Conoco Chemicals Company
Conoco Inc.
P. O. Box 91, New Highway 25
Aberdeen, Mississippi 39730
(601) 369-8111

CONFIDENTIAL

April 23, 1982

Mr. Jerry B. Banks
Mississippi Department of Natural Resources
Bureau of Pollution Control
P. O. Box 10385
Jackson, MS 39204

Dear Mr. Banks:

At approximately 11:40 P.M. on April 14, 1982, our plant experienced an emergency relief valve discharge. Pursuant to the National Emission Standard for Vinyl Chloride (40 CFR, Part 61, Subpart G, paragraph 61.55 (a)) we are reporting this incident to your office. This release has also been reported to the National Response Center under the Comprehensive Environmental Response Compensation and Liability Act of 1980.

The vessel involved was the PVC polymerization reactor D-744. The release discharged through a 6" X 10" relief valve on the reactor condenser which has a 6" rupture disc between it and the reactor condenser. The relief valve setting was 175 psig and the rupture disc was rated to burst at 190 psig at 200°F. The cause of the release was premature failure of the rupture disc at 155 psig.

The release occurred approximately two hours after polymerization reactor D-744 had been charged, at which time the reactor had attained run temperature and pressure. At this time the shift supervisor who was walking into the control room heard what sounded like a compressed air discharge coming from the direction of the new reactor module. He stepped inside the control room and asked the panel operator if anything was wrong. The panel operator said nothing was wrong and the shift supervisor stepped back outside and noticed the noise had stopped. The control panel was then checked and a slight reduction in pressure was noted on 744 reactor. The shift supervisor then went to the reactor and found the pressure gauge between the rupture disc and the relief valve was showing pressure indicating the rupture disc had failed. The pressure in the reactor had not exceed 155 psig during the run.

Although the reactor pressure did not exceed the relief valve pressure setting, the premature failure of the rupture disc at 155 psig apparently caused a sudden pressure wave resulting in the momentary opening of the relief valve. This shock wave effect has been documented by Conoco's Research and Development Department studies and is not an unlikely event. Upon completion of the reactor batch the relief valve was taken to the maintenance shop and pressure tested. The relief valve opened at 173 psig and then quickly reseated.

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The amount of VCM discharged to the atmosphere from the relief valve was estimated to be 165 pounds using a calculational procedure provided by the relief valve manufacturer, Teledyne Farris. A copy of the discharge calculation is attached. The relief valve discharge stack is 61 feet above grade, and no personnel were overexposed to vinyl chloride during the release.

The weather conditions at the time of the release according to the plant weather station were as follows:

Barometric Pressure	-	29.80 in. Hg
Temperature -		58°F
Wind Direction -		East
Wind Speed -		Trace

No action was taken at the time of the incident to prevent the discharge as the relief valve reseated immediately after the momentary opening resulting from the premature rupture disc failure. In order to minimize the likelihood of such future discharges the plant will continue the following practices:

1. Use of nickel as the material of construction for rupture discs.
2. Replacement of rupture discs on the reactor every six months.
3. Assembly of the rupture discs in the pretorqued holders in the machine shop.
4. Pressure testing of each assembled rupture disc assembly in the machine shop prior to installation on the reactors.
5. Periodic training of the maintenance personnel by the rupture disc manufacturer in the proper handling, assembly, and installation of rupture discs.
6. Continue contacts with the rupture disc manufacturer to keep abreast of the development of better rupture discs.

In addition, the following new practices have been instigated to further reduce the possibility of premature rupture disc failures.

1. One rupture disc from each lot of discs shipped from the manufacturer will be randomly selected and burst in the maintenance shop to verify the rated pressure of the lot.
2. A supervisor must observe the assembly of the rupture discs into the pretorqued holders and the shop-testing of the assembly to 90% of its rated burst pressure.
3. A supervisor must observe the installation of the rupture disc assembly on the reactor.

Conoco has devoted a considerable amount of time and effort to determine the cause and to prevent premature rupture disc failures in the PVC reactors. The plants, corporate engineering, corporate research and the rupture disc manufacturer have all worked on the problem.

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A few years ago, stainless steel rupture discs were used on the PVC reactors. Stainless steel rupture discs which had failed prematurely were examined by Conoco's metallurgical specialists using microscopic analysis and were found to have sustained chloride stress corrosion cracking. Upon this finding the material of construction of the rupture discs was changed to nickel which is not susceptable to chloride stress corrosion cracking.

While the change of the rupture disc material from stainless steel to nickel eliminated chloride stress corrosion cracking as a cause of premature rupture disc failures, premature failures of rupture discs due to other causes remained a concern.

The rupture disc manufacturer (BS & B) was consulted to determine if they had any suggestions for preventing premature rupture disc failures. They stated improper installation of rupture discs in rupture discs holders was a potential cause for premature failucres. At that time the rupture disc assemblies at the plant had to be field assembled. While the plant's maintenance department had been trained inproper rupture disc installation procedures, it was believed that a different type rupture disc holder available from BS & B, which could be assembled in the shop prior to field installation, offered an additional level of safety. These new type holders were then installed on all PVC reactors.

In addition to metallurgical and manufacturing defects, mechanical damage to the rupture disc during assembly of the disc in the holder can cause premature failures. The disc manufacturere has recommended each disc be tested to 90 percent of its rated burst pressure after assembly in the holder prior to installation on the reactor. A damaged disc should rupture in this test. This testing procedure is followed before installation all rupture discs on the reactors.

Plant procedures require reactor rupture discs be changed out after six months of reactor operation. This reduces the possibility of premature failure due to fatigue of the disc.

Several years ago the rupture disc manufacturer was asked if a rupture disc system could be developed that, if a premature disc failure occurred, it would fail in such a way as not to effect the downstream relief valve. The manufacturer has worked on this concept but to date such a system is not commercially available.

The reporting requirements of the standard pertaining to relief valve discharges are summarized below for this release:

Source: Reactor D-744, Reactor Module No. 2

Nature: Discharge through relief system on the reactor D-744 condenser.

Cause: Premature failure of the reactor D-744 condenser rupture disc caused the relief valve to pop open momentarily after the rupture disc failed.

Date: April 14, 1982

Time: 11:40 P.M.

Approximate
Discharge: 165 lbs. VCM

Method of
Determining
Discharge: Relief valve discharge calculation.

Action Taken
To Prevent
Release: The relief valve immediately reseated itself.

Measures Taken
To Minimize
the Possibility
of Future
Discharges:

1. Supervision must observe the assembly and shop testing of the rupture disc assembly to 90% of its rated burst pressure.
2. Supervision must observe the installation of the rupture disc assembly on the reactor.
3. One rupture disc from each lot received from the manufacturer will be burst in the maintenance shop to verify the rated pressure of the lot.

If there are any questions concerning this report, please me at (601) 369-8111, extension 2239.

Sincerely,

R. A. Frohreich

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Attachment

bcc: JF, CRM, SJV, PEM, DLM, JCL