12.7 A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30308

DEC 17 1979

REF: 4AH-AF

Mr. R. A. Frohreich
Chief Process Engineer
Conoco Chemicals Company
P. O. Box 91, New Highway 25
Aberdeen, MS 39730

Dear Mr. Frohreich:

Your letters of September 21, 1979 and November 21, 1979, concerning the application for construction of two polyvinyl chloride polymerization reactors and a fluid bed dryer at Aberdeen, Mississippi have been reviewed and your application is hereby approved.

Please be advised that this approval to modify an existing source of a hazardous air pollutant does not relieve you of responsibility of 40 CFR Part 61 or other applicable Federal, State, or local regulations.

If you have any questions concerning this approval, please call either William Rhea or Michael Brandon of my staff.

Sincerely yours,

Tommie A. Gibbs
Chief
Air Engineering Branch

cc: MS Bureau of Pollution Control

Conoco Chemicals Company
Conoco Inc.
P. O. Box 91, New Highway 25
Aberdeen, Mississippi 39730

November 21, 1979

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Mr. Tommie A. Gibbs
Chief, Air Facilities Branch
United States Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, GA 30308

Dear Mr. Gibbs:

This is in reference to your letter of November 2, 1979, requesting additional information on our application for approval of construction of a proposed PVC resin expansion at the Aberdeen Plant.

The proposed expansion includes the addition of one new polymerization reactor to each of the two existing reactor modules. The existing facilities in each of the reactor modules necessary to carry out the batch polymerization process will be utilized in the operation of the new reactors. The existing vinyl chloride charge receivers and vinyl chloride charge pumps will be used to charge vinyl chloride into the new reactor in each module. After the batch polymerization is terminated, the unreacted vinyl chloride will be recovered from the new reactors with the existing recovery systems in each of the reactor modules. The existing recovered vinyl chloride receivers, vent refrigeration system, and incinerator will be used to contain vinyl chloride. Thus, the existing vinyl chloride containment systems will be utilized on the new reactors.

The specific points of your letter are addressed below:

1. <u>Ducting of Vinyl Chloride Emissions</u>

The proposed new reactors will utilize stripping in the reactors to meet the requirements of § 61.64 (e) (1) (ii) [residual vinyl chloride reduced to less than 400 ppm prior to dumping the slurry from the reactors]. The procedure used will be as described in Section VII, item § 61.64 (e) (1) (ii) of this plant's "Compliance Manual" (refer to Mr. Douglas Michels' letter to Tommie A. Gibbs dated August 14, 1978).

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1. Ducting of Vinyl Chloride Emissions (Cont.)

Figure 1 attached, a flow chart of the recovery operation, indicates the flow and containment of vinyl chloride emissions from the reactor thru the control device. Upon termination of the batch polymerization reaction, the unreacted vinyl chloride will be recovered from the reactors. Steam will be added directly to the reactors during the recovery operation to heat the contents of the reactor and to strip the vinyl chloride from the slurry. The unreacted vinyl chloride will be removed from the reactor using existing vacuum pumps, compressors, and condensers. The condensed vinyl chloride will be collected in existing receivers and charged back to the reactors with existing pumps. Inerts collected in the vinyl chloride receivers from the recovery operation will be ducted thru an existing vent refrigeration system and then into the existing vent gas incinerator. The vent stream will be reduced to less than 10 ppm vinyl chloride in the incinerator prior to discharge to the atmosphere.

Thus, after polymerization, the slurry will be stripped to less than 400 ppm vinyl chloride and the vinyl chloride removed will be contained and recovered in the closed recovery system.. Any non-condensables will be reduced to less than 10 ppm vinyl chloride in the incinerator prior to discharge to the atmosphere.

2. Leak Detection and Elimination

The plant's Leak Detection and Elimination Program approved by your office July 6, 1979, will be modified to include coverage of the two new reactors. Figure 2 attached, Fixed Point Monitor Locations, shows proposed locations of monitor positions to cover the new reactors and the existing equipment. These locations are listed in Table I. The new reactors will be included in the routine leak patrol. The survey points, including the new reactors, are attached as Table II. Other portions of the program such as calibrations, maintenance procedures, recordkeeping, and action plan for leak elimination will continue as with our existing program.

3. Treatment of In-Process Waste Water

In-process waste water will not be generated in the new reactors per se. Stripping technology to control vinyl chloride emissions will be used to meet the requirements of § 61.64 (e) (1) (ii); therefore, water in the slurry will not require further treatment.

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3. Treatment of In-Process Waste Water (Cont.)

In-process waste water will be generated in the recovery portion of the batch polymerization cycle of the new reactors. This in-process waste water will collect in the existing knockout scrubbers, seal water separators, and recovered vinyl chloride receivers. The additional in-process waste water, along with in-process waste water presently generated, will be transferred to the existing batch water strippers. Periodically, the in-process water accumulated in the strippers will be steam stripped at a vacuum to a recovery system to reduce the vinyl chloride content of the in-process water to less than 10 ppm. The stripped water is then pumped to the sewer. See Figure 3 for a flow chart of the in-process waste water systems.

4. Emissions Calculations

A. Vinyl Chloride in Incinerator Off Gas

Allowable emission - based on 10 ppm VCM in exhaust

$$3000 \frac{\text{Std. ft.}^3}{\text{hr.}} \times \frac{24 \text{ hr.}}{\text{day}} \times \frac{365 \text{ day}}{\text{yr.}} \times \frac{10 \text{ ft.}^3 \text{ VCM}}{1{,}000{,}000 \text{ Std. ft.}^3}$$

$$\times \frac{62.5 \text{ lb. VCM}}{370 \text{ ft.}^3 \text{ VCM}} = 44.4 \frac{\text{lb. VCM}}{\text{yr.}}$$

Probable emission - based on past experience of incinerator off gas averaging 1.1 ppm vinyl chloride.

$$3000 \frac{\text{Std. ft.}^3}{\text{hr.}} \times \frac{24 \text{ hr.}}{\text{day}} \times \frac{365 \text{ day}}{\text{yr.}} \times \frac{1.1 \text{ ft.}^3 \text{ VCM}}{1{,}000{,}000 \text{ Std. ft.}^3}$$

$$\times 62.5 \text{ lb. VCM} = 4.9 \frac{\text{lb. VCM}}{\text{yr.}}$$

B. Rail Car Unloading - Fugitive Emission

Allowable emission - based on opening three lines per railcar unloaded, each line to contain a maximum 0.13 ft.^{3} VCM at standard temperature and pressure.

$$130{,}000{,}000 \frac{\text{lb. VCM}}{\text{yr.}} \times \frac{\text{VCM cars}}{180{,}000 \text{ lb. VCM}} \times \frac{0.39 \text{ ft.}^3 \text{ VCM}}{\text{VCM car}}$$

$$\times \frac{62.5 \text{ lb. VCM}}{370 \text{ ft.}^3 \text{ VCM}} = 47.6 \frac{\text{lb. VCM}}{\text{yr.}}$$

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B. Rail Car Unloading - Fugitive Emission (Cont.)

Probable emission - plant operating conditions are very similar to those for the allowable emission; therefore, the probable emission will be esentially equal to the allowable emission.

C. Residual VCM in Reactor Slurry and Reactor Opening Loss

Allowable emission - 420 pounds VCM per 1,000,000 pounds of PVC produced

$$130{,}000{,}000 \frac{\text{lb. PVC}}{\text{yr.}} \times \frac{420 \text{ lb. VCM}}{1{,}000{,}000 \text{ lb. PVC}} = 54{,}600 \frac{\text{lb. VCM}}{\text{yr.}}$$

Probable emission - 220 pounds VCM per 1,000,000 pounds of PVC produced based on March thru August, 1979 operating experience.

$$130{,}000{,}000 \frac{\text{lb. PVC}}{\text{yr.}} \times \frac{220 \text{ lb. VCM}}{1{,}000{,}000 \text{ lb. VCM}} = 28{,}600 \frac{\text{lb. VCM}}{\text{yr.}}$$

5. Prevention of Vinyl Chloride Releases from Relief Valves

The design of the new reactors will incorporate the following features to prevent vinyl chloride releases from relief valves.

A. Each reactor will be provided with an alpha methyl styrene kill system. This type system on the existing reactors has proven to be effective in reducing the polymerization rate if an increase in temperature and pressure does occur in the polymerization reactor.

B. Each reactor will also be provided with an emergency nitric oxide kill system. This type system on the existing reactors has proven to be effective in terminating the polymerization reaction in emergency situations. The nitric oxide system will be used as a backup system to control reactor runaways if for some reason the alpha methyl styrene system does not control a rise in reactor temperature and pressure.

C. The design pressure of the new reactors is 225 psig. This is 25 psig higher than the existing reactors which will allow the relief valves on the new reactors to be set 25 psig higher than the old reactors. Polymerization temperature and pressures will be the same in the new and old reactors. Thus, this increased reactor relief valve setting will provide an additional cushion to regain control of an upset condition before a release would occur. Also there is less likelihood of a premature relief valve release at normal operating conditions due to the increased pressure setting of the new relief valves.

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5. Prevention of Vinyl Chloride Releases from Relief Valves (Cont.)

D. The pressure relieving devices on the new reactors will be rupture disc - relief valve systems. The old reactors also have double rupture disc pressure relieving systems. The rupture disc - relief valve systems are less likely to relieve from premature failure.

E. All rupture disc holders on the new reactors will be of the type that is assembled and pretorqued in the shop under controlled conditions. Pretorquing in the shop eliminates the possibility of a premature disc failure due to improper torquing which can occur with the older type holders which must be torqued after assembly in the field.

In the maintenance area, all rupture discs on the new reactors will be changed out every six months. Also, every six months, all relief valves on the new reactors will be checked to assure they relieve and reseat at the correct pressure.

The plant did experience two reactor relief valve discharges in February of 1979, one due to the relief system relieving below set pressure and the other due to problems with the emergency kill system. At that time, procedural and equipment changes, which will also apply to the new reactors, were instituted in the plant. No additional relief valve discharges have occurred since that time. These changes are stated in Mr. C. L. Miller's letter to Mr. James T. Wilburn dated April 23, 1979 and include the following items:

- The standard operating procedure was revised to require termination of polymerization with the emergency kill system if the reactor pressure reaches 145 psig during production of 5385 grade resin.
- Operator training sessions covering the standard operating procedures are conducted on a formal basis once per year and for new employees during their initial orientation period.
- The emergency nitric oxide kill system is pressure checked every six months to assure integrity and readiness of these systems.
- The new type rupture disc holders which are assembled and pretorqued prior to installation were installed beneath the relief valves on the reactor which had the relief valve discharges.
- A new relief valve was installed replacing the relief valve which relieved prematurely.

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Your prompt attention to the application for approval of construction for the proposed expansion will be appreciated as we desire to proceed with the project as quickly as possible.

Please direct any further questions on the application to me at (601) 369-8111, Extension 239.

Sincerely,

R.A. Frohreich

R. A. Frohreich
Chief Process Engineer

jf

Attachments
c: Michael Brandon - EPA
Wayne B. Anderson - Mississippi Bureau of Pollution Control

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TABLE I

FIXED POINT MONITOR LOCATIONS

EXPANSION - APPROVAL OF CONSTRUCTION

ABERDEEN PVC PLANT

HONEYWELL CHROMATOGRAPH NO. 1

POINT NO.	LOCATION
1-A	401 Receiver
1-B	Recovery System, 2nd Floor
1-C	Dump Sweco
1-D	3rd Recovery Compressor
1-E	Incinerator Off Gas Stack
1-F	Middle Receiver
1-G	Bottom of D-300
1-H	Top of D-400
1-I	Bottom of D-500
1-J	Top of D-600

HONEYWELL CHROMATOGRAPH NO. 2

POINT NO.	LOCATION
2-A	South Unloading Station
2-B	Middle Unloading Station
2-C	North Unloading Station
2-D	Compressor Shed
2-E	Process Control Room
2-F	VCM Storage Tanks - 201 & 202
2-G	Respirator Air Filter Outlet
2-H	Dryer Line #6, Blend Tanks, 1st Floor
2-I	Bottom of D-700
2-J	Bottom of 745

HONEYWELL CHROMATOGRAPH NO. 3

POINT NO.	LOCATION
3-A	Bottom of 741
3-B	Top of 742
3-C	Bottom of 743
3-D	Top of 744
3-E	North of Dump Sweco
3-F	K.O. Tank Pumps, 1st Floor
3-G	Bottom of Middle VCM Receiver
3-H	Recovered VCM Transfer Pumps
3-I	Middle Recovery Compressor, 2nd Floor
3-J	Fresh VCM Charge Pumps

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TABLE I (Cont.)

FIXED POINT MONITOR LOCATIONS

EXPANSION - APPROVAL OF CONSTRUCTION

ABERDEEN PVC PLANT

HONEYWELL CHROMATOGRAPH NO. 4

POINT NO.	LOCATION
4-A	Vinyl Bagging Machines
4-B	Quality Control Lab
4-C	Compound Line I Blenders
4-D	Compound Line III Blenders
4-E	Development Lab (GC)
4-F	Welex Deck
4-G	Dry Blend Control Room
4-H	V-10 Blend Tank
4-I	Middle of East Warehouse
4-J	Shrink Wrap Unit (East Warehouse)

TABLE II

LEAK PATROL SURVEY

EXPANSION - APPROVAL FOR CONSTRUCTION

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DATE: _____ _____ _____ _____ _____

INSPECTOR: _____ _____ _____ _____ _____

LOCATION:	Conc. ppm	Conc. ppm	Conc. ppm	Conc. ppm	Conc. ppm
I. New Reactor Area - Reactor Module					
A. Ground Level					
1. 741 Charge valve					
2. Directly Under 741					
3. 742 Charge Valve					
4. Directly Under 742					
5. 743 Charge Valve					
6. Directly Under 743					
7. 744 Charge Valve					
8. Directly Under 744					
9. 745 Charge Valve					
10. Directly Under 745					
B. Third Level (Top of Reactors)					
1. 741 Lenape Seal					
2. 741 Condenser Bottom Seal					
3. 741 Recovery Valve					
4. 741 Rinse Water Line					
5. 742 Lenape Seal					
6. 742 Condenser Bottom Seal					
7. 742 Recovery Valve					

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TABLE II (Cont.)

B. Third Level (Top of Reactors) (Cont.)	Conc. ppm	Conc. ppm	Conc. ppm	Conc. ppm	Conc. ppm
8. 741 Rinse Water Line					
9. 743 Lenape Seal					
10. 743 Condenser Bottom Seal					
11. 743 Recovery Valve					
12. 743 Rinse Water Line					
13. 744 Lenape Seal					
14. 744 Condenser Bottom Seal					
15. 744 Recovery Valve					
16. 744 Rinse Water Line					
17. 745 Lenape Seal					
18. 745 Condenser Bottom Seal					
19. 745 Recovery Valve					
20. 745 Rinse Water Line					
C. Top of Condensers					
1. 741 Condenser Seal					
2. 741 Condenser Valve					
3. 742 Condenser Seal					
4. 742 Condenser Valve					
5. 743 Condenser Seal					
6. 743 Condenser Valve					
7. 744 Condenser Seal					
8. 744 Condenser Valve					
9. 745 Condenser Seal					
10. 745 Condenser Valve					

A

TABLE II (Cont.)

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II. New Reactor Area - Recovery Unit	Conc. ppm	Conc. ppm	Conc. ppm	Conc. ppm	Conc. ppm
A. 2nd Floor					
1. 901 (South) Vacuum Pump Seal					
2. 901 (South) Vacuum Pump Overflow					
3. 902 (North) Vacuum Pump Seal					
4. 902 (North) Vacuum Pump Overflow					
5. 903 Recover Compressor Seal					
6. 903 Recovery Compressor Overflow					
7. 904 Recovery Compressor Seal					
8. 904 Recovery Compressor Overflow					
9. 905 Recovery Compressor Seal					
10. 905 Recovery Compressor Overflow					
11. VCM Collection Tank (Area)					
12. East Recovery Condenser (Area)					
13. West Recovery Condenser (Area)					
B. Ground Level					
1. East VCM Storage Tank Bottom (Area)					
2. East VCM Storage Tank Top (Area)					
3. Middle VCM Storage Tank Bottom (Area)					
4. Middle VCM Storage Tank Top (Area)					
5. West VCM Storage Tank Bottom (Area)					
6. West VCM Storage Tank Top (Area)					

TABLE II (Cont.)

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	Conc. ppm	Conc. ppm	Conc. ppm	Conc. ppm	Conc. ppm
B. Ground Level (Cont.)					
7. East (894) Rec. VCM Return Pump Seal					
8. West (893) Rec. VCM Return Pump Seal					
9. South (891) Seal Water Separator Pump Seal					
10. North (892) Seal Water Separator Pump Seal					
11. Seal Water Filter Pack Head					
12. East Rec. VCM Charge Pump Seal					
13. East Rec. VCM Charge Pump Overflow					
14. West Rec. VCM Charge Pump Seal					
15. West Rec. VCM Charge Pump Overflow					
16. Rec. VCM Filter Pack Head					
17. East Rec. Charge Pump Seal					
18. East VCM Charge Pump Valve					
19. West VCM Charge Pump Seal					
20. West VCM Charge Pump Valve					
21. North Fresh VCM Filter Pack Head					
22. South Fresh VCM Filter Pack Head					
III. Old Reactor Area - Recovery					
A. Area West of V-11					
1. Middle VCM Receiver, Top (Area)					
2. Middle VCM Receiver, Bottom (Area)					
3. South VCM Receiver, Top (Area)					

TABLE II (Cont.)

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	Conc. ppm	Conc. ppm	Conc. ppm	Conc. ppm	Conc. ppm
III. Old Reactor Area - Recovery					
A. Area West of V-11 (Cont.)					
4. South VCM Receiver, Bottom (Area)					
5. 401 Receiver, Top (Area)					
6. 401 Receiver, Bottom (Area)					
7. VCM Transfer Pump (Under South Receiver)					
8. East VCM Charge Pump Seal					
9. West VCM Charge Pump Seal					
10. Rec. VCM Filter Pack Head					
11. North, Fresh VCM Filter Pack Head					
12. South, Fresh VCM Filter Pack Head					
13. Blowdown Tank Relief Vent Platform)					
14. West VCM Return Pump Seal					
15. East VCM Return Pump Seal					
B. 1st Floor - V-11 (Area)					
C. 2nd Floor					
1. A (East) Vacuum Pump, Seal					
2. B (West) Vacuum Pump, Seal					
3. East Recovery Compressor Seal					
4. West Recovery Compressor Seal					
5. North Recovery Compressor Seal					
IV. Old Reactor Area - Reactor Module					
A. Top of Reactors					
1. East Steam Jet Exhaust					
2. West Steam Jet Exhaust					

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TABLE II (Cont.)

IV. Old Reactor Area - Reactor Module	Conc. ppm	Conc. ppm	Conc. ppm	Conc. ppm	Conc. ppm
A. Top of Reactors (Cont.)					
3. D-300 Condenser Top Seal					
4. D-300 Condenser Bottom Seal					
5. D-300 Lenape Manway Seal					
6. D-400 Condenser Top Seal					
7. D-400 Condenser Bottom Seal					
8. D-400 Lenape Manway Seal					
9. D-500 Condenser Top Seal					
10. D-500 Condenser Bottom Seal					
11. D-500 Lenape Manway Seal					
12. D-600 Condenser Top Seal					
13. D-600 Condenser Bottom Seal					
14. D-600 Lenape Manway Seal					
15. D-700 Condenser Top Seal					
16. D-700 Condenser Bottom Seal					
17. D-700 Lenape Manway Seal					
B. Bottom of Reactors					
1. D-300 Dump Valve					
2. D-400 Dump Valve					
3. D-500 Dump Valve					
4. D-600 Dump Valve					
5. D-700 Dump Valve					
6. VCM Charge Manifold Line (Area)					

TABLE II (Cont.)

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V. VCM Tank Farm	Conc. ppm	Conc. ppm	Conc. ppm	Conc. ppm	Conc. ppm
1. #1 Compressor (North)					
2. #2 Compressor					
3. #3 Compressor					
4. #4 Compressor (South)					
5. #5 Compressor					
6. Railcar Connection, North Station					
7. Railcar Connection, Middle Station					
8. Railcar Connection, South Station					
9. Railcar Connection, New Station					
10. North VCM Charge Pump (S. of Sphere)					
11. South VCM Charge Pump (S. of Sphers)					