

VII. MONITORING PROGRAM

The VCM plant monitoring program is designed to determine individual employee exposure levels. The program we have established gives valid determinations of employee exposures that are representative of their VCM concentrations during normal work activities. The selection and number of employees to be monitored will be determined by but not limited to the number of employees per shift, their duties, the areas and operation, and work practices in force.

A. General

1. Personnel exposed to vinyl chloride in excess of the permissible limit (1ppm TWA), without regard to the use of respirators, shall be monitored at least quarterly.
2. Personnel exposed to vinyl chloride in excess of the action level but less than the permissible levels, without regard to the use of respirators, shall be monitored at least quarterly.
3. Personnel exposed to vinyl chloride concentrations between 0 and .5 ppm TWA on at least two (2) consecutive monitoring determinations made not less than 5 working days apart without regard to the use of respirators may be discontinued from monitoring. The frequency of monitoring personnel in this category will be based on employee duties, employee per shift, their duties, the area or operation and work practices in force.
4. The accuracy and confidence levels of the monitoring program will comply with the federal standards as defined in OSHA standard 1910.1017 (d) (4). Samples will be analyzed in the VCM plant laboratory. The analytical method to be used will follow the procedures described in Appendix A and B, page 64 and 72. The recordkeeping and reporting requirements are discussed in Section XIII.
5. An alarm system is installed at the VCM Plant to alert employees when VCM concentrations exceed the alarm set point. This alarm system will alert supervisors to notify personnel working in areas in the plant where VCM concentrations exceed 5 ppm. Personnel in such area(s) will be instructed to take appropriate action to reduce their potential exposure level.
6. Personnel dosimeter monitoring will be the primary ambient air monitoring method of determining personnel exposures to vinyl chloride at both the plant and dock.
7. Other monitoring instruments and equipment will also be used to identify VCM concentrations above the action level and will be used as a tool to implement feasible engineering and work practice controls.

8. If a process or control change is suspected to result in an increase in the release of vinyl chloride or employee exposure above the action level, then a determination by monitoring shall be made no later than one (1) week after the change or suspected exposure.

B. Personnel Monitoring

1. Following initial monitoring, permanent, temporary and casual employees will be selected for monitoring by various job occupations/work classifications for each shift. Personnel will be monitored at random times and dates. Person(s) being monitored will be rotated within their job occupation/classification to provide monitoring measurements for everyone working in the plant in accordance with the criteria in A above.
2. A representative sample of turnaround casual employees will be monitored during their employment with the company. Employees will be monitored within their respective job occupation/classification within 7 workdays after initial employment. This data will provide necessary monitoring measurements with which to base medical surveillance and monitoring requirements for future turnarounds.
3. Temporary assigned permanent employees and joint employees will be monitored as soon as practical within the first month of employment. At that time, person(s) will be regularly scheduled and monitored in accordance with paragraph (A) above.
4. Contractor personnel performing work in the plant will be monitored by their own employer unless the VCM plant is contracted to provide these services on a fee basis.
5. Personnel not falling into one of the above groups will not be a part of the VCM plant monitoring program.

C. Monitoring Guidelines & Analytical Methods

1. Monitoring periods will normally be taken for 8 hour intervals. However, shorter samples shall be taken periodically as deemed necessary. Personnel wearing the personnel dosimeters will be informed how long they will wear the equipment prior to the start of the test.
2. Selected plant personnel will be monitored for 15 minute intervals to determine ceiling VCM concentrations. Monitoring will be accomplished at those times where the employees tasks are representative of his ceiling or highest exposure potential.

3. VCM employees will be instructed and notified by their supervisors when they should report to the lab to obtain the personnel dosimeter equipment to be used for their monitoring period. A schedule of monitoring will be made by the lab personnel and distributed to the supervisors for this purpose. (See Figure 6 page 55)
4. Personnel Monitoring Rules
 - a. Personnel are instructed to continue to perform their normal duties while wearing the monitoring equipment.
 - b. The monitoring device should be placed as close as practical to your breathing zone for best results.
 - c. Don't take monitoring equipment off during monitoring unless instructed to do so by your supervisor.
 - d. Don't deliberately place the monitor near a vinyl chloride source. This will produce unrealistic results and the monitoring will have to be repeated.
 - e. If monitoring equipment is damaged or malfunction occurs, return the equipment to the lab immediately.
 - f. Report back to the lab when the monitoring period is over.
 - g. Describe your activities after wearing the monitor to the analyst. Be specific as possible to help us better understand where you worked, equipment involved and the activities you performed.
5. Following the personnel monitoring, the Field and Lab Data Sheet Report, Figure 7 page 56 will be completed by the lab analyst.
6. The activated charcoal sample will be analyzed per the procedure defined in Appendix a or B and TWA calculations computed by a computer.
7. Data obtained will be recorded on the Field and Lab Data Sheet Report and retained in the VCM Plant laboratory.
8. Vinyl chloride concentrations by occupation will be maintained and updated by the lab on a monthly basis. The records will be filed in the Plant Manager's Secretary's office. (See Figure 8 page 57).
9. Further computer analysis by job classification will be performed by the corporate industrial hygiene department and the VCM Plant safety department.

D. VCM Plant Maintenance/Operation Projects

VCM Plant personnel are periodically involved with routine and special maintenance and operations projects. These projects are monitored periodically to ascertain VCM concentrations in addition to the personnel monitoring program defined above. The number of persons being monitored will depend on the number of employees involved in the project and potential vinyl chloride exposure.

E. Ship Loading Operations - VCM Plant Interfaces

1. Selected dock operators working on the No. 3 dock will be monitored for 8 hours during their regular shifts during vinyl ship loading. Monitoring will periodically be conducted for 15 minute intervals to define ceiling concentrations on those phases of the loading operation where the potential for vinyl exposure may exist. This includes, but shall not be limited to; hose connections, blind removals, hydroquinone addition, cargo sampling, loading dock shack and vent recovery unit, blind insertion, and hose disconnecting. The VCM plant laboratory personnel will coordinate and provide the necessary equipment to conduct the monitoring requirements.
2. The fixed point monitoring unit located at the dock No. 3 area will be used to determine the monitoring requirements when ship loading operations are in progress.
3. Dock operators involved with hydrostatic testing of the VCM piping system with VCM as the fluid medium will be monitored to determine VCM exposure levels during these testing periods.

F. Area Monitoring

1. Fixed Point Analyzers

- a. Three - 10 point monitors, Honeywell model 1000 chromatographs have been purchased. Monitors measure VCM in parts per million and are recorded on a bar graph chart. Two of these units are in service in the VCM plant, the third is installed at the dock. These monitors analyze a point every minute and return to the same point every ten minutes.

People working in an area where VCM concentrations exceed the permissible exposure limit will be appropriately notified to clear the area until the concentration is reduced or appropriate respiratory protection is obtained and worn.

- b. Fixed point monitoring units in the plant and dock are used to identify areas of high VCM concentrations and locate VCM leakage at specific locations in the plant or dock.

- c. Fixed point monitoring can also be used as area monitors during a specific maintenance or operation project or during ship loading at the dock. VCM concentrations are printed out in the control room of the VCM Plant.
- d. The alarm point of the VCM Plant fixed point monitor is set at 5 ppm. Alarm systems are used to alert personnel when these VCM concentrations are exceeded.
- e. Figure 9, page 58 describe and illustrates the locations of the fixed point monitoring units in the VCM Plant.

2. Glass Bomb Grab Samples

Glass bombs and syringes are used in the plant and dock facilities by lab analysts to take special air samples for measuring specific VCM concentrations in air by analyzing the sample through gas chromatography. These sample cylinders are also used in performing area grid surveys and obtaining samples for special jobs/tasks. (See appendix B, page 72 for the analytical method used.)

Most importantly, this type of sampling shall be made at those times deemed necessary to ensure the safety of personnel from vinyl chloride exposure prior to the opening or blinding of vessels, storage tanks or process lines. This type of sampling will supplement the fixed point monitoring system by sampling at locations not presently monitored by the fixed point monitoring system.

A one cc portion of the sample is injected into a gas chromatograph for analysis. The integrated area of each component is compared to the area and concentration of that component in a standard to determine the component concentration of the sample.

3. Bacharach TLV Sniffer

The Bacharach TLV vapor analyzer is a portable detection unit that operates on a thermal conductivity basis. The instrument is used for measuring total hydrocarbon concentrations in ppm with the capability of verifying the presence of vinyl chloride in air. The equipment provides an instantaneous readout and is therefore very useful to locate and detect vinyl chloride leaks at both the plant and ship dock.

- c. Fixed point monitoring can also be used as area monitors during a specific maintenance or operation project or during ship loading at the dock. VCM concentrations are printed out in the control room of the VCM Plant.
- d. The alarm point of the VCM Plant fixed point monitor is set at 5 ppm. Alarm systems are used to alert personnel when these VCM concentrations are exceeded.
- e. Figure 9, page 58 describe and illustrates the locations of the fixed point monitoring units in the VCM Plant.

2. Glass Bomb Grab Samples

Glass bombs and syringes are used in the plant and dock facilities by lab analysts to take special air samples for measuring specific VCM concentrations in air by analyzing the sample through gas chromatography. These sample cylinders are also used in performing area grid surveys and obtaining samples for special jobs/tasks. (See appendix B, page 72 for the analytical method used.)

Most importantly, this type of sampling shall be made at those times deemed necessary to ensure the safety of personnel from vinyl chloride exposure prior to the opening or blinding of vessels, storage tanks or process lines. This type of sampling will supplement the fixed point monitoring system by sampling at locations not presently monitored by the fixed point monitoring system.

A one cc portion of the sample is injected into a gas chromatograph for analysis. The integrated area of each component is compared to the area and concentration of that component in a standard to determine the component concentration of the sample.

3. Bacharach TLV Sniffer

The Bacharach TLV vapor analyzer is a portable detection unit that operates on a thermal conductivity basis. The instrument is used for measuring total hydrocarbon concentrations in ppm with the capability of verifying the presence of vinyl chloride in air. The equipment provides an instantaneous readout and is therefore very useful to locate and detect vinyl chloride leaks at both the plant and ship dock.

4. Charcoal Method

a. Bendix Method

An eight hour air sample from the breathing zone of the employee is pulled through a charcoal absorption bed using a Bendix C-115 pump. The charcoal is transferred to a 4 oz. bottle, weighed and then chilled to dry ice temperature for at least thirty minutes. Carbon disulfide, previously chilled to dry ice temperature, is slowly added to the bottle containing the charcoal after which it is re-weighed, shaken and allowed to settle for 60 minutes at dry ice temperature. A one microliter sample is injected into a temperature programmed gas chromatograph requiring thirty minutes before the analysis is completed. The integrated area for each component, of the sample and the standard, component concentration of the standard, weight of the disulfide, time of sampling and pump rate are transmitted to a computer which calculates the time-weighted average value.

b. Sipin Method

A Sipin SP-3 pump is used to draw air from the breathing zone of the employee over an eight-hour period through a short tube filled with activated charcoal. The charcoal is transferred to a 1/4 ounce bottle, weighed and then chilled to dry-ice temperature. Carbon disulfide, also chilled to dry-ice temperature, is added. The bottle is tightly capped, shaken, and allowed to warm to room temperature and immediately weighed to obtain the actual amount of carbon disulfide used. A two-microliter sample is injected into a temperature programmed gas chromatograph. The integrated peak areas for each component in the standard and in the sample, the concentration of components in the standard, the weight of carbon disulfide, the number of pump strokes during the sampling period and the calibrated volume per stroke are placed in a computer which calculates the time-weighted average value.

c. 3M #3500 Organic Vapor Monitor Method

The 3M #3500 Organic Vapor Monitor is a diffusion type monitoring device which is placed in the breathing zone where ambient air components diffuse through the badge membrane and are absorbed into a charcoal medium. After a defined exposure period, (usually 8 hours), the charcoal wafer is placed in 2 ml of N, N Dimethyl acetamide in a head space vial. A chromatogram is obtained of the vapor space above the DMA solution and the VCM concentration is calculated against a known standard.