

CONOCOCWT
7-17-81-4-1H**CONFIDENTIAL**IC
IF
IG**Interoffice Communication**

To John Friend
From A. W. Sirmons
Date August 25, 1981
Subject NEAR-MISS ACCIDENT INVESTIGATION - VCM UNLOADING HOSE FAILURE
JULY 17, 1981

The subject incident was investigated at the Oklahoma City Chemical Plant on August 25, 1981. Employees who actively participated in the investigation were:

A. W. Sirmons - Team Leader/Plant Superintendent
Randy V. Gantz - Safety Director
C. W. Turner - Process Superintendent
W. H. Newell - Mechanical Superintendent
J. B. Bello - Temporary Shift Supervisor
L. J. Meeks - No. 2 Operator
Brady Watson - No. 2 Operator

The purpose of the investigation was to determine the cause of the failure and make recommendations to prevent a recurrence of this or similar incidents. Because of the seriously high accident potential following the failure a greater than usual number of employees were selected to assist in the investigation.

1. Extent of Loss

No personnel injuries were sustained. The incident is classified as a near-miss accident.

VCM loss to the atmosphere was estimated to be between five hundred (500) and one thousand (1000) pounds. The appropriate environmental agency was notified.

Following the incident the unloading hose contained a crack in the crest of one convolution of the liner approximately 1/16-inch wide and 1-1/2-inch long. The hose has been sent to MED for metal evaluation.

2. VCM Unloading

Liquid VCM is unloaded in the plant through a number of Anaconda flexible 304 stainless steel hoses (design operating pressure of 400 PSIG) connected to the railcar loading/unloading lines. The hoses are made with convoluted stainless steel liners protected with a braided stainless steel cover. The hoses come equipped with a short piece of stainless steel pipe permanently attached to each end. The end of the pipe is threaded for installation.

The unloading process normally requires the use of one 3-inch hose used to supply VCM vapor to the railcar which forces liquid VCM from the car

John Friend
Page Two
August 25, 1981

2. VCM Unloading - (Continued)

through either of two 2-inch hoses into a VCM storage tank. For unloading purposes the VCM vapor is delivered to the railcar at a higher pressure than that which is contained in the VCM storage tank by Small Corken Gas Compressors located at the unloading area. The unloading compressors normally get suction from the vapor area of the tank which is receiving liquid VCM.

When a VCM unloading hose is replaced the installation date is etched on the pipe surface of the new hose at one end.

3. Circumstances Leading to the Incident

The plant was on a normal five-reactor operation July 17, 1981. A full staff of operating employees were present, having reported to work at 7:00 A.M. and would be relieved upon completion of their scheduled 12-hour shift at 7:00 P.M. Included in the group of on-duty employees were Joe Bello, Operations Supervisor (temporary), and Larry Meeks, a No. 2 Operator assigned to work in D-40 (dryer) and the unloading areas.

Larry had secured two empty VCM railcars for shipping earlier in the afternoon. At 6:00 P.M. he returned to the unloading area, having confirmed the level in F-105 tank was now low enough to hold another car, and started CONX 9081 on liquid (started unloading the car). The car was located at the middle unloading spot on the west side. Larry lined up the railcar and unloading rack valves. He asked the panel operator, Joe Wiley, (by radio) to start the Corken Compressor and left the rack to check out the compressors following start-up. Larry then returned to the unloading rack to confirm that flow had been established. He further confirmed there were no leaks in the unloading system, then returned to the Control Room.

4. The Incident

At approximately 6:15 P.M. the Fixed Point Monitoring System, located in the Control Room, indicated a leak in the VCM unloading area and at C-104 Corken Compressor. Larry recognized the problem and told Joe Wiley he was going to check it out. From the sidewalk, about 25 feet south of the Control Room, Larry could see a leak on the middle unloading platform, and instructed Wiley (by radio) to shut down the unloading compressors. Larry described the leak as a garden hose turned on wide open.

Joe Bello joined Larry and enroute to the unloading area they equipped themselves with Scott Air Paks. Joe went to the top of the unloading rack, closed the valves on the platform and then, with his foot (boot on) partially closed the valves in the railcar dome. Joe and Larry then opened the firewater monitor south of the unloading area and fixed a stream of water onto the railcar dome. Liquid VCM which had collected in

CONFIDENTIAL

John Friend
Page Three
August 25, 1981

4. The Incident - (Continued)

the dome of the car was soon dispersed. Larry then went to the top of the car and finished securing the car's unloading valves, using a hammer handle to tap them shut. Joe finished washing down the car and checked the VCM unloading lineup. Everything was lined up correctly. The leak was secured at approximately 6:35 P.M.

5. The Failure

The failure (a crack approximately 1/16-inch wide by 1-1/2-inch long) occurred in a convoluted crest near the end of the 2-inch unloading hose which is fixed to the liquid VCM unloading line. The Investigating Team found the protective braiding had been torn loose from under a permanently-fixed ring at the end of the hose. The braiding was missing over an area about 2-inches long and about 3-inches wide. Once the protective braiding is damaged or missing the convoluted liner is free to unlimited flexibility, as was evidenced by the critical sharp bend in the hose at the point of failure. The braiding was damaged and missing on other areas near the midsection of the base. The installation date etched on the end of the hose was 8-5-80.

6. Basic Cause of Incident

VCM unloading hose failed.

Excessive and unlimited flexing imposed on a convoluted liner accelerates metal fatigue and can be expected to cause sudden failures.

7. Underlying Cause of Incident

- A. Unloading VCM from a railcar with a hose having visible deterioration beyond an acceptable level.
- B. Safety valves in unloading lines "checking" which causes the unloading hose to be hydraulically shocked.

Note: Hydraulic shock may not have occurred at the time of failure. However, examination of the hose by the Investigating Team does suggest the hose had previously been subjected to hydraulic shock.

- C. A manufacturer's defect could have contributed to the incident if the braiding was not properly secured under the end ring. The Investigation Team could not determine if this was true or not.

8. Safety Rule Violation

There were no safety rule violations.

VEV-261509

CONFIDENTIAL

John Friend
Page Four
August 25, 1981

9. Recommendations to Prevent a Recurrence

- A. Routine pre-hookup unloading hose inspections by the operators. Record inspection findings on Daily Log Sheet. Condemn hoses if inferior in quality.
- B. Hose inspection by the operators after car unloading has begun. Determine that flow is established. Record inspection findings on Daily Log Sheet.
- C. Operator observe car/s unloading for safety check valve behavior. Take corrective action if "chatter" is found.
- D. Install an unloading pressure recorder with alarm in Control Room.
- E. Identify railcars with faulty safety flow check valve and demand check valves be repaired.
- F. Inspection of unloading hoses by the Process Superintendent at least on a monthly basis. Make a record of the inspection.
- G. Train all operators in correct unloading procedures. Cover the hazards of VCM unloading in regular safety meetings.

The Operating members of our team informed us that railcar repairs are not being made. The CONX cars are leaders in our fleet of VCM cars with faulty safety flow check valves. Cars with faulty check valves are received in our plant for unloading at the average rate of three to four cars per week. Corrective action will be taken by the plant to assure that cars with faulty unloading check valves are sent to the rail shop for repairs. To be able to achieve this we must educate ourselves to identify a check valve that is truly faulty and then train our operators to do the same.

The Team discussed the use of a sound system which could be used to alert the Control Room Operator when a safety flow check valve began to "chatter". This could be accomplished by installing a microphone on each unloading rack, connected to a radio unit that would sound on a speaker in the Control Room. The Control Room Operator would hear the "chattering" and advise the No. 2 Operator to correct the situation. The Team felt this system would not be the most effective because it would pick up all sounds in the unloading area. Although the idea was not totally discarded; it was, however, placed second to a VCM unloading pressure recording system with an alarm.

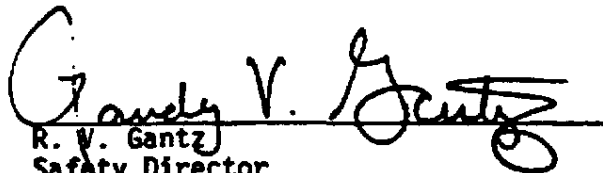
VEV-261510

CONFIDENTIAL

John Friend
Page Five
August 25, 1981



C. W. Turner
Process Superintendent



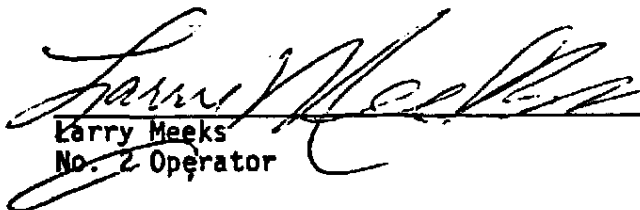
R. V. Gantz
Safety Director



W. H. Newell
Mechanical Superintendent



Joe Bello
No. 1 Operator/Temporary Shift Supervisor



Larry Meeks
No. 2 Operator



Brady Watson
No. 2 Operator



A. W. Simons
Plant Superintendent/Team Leader

AWS-wm
cc: AWS, CWT, WHN, RVG, File: Safety

VEV-261511