

MONSANTO CHEMICAL COMPANY
From Location: Texas City, Texas

Date : July 24, 1959

Subject : MAJOR INJURY REPORT

To : W. R. Nisbet

At : Texas City

cc: H. M. Keating
J. G. McQuarrie
Glenn D. Rucker
R. W. Rotzler
W. H. Slager
A. E. Withrow
N. F. Wood
W. F. Zimmermann/
T. Ryan
E. H. Jones
J. S. Putnam
W. E. Alexander/
C. A. Burton
S. L. Hunter

SUMMARY

At approximately 2220 on Wednesday, July 22, a rotary conical vacuum drier in the EMA interim production unit became overpressured when a valve in the vapor line vibrated closed. The unloading hatch was forced open by the pressure, blowing polymer and EDC vapors into the drier room, out the door and into the area between the pilot plant and Research Building No. 2. An operator, Billy M. Barker was walking in front of the dryer when it dumped. He received minor bruises when pushed against the wall and was exposed to high concentrations of EDC vapors and polymer dust. After emergency treatment under safety shower and eye bath he was taken to Danforth Hospital. As of the morning of July 23 the effect of exposure on skin, stomach and respiratory system had cleared up; though he was still being held for observation. However, eye irritation is still bad, and Dr. Stiernberg has been asked to look at his eyes. It is not known as yet whether this is a lost time accident or not.

The area was washed down by the fire crew and operating staff. Apparent damage to equipment was minor; however, the dryer must still be cleaned and tested to determine if there was any internal damage.

COMMENTS

The EMA dryer was loaded and put in operation using the normal procedure. Full vacuum was put on the dryer and steam on the shell at 1810. The temperature recorder chart indicated that the dryer operated normally until about 1949. At this time the temperature in the dryer started to increase. At about 1900 the dryer was checked and it was found that air was leaking into the dryer through the end hatches. The hatches were tightened and steam pressure on the shell reduced. This is a normal operation since the hatches depend on an internal vacuum for a seal. The temperature chart indicates that the temperature continued to increase at a steady rate until about 2009. At this point the rate of

W. R. Nisbet

July 24, 1959

temperature rise increased for four minutes when the polymer temperature reached a maximum (temperature of the steam) and leveled off. This temperature held for seven minutes before the discharge hatch opened dumping the polymer.

At the time the hatch opened, Barker was walking in front of the dryer and was hit by the polymer and vapors. He was not working the dryer but was passing by on the way to check another piece of equipment. He was pushed against the wall and received bruises on both arms. After being blinded by the dust he called for help and probably inhaled a large volume of dust and vapors. Another operator got him to a safety shower and washed him down. Washing and eye flushing continued for 15-20 minutes after which Tony Ozarchuck took him to the hospital, where he was examined, treated and left for observation.

Polymer apparently started dumping from the discharge hatch near the bottom of the down swing. On the upswing, polymer was discharged against a protective expanded metal gate. The gate was bent releasing pressure on a safety switch which stopped the dryer. The only apparent damage to equipment was to the protective gate. Pictures showing the gate and discharge hatch are attached to Nisbet's copy.

Inspection after the accident showed that a plug cock in the vapor line had closed during operation. It is believed that the reasons for the valve closing are a combination of vibration (from the dryer and a centrifuge on the second floor) plus the weight of the valve wrench. This valve is used to cut off the vacuum system when the drying cycle has been completed. Polymer in the valve makes it hard to open and close on occasions but after the accident it was found to work very easily so it could have vibrated shut. Pressure then built up since steam was still on the shell and vapors could not get out of the dryer.

Calculated pressure in the dryer was 25 psig. A key on one of the gears on the discharge hatch sheared from the pressure and let the hatch open. The reason why a pressure as high as 25 psi built up before the hatch opened is not known. The dryer is built for vacuum operation and depends on internal vacuum for a tight seal on the hatches. Previous experience when breaking vacuum and running ammoniation reactions has shown that the hatches and packing glands leak badly with an internal pressure of 1-2 psig.

In general the injury resulted from a combination of the following circumstances:

SC

16773

LAM024042

W. R. Nisbet

July 24, 1959

1. A free moving plug cock with valve closer left on it.
2. Vibration
3. Failure of the dryer hatches to leak
4. The presence of the operator in front of the dryer at exactly the right time. Fifteen seconds earlier or later and he would not have been injured.

ACTION TO BE TAKEN

1. Provide a positive lock on the block valve so that it cannot vibrate shut
2. Install a relief valve between the block valve and the dryer
3. Install a pressure alarm on the dryer
4. Install relief valves on two other dryers in the pilot plant.

W. R. Johnson
W. R. Johnson

WRJ:mg

SC

16774

LAM024043