



NATIONAL TRANSPORTATION SAFETY BOARD
Investigative Hearing

Norfolk Southern Railway general merchandise freight train 32N
derailment with subsequent hazardous material release and fires,
in East Palestine, Ohio, on February 3, 2023

GROUP	H
EXHIBIT	
14	

Agency / Organization

Norfolk Southern

Title

**NOAA
Cameo Chemical Datasheet
Vinyl Chloride Fact Sheet**



Chemical Datasheet

VINYL CHLORIDE



Chemical Identifiers

CAS Number

75-01-4

UN/NA Number

1086

DOT Hazard Label

Flammable Gas

USCG CHRIS Code

VCM

NIOSH Pocket Guide

Vinyl chloride

International Chem Safety Card

VINYL CHLORIDE

NFPA 704

Diamond	Hazard	Value	Description
4 2 2	Health	2	Can cause temporary incapacitation or residual injury.
	Flammability	4	Burns readily. Rapidly or completely vaporizes at atmospheric pressure and normal ambient temperature.
	Instability	2	Readily undergoes violent chemical changes at elevated temperatures and pressures.
	Special		

(NFPA, 2010)

General Description

A colorless gas with a sweet odor. Easily ignited. Shipped as a liquefied gas under own vapor pressure. Contact with the unconfined liquid may cause frostbite by evaporative cooling. Leaks may be liquid or vapor. Vapors are heavier than air. May asphyxiate by the displacement of air. Under prolonged exposure to fire or intense heat the containers may rupture violently and rocket. Suspected carcinogen. Used to make plastics, adhesives, and other chemicals.

Hazards

Reactivity Alerts

- Highly Flammable
- Polymerizable
- Peroxidizable Compound

Air & Water Reactions

Highly flammable. Forms polymeric peroxides that are explosive [Bretherick 1979. p. 164].

Fire Hazard

Special Hazards of Combustion Products: Forms highly toxic combustion products such as hydrogen chloride, phosgene, and carbon monoxide.

Behavior in Fire: Container may explode in fire. Gas is heavier than air and may travel considerable distance to a source of ignition and flash back. (USCG, 1999)

Health Hazard

INHALATION: high concentrations cause dizziness, anesthesia, lung irritation. SKIN: may cause frostbite; phenol inhibitor may be absorbed through skin if large amounts of liquid evaporate. (USCG, 1999)

Reactivity Profile

VINYL CHLORIDE is peroxidizable. Forms explosive polymeric peroxides in contact with air (in the presence of any of a variety of catalysts) [Bretherick 1979. p. 164]. Long storage in contact with air increases the concentration of the polyperoxides to hazardous levels [MCA Case History 1551. 1969]. The peroxides may initiate exothermic polymerization of the remaining material [Handling Chemicals Safely 1980.p. 958; Bretherick 1979. p. 160]. Light-sensitive. Many oxidizing agents apparently initiate polymerization (oxides of nitrogen, O₂, etc.). May react with very hot water or steam to produce toxic fumes.

Belongs to the Following Reactive Group(s)

- Halogenated Organic Compounds
- Hydrocarbons, Aliphatic Unsaturated
- Polymerizable Compounds

Potentially Incompatible Absorbents

Use caution: Liquids with this reactive group classification have been known to react with the absorbents listed below.

- Mineral-Based & Clay-Based Absorbents
- Dirt/Earth

Response Recommendations

Isolation and Evacuation

Excerpt from ERG Guide 116(P) [Gases - Flammable (Unstable); polymerization hazard]:

IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area for at least 100 meters (330 feet) in all directions.

LARGE SPILL: Consider initial downwind evacuation for at least 800 meters (1/2 mile).

FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions. (ERG, 2020)

Firefighting

Excerpt from ERG Guide 116(P) [Gases - Flammable (Unstable); polymerization hazard]:

DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.

SMALL FIRE: Dry chemical or CO₂.

LARGE FIRE: Water spray or fog. If it can be done safely, move undamaged containers away from the area around the fire.

FIRE INVOLVING TANKS: Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Do not direct water at source of leak or safety devices; icing may occur. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn. (ERG, 2020)

Non-Fire Response

Excerpt from ERG Guide 116(P) [Gases - Flammable (Unstable); polymerization hazard]:

ELIMINATE all ignition sources (no smoking, flares, sparks or flames) from immediate area. All equipment used when handling the product must be grounded. Stop leak if you can do it without risk. Do not touch or walk through spilled material. Do not direct water at spill or source of leak. Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material. If possible, turn leaking containers so that gas escapes rather than liquid. Prevent entry into waterways, sewers, basements or confined areas. Isolate area until gas has dispersed. (ERG, 2020)

Protective Clothing

Excerpt from NIOSH Pocket Guide for Vinyl chloride:

Skin: FROSTBITE - Compressed gases may create low temperatures when they expand rapidly. Leaks and uses that allow rapid expansion may cause a frostbite hazard. Wear appropriate personal protective clothing to prevent the skin from becoming frozen.

Eyes: FROSTBITE - Wear appropriate eye protection to prevent eye contact with the liquid that could result in burns or tissue damage from frostbite.

Wash skin: No recommendation is made specifying the need for washing the substance from the skin (either immediately or at the end of the work shift).

Remove: WHEN WET (FLAMMABLE) - Work clothing that becomes wet should be immediately removed due to its flammability hazard (i.e., for liquids with a flash point <100°F).

Change: No recommendation is made specifying the need for the worker to change clothing after the workshift.

Provide: FROSTBITE WASH - Quick drench facilities and/or eyewash fountains should be provided within the immediate work area for emergency use where there is any possibility of exposure to liquids that are extremely cold or rapidly evaporating. (NIOSH, 2022)

DuPont Tychem® Suit Fabrics

Normalized Breakthrough Times (in Minutes)

Chemical	CAS Number	State	QS	QC	SL	C3	TF	TP	RC	TK	RF
Chloro ethene	75-01-4	Vapor			>480	>480	>480	>480	>480	>480	>480
Vinyl chloride	75-01-4	Vapor			>480	>480	>480	>480	>480	>480	>480

> indicates greater than.

Special Warning from DuPont: Tychem® and Tyvek® fabrics should not be used around heat, flames, sparks or in potentially flammable or explosive environments. Only...

(DuPont, 2022)

First Aid

EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

SKIN: CAUTION: Exposure of skin to compressed gases may result in freezing of the skin. Treatment for frostbite may be necessary. Remove the victim from the source of contamination. IMMEDIATELY wash affected areas gently with COLD water (and soap, if necessary) while removing and isolating all contaminated clothing. Dry carefully with clean, soft towels. If symptoms such as inflammation or irritation develop, IMMEDIATELY call a physician or go to a hospital for treatment.

INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.

INGESTION: This compound is a gas, therefore inhalation is the first route of exposure.

OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

Physical Properties

Chemical Formula: C₂H₃Cl

Flash Point: -110°F (NTP, 1992)

Lower Explosive Limit (LEL): 3.6 % (USCG, 1999)

Upper Explosive Limit (UEL): 33 % (USCG, 1999)

Autoignition Temperature: 882°F (USCG, 1999)

Melting Point: -245°F (NTP, 1992)

Vapor Pressure: 3877.5 mmHg (USCG, 1999)

Vapor Density (Relative to Air): 2.21 (NIOSH, 2022)

Specific Gravity: 0.969 at 8.6°F (USCG, 1999)

Boiling Point: 7°F at 760 mmHg (NTP, 1992)

Molecular Weight: 62.5 (NTP, 1992)




Water Solubility: Slightly soluble (NTP, 1992)

Ionization Energy/Potential: 9.99 eV (NIOSH, 2022)

IDLH: A potential occupational carcinogen. (NIOSH, 2022)

AEGLs (Acute Exposure Guideline Levels)

Final AEGLs for Vinyl chloride (75-01-4)

Exposure Period	AEGL-1	AEGL-2	AEGL-3
10 minutes	450 ppm	2800 ppm	12000 ppm 
30 minutes	310 ppm	1600 ppm	6800 ppm 
60 minutes	250 ppm	1200 ppm	4800 ppm 

Exposure Period	AEGL-1	AEGL-2	AEGL-3
4 hours	140 ppm	820 ppm	3400 ppm
8 hours	70 ppm	820 ppm	3400 ppm

Lower Explosive Limit (LEL) = 38000 ppm

🔥 indicates value is 10-49% of LEL. Safety consideration against explosions must be taken into account. (NAC/NRC, 2022)

ERPGs (Emergency Response Planning Guidelines)

Chemical	ERPG-1	ERPG-2	ERPG-3	
Vinyl Chloride (75-01-4)	500 ppm ⚠️	5000 ppm 🔥	20000 ppm 🔥🔥	LEL = 36000 ppm

⚠️ indicates that odor should be detectable near ERPG-1.

🔥 indicates value is 10-49% of LEL.

🔥🔥 indicates value is 50-99% of LEL.

(AIHA, 2020)

PACs (Protective Action Criteria)

Chemical	PAC-1	PAC-2	PAC-3	
Vinyl chloride (75-01-4)	250 ppm	1200 ppm	4800 ppm 🔥	LEL = 38000 ppm

🔥 indicates value is 10-49% of LEL.

(DOE, 2018)

Regulatory Information

EPA Consolidated List of Lists

Regulatory Name	CAS Number/ 313 Category Code	EPCRA 302 EHS TPQ	EPCRA 304 EHS RQ	CERCLA RQ	EPCRA 313 TRI	RCRA Code	CAA 112(r) RMP TQ
Ethene, chloro-	75-01-4			1 pound	X	U043	10000 pounds
Vinyl chloride	75-01-4			1 pound	313	U043	10000 pounds

"X" indicates that this is a second name for an EPCRA section 313 chemical already included on this consolidated list. May also indicate that the same chemical with the same CAS number appears on another list with a different chemical name.

(EPA List of Lists, 2022)

CISA Chemical Facility Anti-Terrorism Standards (CFATS)

Chemical of Interest	CAS Number	RELEASE			THEFT			SABOTAGE		
		Min Conc	STQ	Security Issue	Min Conc	STQ	Security Issue	Min Conc	STQ	Security Issue
Vinyl chloride; [Ethene, chloro-]	75-01-4	1.00 %	10000 pounds	flammable						

(CISA, 2007)

OSHA Process Safety Management (PSM) Standard List

No regulatory information available.

Alternate Chemical Names

- CHLORETHYLENE
- CHLOROETHENE
- 1-CHLOROETHENE
- CHLOROETHYLENE
- 1-CHLOROETHYLENE
- ETHENE, CHLORO-
- ETHYLENE MONOCHLORIDE
- ETHYLENE, CHLORO-
- MONOCHLOROETHENE
- MONOCHLOROETHYLENE
- MONOCHOROETHENE
- VC
- VCL
- VCM
- VINYL C MONOMER
- VINYL CHLORIDE
- VINYL CHLORIDE MONOMER
- VINYL CHLORIDE MONOMER (VCM)
- VINYL CHLORIDE, STABILIZED