
HEALTH AND SAFETY PROCEDURE 204 – Vinyl Chloride (VCM) Safety

1.0 PURPOSE

- 1.1 The purpose of this document is to establish the requirements and responsibilities associated with the handling of Vinyl Chloride Monomer (VCM) and to satisfy the written requirement of OSHA 29 CFR 1020.1017 to have a vinyl chloride work place protection plan.

2.0 SCOPE

- 2.1 This document applies to the manufacture, packaging, repackaging, storage, handling or use of vinyl chloride or polyvinyl chloride. This does not apply to handling or use of products made of polyvinyl chloride.

3.0 DEFINITIONS

- 3.1 **Action Level** - Airborne concentration of (VCM) Vinyl Chloride Monomer of 0.5 ppm calculated as an eight-hour time weighted average (TWA).
- 3.2 **Affected Area** - Area of a known concentration of VCM as determined by GC monitoring system or portable instrument.
- 3.3 **Authorized Person** - An individual whose job duties require them to enter a regulated area or has specific employer permission to enter a regulated area.
- 3.4 **Container** - Any barrel, bottle, can, cylinder, drum, reaction vessel, storage tank that contains VCM, but does not include piping systems.
- 3.5 **Emergency** – any occurrence such as, but not limited to, equipment failure, or operation of a relief device, which is likely to, or does, result in an unknown amount, release of vinyl chloride.
- 3.6 **Exposure Limits**
- 3.6.1 **Permissible Exposure Limit (PEL) -Time Weighted Average (TWA)** - Amount of Vinyl Chloride an employee can be exposed to without respiratory protection, eight (8) hours per day, and forty (40) hours per week; for Vinyl Chloride Monomer it is 1 ppm.
- 3.6.2 **Short Term Exposure Limit (STEL)** - Amount of Vinyl Chloride an employee without respiratory protection can be exposed to for 15 minutes; for Vinyl Chloride the STEL is 5 ppm.
- 3.7 **Fabricated product** – a product made wholly or partially from polyvinyl chloride and which does not require further processing at temperatures, and for times, sufficient to cause mass melting of polyvinyl chloride resulting in the release of vinyl chloride.
- 3.8 **Hazardous operations** – any operation, procedure or activity where the release of either vinyl chloride liquid or gas might be expected as a consequence of operation or because of an accident in the operation which would result in an employee exposure in excess of the permissible exposure limits.
- 3.9 **Polyvinyl chloride (PVC)** – polyvinyl chloride homopolymer or copolymer before such is converted to a fabricated product.

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3.10 Regulated Area - An established and posted area where access is limited to authorized persons and Vinyl Chloride concentrations can be in excess of the permissible exposure limit. All process areas containing VCM will be regulated and shall be identified with signs and/or gates to restrict entry by unauthorized personnel.

3.11 Unstripped Polyvinyl Chloride (PVC) – PVC resin containing unreacted vinyl chloride monomer.

3.12 Vinyl chloride – (VCM) vinyl chloride monomer.

4.0 RESPONSIBILITIES

4.1 Health and Safety

4.1.1. Conducting exposure monitoring in accordance with OSHA's vinyl chloride regulation (29 CFR 1910.1017).

4.1.2. Assisting the production supervisors and process engineers in complying with the requirements of this program.

4.1.3. Oversee the employee monitoring program and inform employees of their exposure; advice management of potential exposure problems areas based on monitoring results; schedule required medical examinations and maintain medical/exposure records.

4.2 Operations Management

4.2.1. Ensuring that all affected employees receive annual training in accordance with the program

4.2.2. Ensuring that all affected employees receive annual physicals in accordance with this program

4.2.3. Ensuring that all containers, regulated/ hazardous operations areas, etc. are posted or labeled in accordance with this program

4.2.3. Ensuring that all personnel are meeting the requirements of this procedure and wearing the required appropriate personal protective equipment.

4.2 Employees

4.1.1. Wear the required personal protective equipment when handling VCM.

4.3 Company Physician

4.3.1 Perform and evaluate examinations as per OSHA's vinyl chloride regulation (29 CFR 1910.1017) guidelines and advise management and employees of potential health related problems based on results.

5.0 PROCEDURE



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5.1 Monitoring

- 5.1.1 A program of initial monitoring and measurement shall be undertaken to determine if there is any employee exposed without regard to the use of respirators, in excess of the action level.
- 5.1.2 Where a determination conducted under the program of initial monitoring shows any employee exposures without regard to the use of respirators, in excess of the action level, a program for determining exposures for each such employee shall be established.
- 5.1.3 Monitoring shall be repeated at least-quarterly for employees exposed, without regard to the use of respirators, in excess of the permissible exposure limits (TWA and/or STEL).
- 5.1.4 Monitoring shall be repeated not less than every six months for employees exposed, without regard to the use of respirators, at or above the action level.
- 5.1.5 Monitoring may be reduced to an annual requirement for any employee when at least two consecutive monitoring determinations, made not less than 5 working days apart, show exposures for that employee at or below the action level.
- 5.1.6 Monitoring shall be conducted (as per the program of initial monitoring) whenever there is a change in production, process or control change which may result in an increase in the release of vinyl chloride, or the employer has any other reason to suspect that any employee may be exposed in excess of the action limit.
- 5.1.7 The method of monitoring shall have an accuracy (with a confidence level of 95 percent) of not less than plus or minus 50% from 0.25 through 0.5 ppm, plus or minus 35% from over 0.5 ppm through 1.0 ppm and plus or minus 25% over 1.0 ppm.

5.2 Regulated Area (s)

- 5.2.1 Regulated areas shall be established where vinyl chloride or polyvinyl chloride is manufactured, reacted, repackaged, stored handled or used; and vinyl chloride concentrations are in excess of the OSHA-PELs.
- 5.2.2 Access to regulated areas shall be limited to authorized persons.
- 5.2.3 Currently there are no regulated areas for vinyl chloride at the Geismar facility.

5.3 Signs and Labels

- 5.3.1 Entrances to regulated areas shall be posted with legible signs bearing the legend:

**DANGER
VINYL CHLORIDE
MAY CAUSE CANCER
AUTHORIZED PERSONNEL ONLY**



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

**DANGER
VINYL CHLORIDE
MAY CAUSE CANCER
WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA
AUTHORIZED PERSONNEL ONLY**

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

**CONTAMINATED WITH VINYL CHLORIDE
MAY CAUSE CANCER**

- 5.3.4 Containers of polyvinyl chloride shall be legibly labeled per the OSHA Hazard Communication Standard (29 CFR 1910.1200(f)).

5.4 Methods of Compliance

- 5.4.1 OSHA mandates employee exposures to vinyl chloride shall be controlled to at or below the OSHA-PEL by engineering, work practice, and personal protective equipment.
- 5.4.2 Feasible (economic and/or technologic) engineering controls and work practice controls shall immediately be used to reduce exposures to at or below the OSHA-PEL.
- 5.4.3 Where feasible engineering and work practice controls are not sufficient to reduce exposures to at or below the permissible exposure limits, they shall nonetheless be used to reduce exposures to the lowest practicable level, and shall be supplemented by respiratory protection.
- 5.4.4 A written Exposure Reduction Plan will be established and implemented to reduce exposures to at or below the permissible exposure limit, or to the greatest extent possible. This written plan will be updated at least annually.

5.5 Respiratory Protection

- 5.5.1 Respiratory protection will be required where vinyl chloride concentrations exceed or have the potential to exceed the permissible exposure limits.
- 5.5.2 Respirator Selection
- 5.5.2.1. Pressure demand, self-contained breathing apparatus (SCBA) with full face-piece or airline respirator with full face-piece and five-minute escape pack is required when performing a task where there is a potential to have exposure to vinyl chloride at or above the PEL.
- 5.5.2.2. The VCM unit has strategically located full face-piece, air-purifying respirators with organic vapor/ acid gas (GMS) cartridges to be used for tasks that create obstruction hazards where access is a concern, such as ladder cage access on elevated structures.



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5.5.2.3. Air-purifying cartridges must be replaced prior to the expiration of their service life or the end of the shift in which they are first used, whichever occurs first. Service life calculations shall be determined prior to cartridge use.

Note: Cartridge Life Expectancy calculation for organic vapor/acid gas (GMC) cartridges is two hours at 10 ppm, with a 50% safety factor.

5.6 Emergency Situations

5.6.3 EMERGENCY PLAN

5.6.3.1. Evacuate personnel from the affected area

5.6.3.2. Response personnel must wear a positive pressure, full-face piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA

5.6.3.3. Response personnel must wear chemical protective clothing when the leak poses a potential for skin contact with liquid vinyl chloride.

5.6.3.4. Secure the leak

5.6.3.5. Continue to monitor the area until readings are clear

5.6.3.6. Return operations to normal state

5.6.3.7. Following the incident all affected personnel must be offered medical surveillance for vinyl chloride exposure. Affected personnel include all workers in the area at the time of release and all response personnel, regardless of respiratory protection.

5.6.4 Alarm Response Procedure

5.6.4.1. When organic vapor detector readings (portable PID or area monitor) are detected at or exceeding 5 ppm or when airborne concentrations are unknown:

5.6.4.1.1. The board operator should notify the outside operator of the respective area to secure the area by regulating or vacating the area until the cause of the alarm can be determined and notify the Shift Supervisor.

5.6.4.1.2. Utilizing supplied air respiratory protection and a direct reading instrument, such as an MX6 Industrial Scientific portable meter, capable of detecting low concentrations of vinyl chloride, the respective outside operator should proceed to the alarm location to determine the source of the leak and determine if it can be controlled. If it can be controlled, take necessary steps to control and contain the leak.

5.6.4.1.3. Use supplied air respiratory protection and the appropriate level of PPE until it is determined that the potential exposures are below the Permissible Exposure Limits.

5.6.4.1.4. Once the leak has been evaluated and controlled, the outside operator should notify the board operator.

5.7 REPORTING

5.7.1 Exposure Notification



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5.7.1.2. Exposure notifications shall be posted in the specific area where the sampling was performed. I.e. Unit control rooms.

5.7.2 Protocol for Employee Notification

5.7.2.1. The employee notification of his/her exposure measurement should be signed by the monitored employee, signifying the notification has taken place.

5.7.2.2. The signed notification forms shall be maintained in the medical record for record retention purposes.

6.0 TRAINING

6.1 Training Requirement for Vinyl Chloride and Polyvinyl Chloride Workers

6.1.1 Each employee engaged in vinyl chloride or polyvinyl chloride operations as well as emergency responders (Fire Brigade and Rescue Team) shall be provided training in a program relating to the hazards of vinyl chloride and precautions for its safe use. This training will be provided upon the employee's initial assignment and annually thereafter.

6.1.2 The training program shall include but not be limited to:

6.1.2.1 The nature of the health hazard from chronic exposure to vinyl chloride including the specific carcinogenic hazard.

6.1.2.2. The specific nature of operations that could result in exposure to vinyl chloride in excess of the permissible exposure limit and necessary protective steps.

6.1.2.3. The purpose for, proper use, and limitations of respiratory devices.

6.1.2.4. The fire hazard and acute toxicity of vinyl chloride and the necessary protective steps.

6.1.2.5. The purpose for and a description of the monitoring program.

6.1.2.6. The purpose for and a description of the medical surveillance program.

6.1.2.7. Emergency procedures.

6.1.2.8. Specific information to aid the employee in recognition of conditions that may result in the release of vinyl chloride.

6.1.2.9. A review of the OSHA Vinyl Chloride Standard (29 CFR 1910.1017)

7.0 MEDICAL SURVEILLANCE

A program of medical surveillance shall be instituted for each employee exposed, without regard to use of respirators, to vinyl chloride in excess of the action level (0.5 ppm).

7.1 The medical surveillance program shall provide each such employee with an opportunity for examinations and tests in accordance with 29 CFR 1910.1017(k).

7.2 All medical examinations and procedures shall be performed by or under the supervision of a licensed physician and shall be provided without cost to the employee at the time of initial assignment, or institution of medical surveillance.



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- 7.3 A general physical exam shall be performed with specific attention to detecting enlargement of the liver, spleen or kidneys; or dysfunction of these organs and for abnormalities in skin, connective tissues and the pulmonary system.
- 7.4 A medical history shall be taken, including the following topics:
 - 7.4.1 Alcohol intake
 - 7.4.2 Past history of hepatitis
 - 7.4.3 Work history and past exposure agents to hepatotoxic agents, including drugs and chemicals
 - 7.4.4 Past history of blood transfusions and hospitalizations
 - 7.4.5 A serum specimen shall be obtained and determinations made of:
 - a. Total bilirubin
 - b. Alkaline phosphatase
 - c. Serum glutamic oxalacetic transaminase (SGOT)
 - d. Serum glutamic pyruvic transaminase (SGPT)
 - e. Gamma glutamyl transpeptidase
- 7.5 Examinations shall be provided at least annually in accordance with 29 CFR 1910.1017(k).
 - 7.5.1 A statement of each employee's suitability for continued exposure to vinyl chloride including use of protective equipment and respirators shall be obtained from the examining physician promptly after any examination.
 - 7.5.2 A copy of the physician's statement shall be provided each employee and place in the respective medical file.
 - 7.5.3 If the employee's health would be materially impaired by continued exposure, such employee shall be withdrawn from possible contact with vinyl chloride.
 - 7.5.4 Laboratory analyses for all biological specimens included in medical examinations shall be performed in accredited laboratories.
 - 7.5.5 If the examining Physician determines that alternative medical examinations will provide at least equal assurance of detecting medical conditions pertinent to the exposure to vinyl chloride, the employer may accept such alternative examinations as meeting the requirements, if the employer obtains a statement from the examining physician setting forth the alternative examinations and the rationale for substitution. This statement shall be available upon request for examination and copying to authorized representatives of the Assistant Secretary and Director.
- 7.6 Protocol for Obtaining Emergency Medical Surveillance
 - 7.6.1 Employees exposed to a vinyl chloride emergency will be offered medical surveillance as per 29 CFR 1910.1017(k)(3) Vinyl Chloride by supervision.



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- 7.6.3 Employees that elect to receive medical surveillance will have their appointment arranged at the earliest convenience.

8.0 RECORDS

- 8.1 All records maintained in accordance to the OSHA vinyl chloride regulation shall include the name and sufficient information to allow easy cross reference to the ID number of each employee, where relevant.
- 8.2 Records of required monitoring and measuring and medical records shall be provided upon request to employees, designated representatives, and the Assistant Secretary in accordance with OSHA's Access to Employee Medical and Monitoring Records (29 CFR 1910.1020). These records shall be provided upon request to the Director. Authorized personnel rosters shall also be provided upon request to the Assistant Secretary and Director.
- 8.3 Monitoring and Measuring records shall:
- 8.3.1 State the date of such monitoring and measuring and the concentrations determined and identify the instruments and methods used.
- 8.3.2 Include any additional information necessary to determine individual employee exposures where such exposures are determined by means other than individual monitoring of employees and be maintained for not less than 30 years.
- 8.4 The monitoring/measuring records requirements are:
- 8.4.1 The airborne concentration of vinyl chloride
- 8.4.2 The date of the monitoring/measuring
- 8.4.3 The identity of the monitoring/measuring instrument
- 8.4.4 The sampling and analytical method used
- 8.4.5 The steps taken to reduce exposures to within the permissible exposure limits
- 8.5 Medical records shall be maintained for the duration of employment of each employee plus 20 years, or 30 years, whichever is longer.
- 8.6 In the event the employer ceases to do business and there is no successor to receive and retain his records for the prescribed period, these records shall be transmitted by registered mail to the Director, and each employee individually notified in writing of this requirement set forth in 29 CFR 1910.1020.

9.0 REFERENCES

Occupational Safety and Health Administration "Vinyl Chloride Regulation" 29 CFR 1910.1017 and published letters of interpretation.

10 APPENDICES

N/A



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REVISION HISTORY

Rev	Changes	Approved	Date
3	No change to current procedure.		4/5/2022
3	Removed non-applicable sections referring signage from 2016.		2/10/2021
2	Updated with assistance from Westlake's Industrial Hygienist. Added Scope, added definitions, added to Responsibility section, modified Monitoring section, added Regulated areas, modified signs and labeling section, methods of compliance, updated Respiratory protection, Updated Emergency plan section, Updated alarm response section, updated Reporting section, modified Training section, Added Protocol for obtaining emergency medical surveillance and Records section.		2/6/2020