

EXHIBIT A

KEEP CONFIDENTIAL BY REQUEST OF B. F. GOODRICH

Massive release from VCM storage sphere (Feb., 1982)

At their Australian PVC plant during a three-week shutdown, human error caused the loss of about 1.5 million pounds of VCM, but luckily no injury to humans, no fire or explosion. Event occurred on a 70°F day with 12 MPH wind toward the polymerization area, but away from neighboring residents. Luckily no fire or explosion occurred, nor was there any injury to humans from the vapor cloud.

A group of maintenance men were assigned to replace a 34 ft. section of 3" pipe from a VCM storage sphere. A fitter was directed to break the flange where the pipe connected to the sphere bottom outlet valve. This 4" air-operated piston valve had a metal guard around it and the fitter attempted to work around the guard rather than remove it. In error the fitter removed the U bolts of the valve actuator. When the pipe was lowered the valve was inadvertently struck and a small VCM leak started.

The alarm was given at once and all electric power was shut down in the area. An attempt was made to close the valve by levering the piston up with a wooden plank. The plank broke and the 48-lb. piston then fell downward into the full open position.

All surrounding plants and a nearby highway were shut down. The vapor cloud eventually extended five miles at the end of which a VCM concentration of 1 ppm was measured. In the polymerization area 300 feet away, VCM concentration was 1 percent.

At the end, a new valve was finally installed and water injected, but too late to save any VCM. Ice built up from the ground 10 feet to the bottom of the sphere and started up the sides.

Conclusion

BFG concludes that the work-order system failed. A maintenance Engineer wrote the work order without viewing the job site. A Production Foreman signed the work order, since the Area Foreman was busy on a shutdown job in the Boiler House. The Maintenance Job Check List, which should have been with the work order, could not be found. Only the fitter was scheduled for the job and not an instrument man.

Aftermath

A Corrective Action Team was formed to survey all BFG plants worldwide to attempt to eliminate the possibility of this type of emergency in the future. Members came from all Departments: Safety, Manufacturing, Engineering, etc. and eventually totaled eight people. The survey extended from February through September, 1982 and involved four elements:

- 1) Current equipment and procedures at all plants.
- 2) Determining the deficiencies at each plant. Two plants were found to have faults so serious as to require immediate correction.
- 3) Recommending of corrective action for each plant.
- 4) Follow up to insure that corrections would be made.

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Team Recommendation

- a. Revise the work-order system
- b. Clarify the organization and responsibilities of all personnel. The tank farm area of the subject plant was particularly weak in the clear assignment of responsibility.
- c. Revise and standardize vessel inspection procedures. The speaker here conducted a poll of the meeting:
 - 2 companies inspect spheres every 3 years
 - 8 companies inspect spheres every 5 years
 - 2 companies never inspect spheres
 - 5 companies hydrostatically test their spheres
- d. Standardize Relief Valve testing: BFG found that the times for this throughout the corporation varied from 1-6 years. Another poll:
 - 19 companies test each year
 - no companies test every 2 years
 - 1 company tests every 3 years
 - no companies test every 5 or more years.

BFG recommended to its plants that either one 3-way Relief Valve be used or two 1-way valves with a block valve under each.

- e. Standardize on equipment; new and that retrofitted as a result of the Team recommendations:
 - Sphere bottom valves should be: ball type; air operated with air to open (the subject valve was air to close); valve actuator to pass a fire test; quick open and close; mounted on vessel flange directly. Another poll:
 - 16 companies have air operated valves on spheres
 - types: 1 company has a gate valve
 - 13 companies have ball valves
 - 11 companies have plug valves
 - No company uses a butterfly type

BFG cautions against relying on excess flow valves; 6 companies have these on VCM storage tank outlets, all but one inside.

- f. Provide continuous VCM monitoring around all VCM storage tanks: to alarm, to close the bottom valve and to activate the deluge system. Another poll:
 - 15 companies have such area monitors, all GC
 - 13 companies have monitors for LEL
 - 12 companies have both of the above
 - 2 companies have no monitoring

The speaker conducted additional polls:

1. Deluge Systems on spheres: 16 companies have these but not at the bottom.
Testing Deluge Systems:
 - 10 companies test every year
 - No company tests every 6 months or every 2 years or longer
2. Miscellaneous: 4 companies have insulation on the bottom half of their spheres; this is said to be effective only a short time.
 - 3 companies have underground VCM storage tanks.
 - Only Primex, Mexico City, limits the size of the outlet at the bottom of its sphere, and this subsequent to its 1977 disaster.

NOTE: The Governmental authorities were closely involved throughout, but no punitive action resulted. This goes along with the official climate prevailing in Britain as noted in the ICI incident in the main report.

J. A. KING JAK 10/15/82

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