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MAY 1 1978
J. T. BARR

INTEROFFICE MEMORANDUM

Date 27 April 1978

Subject Engineering Program for Vinyl Chloride

To T. L. Carey — Trexlertown (Location, Organization, or Department)

From J. C. Novak — Trexlertown (Location, Organization, or Department)

cc: Escambia

R. E. Gilbert
R. E. Jones
W. J. Stueben

Calvert City

J. D. Kramer
R. W. McGinnis
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E. A. Primeau
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H. L. Jaffe
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A. K. McMillan
W. T. Rector
R. H. Schenck
W. M. Smith
H. L. Watson

Attached is the semi-annual revision of the Engineering Program for Abatement of Worker Expsoure to Vinyl Chloride for use after October 1, 1976. This replaces the program sent to you on September 1977, and should be attached to notification letters to employees concerning vinyl chloride exposure.

J. C. Novak

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attachment

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AP00025541

ENGINEERING PROGRAM FOR

ABATEMENT OF WORKER EXPOSURE TO

VINYL CHLORIDE

The Engineering Program for abatement of worker exposure to Vinyl Chloride Monomer consists of a combined effort from Research, Plant Staffs and Divisional Management. Those programs which are active at this time are indicated below:

I. RESEARCH

The following studies are underway:

1. Methods to reduce exposure by decreasing the frequency of opening and closing or cleaning of reactors by developing effective antifoulents and more stable recipes which reduce the amount of wall fouling and scrap resin. Part of this work has been a joint project with a National Sciene Foundation fellow.

2. Methods to improve stripping by reformulation to produce more porous resins, and improved anti-foam agents.

3. Fundamental studies on diffusion constants and equilibrium data for the system PVC-Water-Vinyl Chloride in order to extend our knowledge of the stripping and drying processes, and thus reduce exposure in the production and fabrication stages.

4. Continuing studies are underway to reduce the monomer content of resin and compound after the production phase, also for protection of the worker and consumer.

5. A program is in progress to develop practical means of removal of Vinyl Chloride from vent streams by destruction or recovery.

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6. A joint study is underway with a manufacturer of mixing equipment to optimize the agitation equipment so as to minimize fouling and cleaning.

II. PLANT STUDIES

Plant engineering and process studies now completed or underway include the following items:

1. Use of the fixed and portable monitors to locate sources of exposure, evaluate modifications to equipment and ventilation systems, and test the effectiveness of new work procedures.

2. Relocation of equipment so as to remove potential sources from the work area or relocate work positions away from possible exposures.

Example: Escambia - Relocate solution tanks away from reactor floor.

- Installation of stripping column on south line now that it has proven successful on the north line.

Emulsions - Relocate monomer transfer pump outside polymer building.

3. The installation of detection equipment and flow recorders in various vent stacks and drier exits to detect malfunction of critical control equipment and thus reduce exposure.

4. A continuing program of revision of procedures and retraining of personnel for the purpose of reducing the chance for error and improving work production. Revised copies of

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this written program are available at each plant and have been distributed to each affected employee.

5. A multimillion dollar program to improve slurry stripping and to reduce manual cleaning of reactors has been completed. The first continuous stripping unit has been in operation since November 1975 at Calvert City, and a similar unit is in operation at Escambia. The solvent recovery equipment has been expanded and improved.

III. OUTSIDE ASSISTANCE

Assistance is being obtained from outside the company in the following ways:

1. Participation in information exchange with industry within the U.S. through the technical programs of the Vinyl Chloride Safety Association and the Society for the Plastics Industries, as well as through personal contacts.

2. Information exchange programs with PVC producers in Europe and Asia.

3. Engaged an outside consultant to review the studies by Corporate Research and our Engineering on ventilation programs and methods of assuring a source of uncontaminated air for respirator and control rooms. Their recommendations were evaluated by Corporate Research in a computer dispersion model program, and revisions have been made in stack heights at the plants.

4. A proprietary antifouling additive has been licensed and tests of its effectiveness are underway, together with materials developed in-house.

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IV. PLANT MODIFICATIONS

A. Escambia Plant

1) A major capital investment has been made which resulted in a plant capcable of reducing exposure to as low a level as any other plant. Two 24,000 gallon reactors have been installed complete with all required supporting equipment. Five of the existing reactors have been retrofitted so that the entire plant is now computer controlled from a remote area.

2) Controlled atmosphere areas exist on two floors of the old reactor building to provide a work area free from vinyl chloride.

3) Reactor relief lines have been extended above the roof peak.

4) A closed reactor rinse water system will be completed in mid-1978.

5) The personnel entrance gates and data logging equipment are currently being installed. Completion is expected in mid-1978.

6) A solvent cleaning system is in operation. Further capacity expansion is included under item #1.

7) A separate air system, with carbon-bed protection against VC contamination, has been installed, to provide VCL free breathing air to be used with continued flow respirators where overexposure potential exists.

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8) The reactor seal pressure system has been redesigned to minimize possible agitator seal leakage.

9) All reactor manways and sightglass assembly are routinely serviced to reduce the possibility of leakage.

10) A revision is underway on the recovered monomer water drain line to eliminate monomer spillage.

B. Calvert City PVC Plant

1) The monomer recovery system has been rebuilt, modernized and the system was relocated outside the process building.

2) Electronic processing of the area monitoring data and the data from some parts of the stripping system is being installed.

3) Ventilation has been improved in the compound, warehouse and bagging area, so that these are not regulated areas.

4) The reactor seal pressure system has been revised to give better protection against agitator seal leakage.

5) All reactor manways have been rebuilt to reduce the possibility of leakage.

6) A revision of the recovered monomer water drain line to eliminate monomer spillage was completed.

7) Relief valves have been placed on the charge pots to control emissions from overpressure.

8) A continuous stripper has been installed to reduce residual vinyl chloride in the product.

9) Controlled atmosphere areas have been installed for operators to provide an area free of vinyl chloride.

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10) Respiratory protection for the worker is being provided in the interim while the results of these, and other methods being considered, are determined. Alarm points have been reset to comply with April 1976 requirements.

11) The entire polymerization area will be replaced by late 1978 by a totally new, modern, large reactor plant, as was done at Escambia.

C. Calvert City Emulsions Plant

Monitoring results show that workers are not generally exposed to concentrations above 0.5 ppm vinyl chloride during normal production of VC-containing polymer, but may be aggected by upsets in the PVC plant, or during some venting and repair operations. The engineering program is designed to reduce further these possible excursions.

1. Items listed under IV B, above, will reduce the effects of upsets in the PVC Plant.

2. A major project is underway to recover and recycle the unreacted monomers, thus reducing emissions and potential exposure.

3. In the interim, operators are furnished respirator protection.

4. To reduce the potential for operators exposure to VCM, a direct vinyl chloride monomer feed is being installed. This will eliminate the present charge tank and certain sequences in the operation for VCM addition.

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Air Products

Date 4 November 1977

INTEROFFICE
MEMORANDUM

Subject Engineering Program for Vinyl Chloride

To DISTRIBUTION

(Location, Organization, or Department)

From J. T. Barr

(Location, Organization, or Department)

Escambia	Calvert City	Allentown
D. Francke	J. D. Kramer	T. L. Carey
R. E. Gilbert	R. McGinnis	A. K. McMillan
R. E. Jones	M. T. McHale	T. Medovich
W. Stuben	F. Riddle	J. Novak
	J. Russell	R. H. Schenck
		H. L. Watson

Attached is the latest revision of the Engineering Program for the Abatement of Worker Exposure to Vinyl Chloride. This replaces the issue sent to you in September, 1976, and should be used as required by the OSHA standard on Vinyl Chloride.

JTB:djm

J. T. Barr

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ENGINEERING PROGRAM FOR

ABATEMENT OF WORKER EXPOSURE TO

VINYL CHLORIDE

The Engineering Program for abatement of worker exposure to vinyl chloride monomer consists of a combined effort from Research, Plant Staffs and Divisional Management. Those programs which are active at this time are indicated below:

I. RESEARCH

The following studies are under-way:

1. Methods to reduce exposure by decreasing the frequency of opening and closing or dleaning of reactors by developing effective antifoulants and more stable recipes which reduce the amount of wall fouling and scrap resin. Part of this work has been a joint project with a National Science Foundation fellow.

2. Methods to improve stripping by reformulation to produce more porous resins, and improved anti-foam agents.

3. Fundamental studies on diffusion constants and equilibrium data for the system PVC-Water-Vinyl Chloride in order to extend our knowledge of the stripping and drying processes, and thus reduce exposure in the production and fabrication stages.

4. Continuing studies are underway to reduce the monomer content of resin and coumpound after the production phase, also for protection of the worker and consumer.

5. A program is in progress to develop practical means of removal of vinyl chloride from vent streams by destruction or recovery.

6. A joint study is underway with a manufacturer of mixing equipment to optimize the agitation equipment so as to minimize fouling and cleaning.

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II. PLANT STUDIES

Plant engineering and process studies now completed or underway include the following items:

1. Use of the fixed and portable monitors to locate sources of exposure, evaluate modifications to equipment and ventilation systems, and test the effectiveness of new work procedures.

2. Relocation of equipment so as to remove potential sources from the work area or relocate work positions away from possible exposures.

Example: Escambia - Relocate solution tanks away from reactor floor.

Emulsions - Relocate monomer transfer pump outside polymer building.

3. The installation of detection equipment and flow recorders in various vent stacks and drier exits to detect malfunction of critical control equipment and thus reduce exposure.

4. A continuing program of revision of procedures and retaining of personnel for the purpose of reducing the chance for error and improving work production. Revised copies of this written program are available at each plant and have been distributed to each affected employee.

5. A multimillion dollar program to improve slurry stripping and to reduce manual cleaning of reactors has been completed. The first continuous stripping unit has been in operation since November 1975 at Calvert City, and a similar unit is in operation at Escambia. The solvent recovery equipment has been expanded and improved.

III. OUTSIDE ASSISTANCE

Assistance is being obtained from outside the company in the following ways:

1. Participation in information exchange with industry within the U.S. through the technical programs of the Vinyl Chloride Safety Association and the Society for the Plastics Industries, as well as through personal contacts.

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2. Information exchange programs with PVC producers in Europe and Asia.

3. Engaged an outside consultant to review the studies by Corporate Research and our Engineering on ventilation programs and methods of assuring a source of uncontaminated air for respirator and control rooms. Their recommendations were evaluated by Corporate Research in a computer dispersion model program, and revisions have been made in stack heights at the plants.

4. A proprietary antifouling additive has been licensed and tests of its effectiveness are underway, together with materials developed in-house.

IV. PLANT MODIFICATIONS

A. Escambia Plant

1. A major capital investment was made which has resulted in reducing exposure to as low a level as any other plant. Two 24,000 gallon reactors were installed complete with all required supporting equipment. Five of the existing reactors were retrofitted so that the entire plant is computer controlled from a remote area. This has been in operation since January, 1977.

2. Controlled atmosphere areas have been constructed on two floors of the polymer buildings to provide a work area free from vinyl chloride.

3. Reactor relief lines have been extended above the roof peak.

4. A closed reactor rinse water system has been completed.

5. The solvent cleaning system study has been completed successfully and is in operation. Further capacity expansion was included under item #1.

6. In the interim, air-supplied respirators are provided for the protection of the workers. A separate breathing air supply system, with carbon-bed protection against VC contamination, has been installed. Alarm points have been reset to comply with April 1976 requirements.

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B. Calvert City PVC Plant

1. The monomer recovery system has been rebuilt, modernized and the system was relocated outside the process building.

2. Electronic processing of the area monitoring data and the data from some parts of the stripping system is being installed.

3. Ventilation has been improved in the compound, warehouse and bagging area, so that these are not regulated areas.

4. Automatic pH equipment will be installed on all copolymer reactors after completion of a test in one vessel. This will reduce the chance of lost batches.

5. The reactor seal pressure system has been revised to give better protection against agitator seal leakage.

6. All reactor manways have been rebuilt to reduce the possibility of leakage.

7. A revision of the recovered monomer water drain line to eliminate monomer spillage was completed.

8. Relief valves have been placed on the charge pots to control emissions from overpressure.

9. A continuous stripper has been installed to reduce residual vinyl chloride in the product.

10. Controlled atmosphere areas have been installed for operators to provide an area free of vinyl chloride.

11. Respiratory protection for the worker is being provided in the interim while the results of these, and other methods being considered, are determined. Alarm points have been reset to comply with April 1976 requirements.

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12. The entire polymerization area will be replaced by late 1978 by a totally new, modern, large reactor plant, as was done at Escambia.

C. Calvert City Emulsions Plant

Monitoring results show that workers are not generally exposed to concentrations above 0.5 ppm vinyl chloride during normal production of VC-containing polymer, but may be affected by upsets in the PVC plant, or during some venting and repair operations. The engineering program is designed to reduce further these possible excursions.

1. Items listed under IV B, above, will reduce the effects of upsets in the PVC Plant.

2. A major project is underway to recover and recycle the unreacted monomers, thus reducing emissions and potential exposure.

3. In the interim, operators are furnished respirator protection.

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