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ABD/RVDR

Conoco Chemicals Company
Division of Conoco Inc.
P.O. Box 91, New Highway 25
Aberdeen, MS 39730

April 9, 1980

Ms. Rebecca W. Hamner
Regional Administrator
Region IV
United States Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, GA 30308

Dear Ms. Hamner:

A leak through a double rupture disc assembly on one of the polymerization reactors was detected at approximately 12:45 p.m. on April 1, 1980. Pursuant to the National Emission Standard for Vinyl Chloride (40 CFR, part 61, subpart F, paragraph 61.65a) this incident is being reported to your office.

The vessel involved was polymerization reactor D-500. The leak occurred thru a crack in the top rupture disc of a double rupture disc assembly on the reactor. The rupture discs in the assembly were rated at 200 psig at 200°F. The reactor design pressure is 200 psig at 200°F.

Reactor batch D-500 - 4684 was charged at 11:05 a.m. on April 1, 1980. The charge was normal and polymerization of the batch was initiated. At 12:45 p.m. a vinyl area supervisor thought he heard an air leak. Upon investigation he determined the noise was coming from a leak through the double rupture disc assembly. The supervisor notified the control room of the situation and instructed the panel operator to kill the reactor. The reactor was killed at 12:50 p.m. The reactor temperature was 136°F at a pressure of 123 psig at the time the reaction was killed. Immediately recovery was started on the reactor and full cooling was applied to the reactor. The pressure and temperature of the reactor began dropping rapidly as the recovery of the reactor was started. At approximately 1:40 p.m. reactor D-300 became empty. The reactor was evacuated and D-500 reactor equalized with it at 1:50 p.m.

The pressure in the reactor continued to drop as the recovery operation proceeded. At 5:10 p.m. the reactor pressure was reduced to less than atmospheric and the leak thru the rupture disc stopped. During the last half-hour of the recovery, steam injected into the reactor to strip the vinyl chloride from the resin increased the temperature of the reactor to the point where the vapor pressure of water in the reactor became significant. Thus the vinyl chloride concentration of the leak decreased during this period. A copy of the reactor pressure and temperature strip chart is attached. The vent stack on the double disc assembly is 50 feet above grade.

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No personnel were exposed to vinyl chloride from the leak. The weather conditions from the plant weather station during the leak were as follows:

Barometric Pressure	- 29.88 in. Hg.
Temperature	- 70°F
Wind Direction	- variable from south and southwest
Wind Speed	- variable 0 to 5 miles per hour

The amount of vinyl chloride from the leak is estimated to be 283 pounds. This is based on orifice calculations using the wetted perimeter of the crack and calculating the flow rate of the leak using the average pressure and temperature of the reactor over ten minute intervals. A copy of the calculation is attached.

New improved rupture disc holders and discs were ordered for the reactors in December 1979. This type rupture disc holder had previously been purchased and installed on D-300 reactor. Since this holder did have improvements over those in use at the time, they were ordered for all the other reactors. These new holders and discs were received in the plant in mid March of this year. Two new type holders and discs were installed on D-500 reactor before the next batch was charged. These new holders are the improved type that the disc is put in the holders and pretorqued in the shop. The holders with the disc in place is then taken to the field and installed on the reactor. Pretorquing in the shop minimizes the chance of a premature disc failure due to improper torquing on the disc. This improved type holder and disc is being installed on all the polymerization reactors. In addition a feasibility study will be conducted to determine if the double rupture disc assembly can be replaced with a single disc and a relief valve.

The reporting requirements of the standard are summarized below:

Source:	Reactor D-500
Nature:	Leak through crack in top disc of a double rupture disc assembly.
Cause:	Premature failure of rupture disc.
Date:	April 1, 1980
Time:	12:45 p.m.

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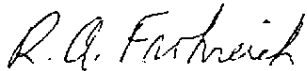
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Approximate Discharge:	283 pounds of vinyl chloride
Method of Determining Discharge:	Orifice calculation
Actions Taken To Prevent Discharge:	1. Reaction Killed 2. Batch recovered 3. Batch equalized with another reactor
Measures Taken To Prevent Future Discharges:	1. New type rupture disc holders and rupture discs installed in the reactor. 2. A feasibility study will be conducted to determine if the double rupture disc assembly can be replaced with a single disc and a relief valve.

If there are any questions on this matter, please contact me at (601) 369-8111, Ext. 239.

Sincerely,



R. A. Frohreich
Chief Process Engineer

cjt

Attachments

c: Wayne Anderson - Mississippi Bureau of Pollution Control

bc: CLM, CRM, JEB, MPB, SJV, JJH

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LEAK CALCULATIOND-500 REACTOR12:45 p.m. - April 1, 1980

An orifice calculational procedure based on the methods of Spink⁽¹⁾ was used to determine the amount of the leak. The length and width of the crack were measured and from this a hydraulic radius of 0.0315 inches was calculated. Leak rates were then calculated for ten minute intervals using the average pressure and temperature of the reactor for each interval. These results are shown below:

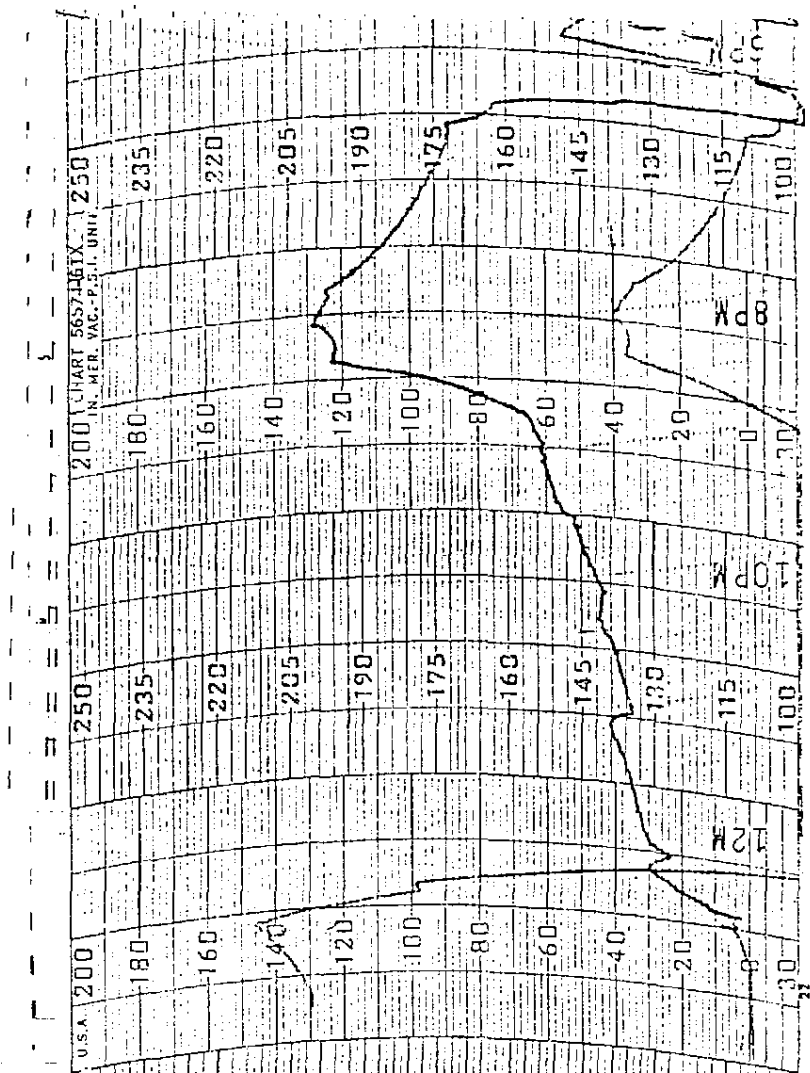
Time Period	Reactor		Discharge Rate (lb./hr.)	Weight Fraction VCM	VCM Leaked in Period lbs.
	Pressure Psig	Temperature °F			
12:45 - 12:55	118.5	133	139	0.996	23
12:55 - 13:05	98.5	120	120	0.998	20
13:05 - 13:15	73.5	106	94	0.999	16
13:15 - 13:25	63.0	99	84	0.999	14
13:25 - 13:35	60.5	95	81	1.000	14
13:35 - 13:45	59.0	93	80	1.000	13
13:45 - 13:55	57.0	93	78	1.000	13
13:55 - 14:05	53.5	90	74	1.000	12
14:05 - 14:15	49.5	86	70	1.000	12
14:15 - 14:25	46.5	82	67	1.000	11
14:25 - 14:35	44.5	81	65	1.000	11
14:35 - 14:45	44.0	81	64	1.000	11
14:45 - 14:55	42.0	79	62	1.000	10
14:55 - 15:05	39.5	75	60	1.000	10
15:05 - 15:15	38.0	73	58	1.000	10
15:15 - 15:25	38.0	73	58	1.000	10
15:25 - 15:35	39.5	75	60	1.000	10
15:35 - 15:45	38.5	73	58	1.000	10
15:45 - 15:55	36.0	72	56	1.000	9
15:55 - 16:05	34.0	70	54	1.000	9
16:05 - 16:15	32.5	66	52	1.000	9
16:15 - 16:25	28.0	63	48	1.000	8
16:25 - 16:35	27.0	61	47	1.000	8
16:35 - 16:45	22.0	127	38	0.983	6
16:45 - 16:55	9.0	164	21	0.925	3
16:55 - 17:05	3.0	187	9	0.780	1
17:05 - 17:15	1.0	200	5	0.556	-
				TOTAL	283

¹Spink, L. K., "Principles and Practices of Flow Meter Engineering, 9th ed., The Foxboro Company, 1967.

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CONOCO CHEMICALS COMPANY
REACTOR BATCH D-500-4684
TEMPERATURE & PRESSURE CHART

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