediate response/action information for police, fire fighters and others concerned with the control of chemical transportation emergency situations.

8.6 Transportation Emergencies (continued)

8.6.1 Assistance Available (continued)

8.6.1.1 CHEMTREC (continued)

For assistance, dial:

*(800) 424-9300 in the 48 contiguous States of the USA.

*(800) 483-7616 in District of Columbia.

*(200) 483-7616 in Alaska.

In Canada, call Canadian Chemical Producers Association's TEAP (Transportation Emergency Assistance Plan).

*Use long distance prefix if needed.

8.6.1.2 Company Mutual Aid

A number of vinyl chloride manufacturing companies voluntarily participate in a mutual-aid organization under which, in the event of a transportation accident, the closest company vinyl chloride plant will dispatch a qualified adviser to the scene of the accident if requested to do so by the shipper of the commodity.

8.6.2 Emergency Control

8.6.2.1 Personnel Attending Accident Scene

Shippers' representatives do not take charge of emergency operations. They are present as advisers only.

8.6.2.2 Recommended Emergency Kit

The following are considered essential:

- a. Explosion meter
- b. NIOSH/MESA approved self-contained breathing apparatus
- c. Wood plugs and wood mallet
- d. Data sheet and pencil
- e. Camera and film
- f. Flashlight (Bureau of Mines approved)
- g. Rubber gloves
- h. Slicker suit
- i. Rubber overshoes
- j. Safety lines (braided stainless, plastic covered) and harness

add: ① hnu or other meter to measure low
ppm levels ^{A-52} & VEM
② Barricade tape

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8.6 Transportation Emergencies (continued)

8.6.2 Emergency Control (continued)

8.6.2.2 Recommended Emergency Kit (continued)

- k. Goggles
- l. Safety hat
- m. O-rings
- n. Strap wrench
- o. Ten-inch adjustable wrench
- p. Screwdriver
- q. Ground continuity meter
- r. Large first aid kit and collapsible water container, approximately fifty gallons. The water container should be filled at the emergency site and be available for eye wash or treatment of chemical skin contacts.

8.6.2.3 Recommended Procedures

There is a kit available to cap the valves on a VC car if it has been retrofitted RJ

Leaks of Vinyl Chloride

I. Controllable Leaks

- a. Small holes: Drive wooden plugs.
- b. Larger holes: Neoprene patch, bonded or chained to tank. Special rigs should be left to the judgment of the man at the scene.
- c. Jagged holes are difficult to close.
- d. Potassium bicarbonate will extinguish a vinyl chloride fire but reignition often occurs. Use it around valves if it appears that a leak can be subsequently controlled.

II. Uncontrollable Leaks - No Fire

- a. Evacuate area and isolate.
- b. Remove sources of ignition.
- c. Control spread of vapors by water spray.

III. Uncontrollable Leaks - Fire

- a. Evacuate and isolate area.
- b. Keep adjacent cars cool, if possible, with water spray.
- c. Keep nonessential personnel away.
- d. Treat a non-burning tank car in vicinity of fire as if it is about to rupture.
- e. If vinyl chloride gets to a sewer, evacuate area and flush sewers with fire hoses.

8.6 Transportation Emergencies (continued)

8.6.2 Emergency Control (continued)

8.6.2.4 Spilled Vinyl Chloride

Spilled vinyl chloride should not be deliberately ignited.

Note: Water spray will vaporize pools of VCM

8.6.2.5 Recovery or Removal of Vinyl Chloride

Depending upon circumstances and extent of car damage, vinyl chloride may be recoverable, but recovery should not be the determining factor in controlling the situation.

- If car condition permits, transfer contents to empty tank car using nitrogen pressure.
- If car is ruptured, attempt to use pump with flooded suction.
- If pumping is impractical, use water or oil to float out remainder of vinyl chloride.
- Fill empty tank with water or nitrogen.
- If a vinyl-ice mixture forms, keep a water stream on the tank until it dissipates.
- Handling of vinyl chloride in a damaged car can be influenced by weather conditions. At low temperatures, since vaporization is reduced, patch tank, if possible, so that it can be moved.

8.6.3 Marine Emergencies

8.6.3.1 United States Coast Guard regulations (reference Vinyl Chloride Coast Guard Standard, i.e. Parts 40, 151, and Chapter 1 of Title 46 CFR. . .) require that a cargo information card for vinyl chloride be carried aboard the tank barge mounted near a warning sign and in such a position as to be easily read by a man standing on the deck of the barge. The cargo information card shall also be carried on the bridge or in the pilot house of the towing vessel. Copies are available from the Manufacturing Chemists Association.

8.6.3.2 Special Safety Equipment

In addition to normal safety equipment provided at the dock, the following special items should be available:

- NIOSH/MESA approved self-contained breathing equipment (at least two and two spare bottles).
- Explosimeters.
- Ground continuity meter.

8.6 Transportation Emergencies (continued)

8.6.3 Marine Emergencies (continued)

8.6.3.2 Special Safety Equipment (continued)

- d. Water with an appropriate number of nozzles.
- e. Dry chemical fire extinguisher.
- f. MCA Chemical Safety Data Sheet SD-56 and Cargo Information Card CIC-80.

8.6.3.3 Recommended Emergency Procedures

8.6.3.3.1 Leaks of Vinyl Chloride

I. General - Activate Alarm

II. Controllable Leaks - No Fires

- a. Evacuate area of nonessential personnel and isolate leak from source.
- b. Eliminate ignition source.
- c. Control spread of vapors by water fog.
- d. Attempt to repair leak using adequate safety protection procedures.

III. Uncontrollable Leaks or Ruptures - No Fires

- a. Evacuate area of nonessential personnel and isolate area.
- b. Remove all sources of ignition.
- c. Use water spray to prevent accumulation of liquid and to dissipate vapor cloud. It is not recommended that the ship's fire water supply be hooked into the city water supply.

IV. Uncontrollable Leaks - Fire

- a. Isolate area.
- b. Evacuate area except for emergency personnel.
- c. Use water fog on fires and fumes (do not extinguish fire unless leak can be controlled).
- d. Use copious amounts of water to keep adjacent areas cool.
- e. Treat adjacent tanks as if about to rupture.
- f. Make provisions to minimize the mixing of air with vinyl chloride vapor in confined spaces and the burning tanks or line (water, N₂ or inert gases).

8.6.3.3.2 Spilled Vinyl Chloride

Spilled vinyl chloride should not be deliberately ignited.

8.6 Transportation Emergencies (continued)

8.6.3.3 Recommended Emergency Procedures (continued)

8.6.3.3.3 Recovery or Removal of Vinyl Chloride

Depending upon circumstances and the extent of the tank damage vinyl chloride may be recoverable but provisions must be made to keep air out of the tank.

- a. If tank condition permits, transfer contents to an empty tank or back to shore.
- b. If tank cannot be patched and it does not have a deep well pump or the deep well pump cannot be used, sparge heated nitrogen into the bottom of the tank to vaporize the vinyl chloride.

Add:

Sections on ① transfer lines

② Waste disposal,

③ Personal monitoring

④ Properties of VCM

See PPH Manual on VCM