



Air Products and Chemicals
INC.

INTEROFFICE
MEMORANDUM

Date February 26, 1974

Subject Reducing Exposure to

Vinyl Chloride

To R. Fleming

Valley Forge

(Location, Organization, or Department)

From J. T. Barr

Valley Forge

(Location, Organization, or Department)

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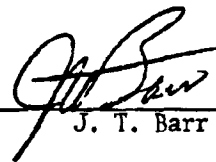
At your request, I have prepared a list of things which we can do to help in meeting the new Kentucky vinyl chloride exposure regulations. This list has drawn heavily on the proposals already made by the plants, and has been reviewed by Calvert personnel and various others at Valley Forge and Trexlertown.

Mr. Smith of the Corporate Safety Group is reviewing the available equipment in preparation for making more specific recommendations on the respiratory equipment.

This list actually consists of two parts, the first being either those things that we know we can do now or can start before the enforcement deadline in Kentucky, plus a last section on additional things that we may need or want to do on a longer term basis. It is intended to supplement the interim NIOSH recommendations. Calvert is expediting completion of their approved projects as best they can, and will issue regular updates on progress.

Several of these recommendations are not directly applicable to the Pace plant because of differences in equipment. However, they have been reviewed with E. A. Ray, and he is in accord with the general principals represented, and will put them into effect.

JTB:mmm


J. T. Barr

(320)

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PROCEDURES TO MEET NEW KENTUCKY EXPOSURE STANDARDS

I. Revised Operating Methods

1. Reactors will be purged with hot water before opening, and purged with air before and during entry.
2. Washing of reactors will be used to extend the number of batches between openings as much as possible consistent with product quality.
3. Blow down all monomer containing systems to a vent at present, and to recovery when the new compressors are received, before opening. This includes:
 - a) Charge pots and knock out pots
 - b) Filters
 - c) Pumps
 - d) Lines
4. Use inert gas or air to blow the slurry over from the strippers until the new slurry pumps are installed. *RF- Grant*
5. Increase stripping time and temperature as much as possible at this point.
6. Establish a mandatory rule that no equipment shall be opened until:
 - a) The pressure has been vented as in 3a above.
 - b) The system has been purged to an outside location using water whenever possible, or inert gas or steam if it is not.
 - c) Proper protection is worn, as described in V4 below.
7. Establish sampling techniques and analytical procedures in the laboratory so that all samples are taken through a closed system and that exposure of laboratory workers to vinyl chloride vapors is minimized.
8. These same procedures will be instituted in the pilot plant.

II. Improve Ventilation

1. Approved projects:
 - a) Blend tank and Sweco screen forced air systems.
 - b) Polymerization building ventilation.
 - c) #1 Centrifuge vent relocation.
 - d) Compound plant ventilation project, as soon as the equipment now on order is received.
2. New Projects:
 - a) Flexible exhaust hose system for reactors that will provide monomer levels below 50 ppm inside the vessels open.
 - b) A second exhaust system with fixed hoods for known leak

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points such as around the recovery compressors, pump seals, etc., and additional flexible pick up points for maintenance work.

- c) Improve the stairwell exhaust system.
- d) Add roof fans or ridge pole vents in the drying area and the warehouse, if continued testing confirms the need for this.

III. Equipment and Pipe Changes

1. Recovery System

- a) Relocate the effluent lines to a vented collection point.
- b) Reduce leaks both inward and out by routine pressure and vacuum tests, new pump seal systems, and the proposed new recovery system project.
- c) Complete the proposed vinyl acetate recovery system revisions, connecting the effluent by a closed system to the sump mentioned in (a) above.

2. Slurry System

- a) Install the new stripper bottoms pumps.
- b) Complete the installation of the double valves under the reactors.

IV. Monitoring Procedures

- 1. Maintain around-the-clock readings with the Century instrument on a permanent log sheet, showing the recordings at several fixed points and many spot checks throughout the area.
- 2. Institute immediately the use of the personal monitoring units on at least one worker per shift, rotating from man to man. *How many - who in charge.*
- 3. Install a high level alarm on the permanent monitoring system with alarm horns and/or lights, both in the work area affected and at the instrument. When any point shows a reading at a level yet to be determined between 50 and 200 ppm, the attendant will set the trend recorder on that point until remedial action has corrected the cause.
- 4. Evaluate and record in summary form the data obtained in the above three steps in a form suitable for demonstration to authorities that progress is being made and that the regulations are being satisfied. Proper allowance should be made for the background readings in the ambient air.
- 5. Obtain zero air and a calibrated vinyl chloride content air for checking all of the instruments at least once a shift.

V. Training and Supervision

1. Impress on the operators and maintenance men the urgency of the situation. Solicit their suggestions and cooperation and require their adherence to the established procedures.
2. Apply adequate supervision to assure compliance with this requirement.
3. Provide all personnel who enter the area with respiratory protection of a type to be selected with the assistance of the Corporate Safety Department. This protection shall be on their persons at all times and worn whenever there is any suspicion of an excursion over 50 ppm.
4. Provide draw-string hoods and a safe air supply (bottled gas or compressed air) or equal protection as recommended by Corporate Safety, for use in operations likely to exceed an exposure of 50 ppm. This will include most maintenance steps involving opening lines and equipment, and may need to include all operations within tanks and vessels. This protection should be worn until it has been demonstrated with the Century instrument that the monomer level in the area is below 50 ppm.
5. Develop and implement a revised emergency evacuation procedure that will minimize worker hazard without endangering the plant.

VI. Longer Term Projects

1. Pursue actively the solvent cleaning and anti-fouling studies to reduce the frequency of vessel entry.
 2. Consider computerized data readout and logging on the monitoring device.
 3. Evaluate the need for additional stripper vessels based on tests in progress and the final establishment of a maximum monomer level in polymer.
 4. Employ as much automation and remote control in the existing plants as is economically feasible.
 5. Provide a means for collecting and recovering the various vents and waste gases now being sent directly to atmosphere.
 6. Reconsider the proposed Pace plant expansion from the standpoint of the reduction in exposure which it will provide.
 7. Reevaluate the new large plant project in the light of the fact that it may well offer the only practicable alternative for remaining in the PVC business.
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T. Birch / Valley Forge
Air Products and Chemicals

PUT IT IN WRITING

Date 22 February 1974

To G. B. H. Speed Subject RESULTS OF TEMPORARY AIR SYSTEMS USE

From D. V. Lowe

☐ Take Action

☐ For Your Approval

☐ For Your Info

☐ Discuss With Me

☐ For Your Comments

☐ As Requested

☐ File

☐ Note & Return

Both the temporary systems for Sweco slurry screener exhaust and fresh air supply to reactors being manually cleaned were put into service yesterday. Results from use of both systems are reported below. The results are quite good. All samples were taken on 22 February with the Century detector (which as yet still has not been calibrated with "zero" air or mixtures of VCI and "zero" air).

A. SWECO SLURRY SCREENERS. A fan was installed capable of pulling 750 cfm (as measured with a velometer) through each of two six inch hoses. One hose is attached to the top cover of the north screener and the other hose to the center screener. These two screeners are set right outside the west door at 3rd floor level. A six inch discharge duct from the fan carries fumes to a point above the roof of the reactor building. The suction is maintained on the screeners at all times regardless of whether slurry is transferring or not. (Screener No. 3 is further away from the building and will be provided with suction from the blend tank ventilation system).

1. Reading taken at void between cover and vibrating body during transfer of slurry and with exhaust fan running.

- a. Generally 5-7 ppm.
- b. Excursions to 8 ppm.
- c. Background in air surrounding building on this day was 4-5 ppm (have had rain).

2. Reading taken at same location under same conditions except exhaust fan was turned off.

- a. Generally 10,000 ppm.
- b. Excursions to 100,000 ppm.

3. Reading at same location and same conditions except exhaust fan turned on again.

- a. Generally 5-7 ppm.
- b. Excursion to 8 ppm.

B. REACTOR FRESH AIR SUPPLY SYSTEM. As a temporary measure to abate the hazard of reactor cleaning, a North American air blower was installed outside the reactor building on the grating south of building at 3rd floor level. The fan is rated 950 cfm at 16 oz. of pressure. A distribution system consisting of 6" aluminum pipe and finally 6" wire-reinforced hose was installed. Each hose section is equipped with 6" aluminum OPW fittings so that various lengths are used as necessary to reach to the bottom of any reactor. The velometer was used again and we determined a flow of air of 800 to 850 cfm through the longest possible hose hookup. This represents 100 air changes per hour in a 500 cu. ft. reactor. No. 16 reactor was tested after a water "cook" and both during and after air purging as shown below.

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1. As normal preparation for manual cleaning, No. 16 reactor was filled with mill water, thus displacing most of the VCI vapors to outside of building. The reactor was water "cooked" and then emptied to the floor. Vacuum was pulled with the steam jets as the reactor manway was opened.
 - a. Readings in reactor room before dropping water = 30 to 40 ppm.
 - b. Readings in room in vicinity of No. 16 reactor while dropping water to floor = 60 to 150 ppm.
 - c. Readings in room 5 minutes after completion of water drop = 30 to 40 ppm.
 - c. Reading inside open manway of reactor after finishing water drop and with vacuum jet still pulling on reactor (suction hose not inserted yet) = 70 ppm.
2. When water had dropped out, a suction hose attached to the induction port of a coppus blower was inserted through the manway all way to bottom of the reactor. The coppus discharge was pointed directly into the suction of a wall exhaust fan in the northeast corner of the building. The steam jet vacuum line was closed. The coppus blower began to pull 850 cfm from the reactor and on into the wall fan.
 - a. Reading of air entering reactor through manway while pulling exhaust in bottom of reactor = 50 to 70 ppm.
 - b. Reading in air discharging from coppus blower to wall fan initially = 10,000 to 100,000 ppm.
 - c. Air discharge from coppus blower after 5 minutes of operation = 7000 ppm.
 - d. Air discharge from coppus after 7 minutes = 2000 ppm.
 - e. Air discharge from coppus after 15 minutes = 70 ppm.
 - f. Air in room at No. 16 reactor during operation of coppus blower = 30 to 40 ppm, which tells us that the wall fan was successfully carrying the coppus discharge to the outside of building.
 - g. Air in reactor after coppus hose removed = 58 ppm.
3. Next, the new reactor fresh air purge was put into use. The coppus with hose was removed and another hose carrying 800 to 850 cfm of fresh air from the outside was inserted.
 - a. Reading inside manway after start blowing fresh air into reactor = 26 ppm.
 - b. Reading in manway after 5 minutes of fresh air purge = 15 ppm.
 - c. Reading in manway after 15 minutes of fresh air purge = 13 ppm.
 - d. Room reading at beginning of fresh air purge = 36 ppm.
 - e. Room reading at end of fresh air purge = 32 ppm.
4. The fresh air supply hose was removed from the reactor so men could enter through the manway. After entering, the 6" hose was re-inserted.

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- a. Reading inside reactor at about 3 feet under manway at the time of entry = 52 ppm.
- b. After entering, hose was re-inserted and readings taken over the next 10 minutes as they continued to work: 18 to 24 ppm.

D. V. Lowe
D. V. LOWE

DVL/pk

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