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

January 17, 1983

CONFIDENTIAL

Mr. Jerry B. Banks, P. E.
Mississippi Department of
Natural Resources
Bureau of Pollution Control
P. O. Box 10385
Jackson, MS 39209

Dear Mr. Banks:

At approximately 10:10 a.m. on January 8, 1983, 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 was reported to the National Response Center under the Comprehensive Environmental Response Compensation and Liability Act of 1980 on January 8, 1983.

The vessel involved was the PVC polymerization reactor D-744. The vinyl chloride monomer (VCM) 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 185 psig at 200° F. The cause of the release was premature failure of the rupture disc at 142 psig.

The release occurred approximately one and one half hours after polymerization reactor D-744 had been charged. Reactor temperature and pressure were both below normal run temperature and pressure. At the time of the release, the shift supervisor was near the control room. He heard a loud noise that sounded like an air line had ruptured and immediately ran toward the noise. When he reached the new reactor module, he could see nothing coming from the reactor relief valve discharge stacks, but the noise continued. Thinking an air line must have ruptured, the shift supervisor and the "A" reactor operator went to the work platform which is on the top side of the reactors. They could see nothing coming from the D-744 condenser relief valve stack. The shift supervisor climbed onto the condenser platform and felt that the relief valve was warm. He bent over and could then see vapors coming from the relief valve discharge piping. The "A" reactor operator standing below the relief valve saw nothing coming from the relief valve stack. Another operator at ground level saw nothing coming from the relief valve stack. The shift supervisor attempted to radio to the panel operator to equalize reactor D-744 with another reactor. He could not communicate with the panel operator by radio due to the loud noise from the relief valve. He came down from the reactor and went to the control room. Radio contact with the panel operator was established while the shift supervisor was on the way to the control room and the panel operator was instructed to equalize reactor D-744 with reactor D-745 which was empty at the time.

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During this time, the panel operator had heard the noise and checked the operating status all the reactors from the control panel. Reactor D-744 had the highest pressure of all the new module reactors at the time and was checked first. The pressure in reactor D-744 was 142 psig and the temperature was 148° F. No signs of decreasing pressure or temperature were observed. When the panel operator received word that the relief valve on reactor D-744 was relieving, he immediately took action to equalize reactor D-744 with reactor D-745. Within about one minute after equalization began, the noise stopped indicating the relief valve had stopped discharging. The total time the relief valve was relieving was 4 to 5 minutes.

Although the reactor pressure did not exceed the relief valve pressure setting, the premature failure of the rupture disc at 142 psig apparently caused a sudden pressure wave resulting in the opening of the relief valve. This shock wave effect has been documented by Conoco's Research and Development studies and is not an unlikely event. However, the relief valve apparently was relieving at well below its set point for several minutes. In order to understand this, the relief valve manufacturer was contacted. No immediate explanation could be given. A formal request to investigate the problem will be forwarded to the manufacturer. After the reactor batch was completed, the relief valve was taken to the shop and tested. The relief valve opened at 174 psig and quickly reseated.

The amount of the VCM discharged to the atmosphere by the relief valve was estimated to be 1,162 pounds. This amount is calculated by a reactor material balance. The calculations are attached. The relief valve discharge stack is 61 feet above grade, and no personnel were overexposed to vinyl chloride during the release. No high readings were observed on the new reactor module fixed point monitoring system.

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

Barometric Pressure	:	29.98 in Hg
Temperature	:	44° F
Wind Direction	:	From East
Wind Speed	:	0 gusting to 1-2 mph
Conditions	:	Raining slightly

Action taken at the time of the release was to equalize reactor D-744 with reactor D-745. This action caused the relief valve to stop discharging. Also, the plant has a rupture disc inspection, handling, and installation program designed to incorporate all the information we have to date on how to reduce the possibility of a premature rupture disc failure. The following control measures were used to protect the subject disc from premature failure:

1- The disc was a BS & B S-90 reverse buckling disc. Conoco and DuPont testing has been conducted on this type disc that shows it to be the best proven disc on the market.

2- The disc was constructed of nickel to reduce corrosion.

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3- The disc was in service less than 6 months.

4- The disc was assembled in the shop using a pretorqued rupture disc holder. The shop assembly was witnessed by a maintenance supervisor.

5- The disc in the pretorqued holder was pressure tested to 90% of its burst pressure in the shop. This testing was witnessed by a maintenance supervisor.

6- The installation of the disc on the reactor was witnessed by a maintenance supervisor.

7- Three training sessions have been conducted in the past year to train maintenance personnel in proper handling, assembly, and installation of rupture discs.

8- Reactor D-744 was hydrotested to 165 psig seven times to check the integrity of the discs during the time this disc was in service. A hydrotest is performed each time a major flange is unbolted on the reactor. The most recent hydrotest was on December 7, 1982, at which time no problems were encountered with the disc. Each hydrotest was witnessed by supervisory or engineering personnel.

9- One disc from the lot of discs was not burst to verify rated pressure of the lot. This is because this lot of discs was already at the plant when the procedure to check incoming disc lots was instituted. However, the plant has documentation that the manufacturer tested five discs from this lot. All five of these discs burst at the proper conditions.

As previously discussed in a letter to you on April 23, 1982, Conoco has devoted a considerable amount of time and effort to determine the cause and to prevent premature rupture disc failures. The rupture disc handling and installation procedures have recently been updated to incorporate all the information that we have to date concerning reducing the possibility of premature rupture disc failures. Input into these procedures was received not only from plant experience, but from the manufacturer, our Oklahoma City PVC plant, Conoco's corporate engineering and from DuPont engineering. The plant will continue to follow these handling and installation procedures.

Conoco has also asked the rupture disc manufacturer to develop a disc system that, if a premature disc failure occurred, it would fail in such a way as not to affect the down stream relief valve. The manufacturer has developed a disc for testing. Plans are to install this type disc at our Oklahoma City PVC Plant for testing. If testing of the disc proves to be satisfactory, funds will be requested to install these type discs. At the present time, these discs are only commercially available in an 8 inch size.

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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's condenser

Cause: Premature failure of the reactor's condenser rupture disc caused the relief valve to open after the rupture disc failed.

Date: January 8, 1983

Time: 10:10 a.m.

Approximate Discharge: 1,162 pounds VCM

Method of Determining Discharge: Reactor material balance

Action Taken To Prevent Release: Reactor D-744 was equalized to reactor D-745 which caused relief valve to stop discharging.

Measures Taken To Minimize The Possibility Of Future Discharges: The plant will continue its rupture disc inspection, handling, and installation procedures which incorporate all known items in reducing premature rupture disc failures.

If there are any questions concerning this report, please call me at (601) 369-8111, extension 2331.

Sincerely,

Veldon E. Messick

Veldon E. Messick
Senior Process Engineer

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Attachments