



INTER-COMPANY AND OFFICE CORRESPONDENCE

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Below is a summary of the program presented at the Vinyl Chloride Safety Association meeting held in Boston.

I. Case Studies:

A. Explosion in a PVC Reactor

Georgia Gulf reported the details of an explosion inside a PVC reactor at their Delaware city facility last February. VCM was accidentally charged to the wrong vessel which was in the open mode. The source of the ignition was a spark caused by the agitator striking the thermowell as a result of a bent agitator shaft.

B. Fire at an EDC Cracking Unit - See Attachment 1

Wacker reported on an EDC fire in the cracking unit of their VCM plant in Burghausen, West Germany in December, 1988. A pipe coil in their EDC furnace ruptured. Combustion of the leaking EDC resulted in an HCl release of 1-12 metric tons. During the cooldown of the furnace, air was sucked in and detonated. The cause of the tube failure continues to be under investigation. See Attachment 1

C. Explosion in a VCM Plant - Norsk Hydro - See Attachment 2

Norsk Hydro reported on an explosion at their VCM plant near Oslo, Norway in September, 1988. The incident started when a pipe ruptured in the reflux line of their EDC cracking quench system. The gas cloud that formed was ignited by the gas burner in the cracker. Also extensive fire damage resulted.

The cause of the line rupture was attributed to:

- a. High liquid velocities
- b. Coke particles in the liquid acting as an abrasive
- c. Sharp bend of the 90 that failed

These all contributed to erosion in the 90 and its ultimate failure.

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D. Computer Failure of a Reactor Control System

Esso reported a failure in their computer control system that resulted in a VCM release. When the unit I/O card failed, all of the valves on the reactor went to a preselected "safe" position. When an electrician arrived, he shut off power to the I/O card and its power supply. Shortly afterwards, the preevacuation valve opened causing a release.

Esso is unsure what caused the valve to open. They suspect that the I/O card was subject to a high ambient temperature that may be a contributory cause.

II. Diers Implementation at Dow's Texas Operations - See Attachment 3

Since the development of improved relief valve sizing technology by the Design Institute for Emergency Relief Systems (DIERS), Dow has embarked on a program to review the design criteria for all of their relief valve systems at their Texas Operations. Since they estimate there are 14,500 relief valves at these sites, they have established a project team to coordinate this program. Emphasis of the program has been:

- a. Improve design standardization by training many people in the DIERS methodology.
- b. Develop a review process for all relief valve system designs.
- c. Develop a prioritization system.
- d. Develop an integrated calculation and documentation system.

III. Primex Safety Program

After a number of major accidents at Primex in the past several years, the most notable being the explosion at the Mexico city LPG terminal, Primex has developed a safety program based on Crosby's philosophy of zero defects and cost of quality. All accidents are rated on frequency and seriousness of the injuries as well as the effect on machinery, materials and the environment. A rating system has been identified to quantify the severity of impairment to each category. By developing a rating system and identifying the total cost of each accident, Primex believes they have been able to significantly improve the safety performance of their operation.

IV. Delaware's Risk Management Program Regulation - See Attachment 4

Delaware has enacted a new legislation in September, 1989 to regulate the management of hazardous substances. This regulations covers any facility that uses toxics, explosives or flammables in large enough quantities that could result in an explosion or incident beyond the property boundary of the facility. The reportable quantity at Formosa Plastics in Delaware city is 5300 gallons. Highlights of the new regulation include requirements for:

- a. Establishment of a Risk Management Program for each site
- b. Complete a Risk Analysis for the site
- c. Complete a process hazard analysis for any new process to be installed
- d. Require written operating procedures for all hazardous processes
- e. Require a preventive maintenance program and inspection and test program for critical equipment
- f. Require documented training program for all employees that work with the hazardous substances
- g. Incident investigation and remedial action requirement for all potentially catastrophic incidents
- h. Inspection of all aspects of the program by the Delaware EPA at least every three years

V. Update - Short Stop Systems - See Attachment 5

An update of a survey on shortstop systems conducted in 1984 was presented. The survey indicated that more companies have continued to install shortstop systems over the past 5 years. Half of the systems work automatically reacting to upsets in batch temperature, pressure and agitation.

VI. Hazardous Material Transportation

The history of improvements to railcars to improve safety since the mid 60's was reviewed. They are:

- a. Head shields to prevent puncture
- b. Insulation to cushion impact and protect car from heat
- c. Use of a shelf coupler to prevent puncture of the head
- d. Installation of magnetic level gauges

Dow has also standardized all tank cars to allow the utilization of standard repair kits. Currently all cars used in industry are not standard. This makes stopping some leaks more difficult. Dow also uses cable seals both directions on their cars to prevent tampering.

Dow has a central computer dispatch system. This includes the dispatch office that has its own dispersion model available, airplanes available at a local airport on one hour's notice and manpower available around the clock.

Dow has been working on a new program called TRANSCAER. This is a program similar to the CAER program each plant has with its local community. The TRANSCAER program is for all communities that have trains with hazardous chemicals traveling through them. The program is new and several practice drills have been conducted.

VI. US Regulatory Update

- 1) On 9/21/89, USEPA issued revisions to the NESHAPS standard. This revision clarifies some of the definitions in previous revisions.
- 2) On 1/19/89, USEPA revised the Z list. This revision reduced the permissible exposure limit on EDC from 50 ppm to 1 ppm. The SPI feels the ruling is arbitrary and is currently challenging the revision.
- 3) OCPSF - Some areas that may require further regulations are areas where streams will still not meet new clean water guidelines after OCPSF is enforced.
- 4) EPA is getting close to finalizing new hazardous waste regulations. VCM will be regulated at 200 ppb.

VII. Elements of a Superfund Program - See Attachment 6

When Formosa Plastics purchased the Delaware city plant from Stauffer Chemical Co., they also became involved in a Superfund site. Developing a plan to correct the problem required 1 1/2 years. There are four parts to the negotiations with EPA:

- 1) Develop a scope of work
- 2) Develop a work plan
- 3) Develop a Remedial Investigation Site Operation Plan. This takes about one year

4) USEPA issues a Record of Decision

Depending on the acceptance of each one of the steps by both parties, development of a program could be much longer.

Other recommendations from Formosa were:

- 1) Doing the clean up yourself. However time consuming it is better to do it yourself. USEPA's cost will be 3 times TOM rates.
- 2) Offer to do more than necessary if it will benefit your site and apply the difference to offset any pending fine.
- 3) Get a performance contract from environmental contractors.

VIII. Corrosion and Thickness Testing - See Attachment 7

In critical services such as quench recycle lines, a routine thickness testing program is an important tool preventing line rupture. The major source of metal loss in this type of system is erosion. BF Goodrich has gone to full x-rays of all welds in this area. In addition, a routine test program with specific test points along the piping system are monitored on a regular basis.

Other comments during the discussion were:

- 1) A recommendation that seamless tubes be used in all exchangers in VCM service.
- 2) Norsk Hydro pointed out that erosion can be a particular problem outside the U.S. In the U.S., std 40 pipe has a wall thickness of 6.02 mm. In Europe, the std pipe used, DN40, has a wall thickness of 3.6 mm.

IX. TCLP/TOC Impact - See Attachment 8

The impact on the proposed TOC regulations on the VCM and PVC industries was presented. The impression of industry is that the proposed regulations will be promulgated pretty much intact by the end of 1989. Under this regulation, all waste stream with a VCM content in the water or solids above 200 ppb will be considered hazardous. This could potentially have a significant financial impact on the VCM and PVC industries making even scrap resin a hazardous waste.

X. European Regulatory Update/ 1992 EEC Harmonization

There is a wide variation on emission limits between European countries. How these will be coordinated by the 1992 EEC Harmonization is unknown at this time. West Germany and Netherlands have the most stringent regulations at this time. There is also pressure to eliminate PVC packaging.

XI. USEPA and State Litigation - See Attachment 9

XII. Hurricane Preparedness - See Attachment 10

A plan for responding to a hurricane was presented. The plan includes:

- A. Action steps based on location of hurricane and wind speeds at the plant.
- B. Coordination with other local industries and community leaders.
- C. Shelter and personnel preselected and trained.
- D. Stresses the need for good communication.

XIII. Angiosarcoma Update - See Attachment 11

Dr. Bennet presented an update on the number of cases of angiosarcoma occurring in workers of PVC and VCM plants. Through January 1989, there have been 144 cases: 50 in the U.S. and Canada and 82 in Europe. Currently, there are approximately 8 deaths a year due to angiosarcoma. There have been no cases in people with first exposure after 1974. This is when OSHA regulations started to take effect.

There is still misinformation going out to the general public. A Dr. Wagner in Texas has stated that all people exposed to VCM before regulation will get angiosarcoma and there will be 30,000 deaths as a result. The actual cases show this to not be a fact.

Dr. Bennet also displayed a new cannister type air mask for VCM that is able to withstand VCM levels up to 10,000 ppm for 15 minutes. It is also good for HCl, EDC, VAM and Chlorine. Disposal of the activated carbon may be a problem and regeneration may be necessary in the future.

XIV. PVC Dust Fire Testing

As a result of an explosion of PVC dust at a compound plant at Avon Lake, OH, BF Goodrich conducted in depth testing on PVC dust. Previous testing by the Bureau of Mines indicated that PVC dust was not an explosion hazard. But BF Goodrich found that the energy input in the Bureau of Mines test was limited. Where an acrylic polymer required .02 joules to ignite a dust cloud, PVC required to 1086.8 joules. BF Goodrich believes their explosion occurred when they had a small dust explosion of acrylic dust that shook the steel beams and created a dust cloud of PVC. The PVC dust cloud was then ignited by the energy of the first explosion. Their recommendation is that all PVC users should insure they have good housekeeping and good lightning protection (this would also have enough energy to ignite a dust cloud) Users should also use a dust tight electrical classification.

XV. Dow Safety Program - See Attachment 12

Dow presented their new safety program for the 1990's that they call "Safe Working Style". After seeing the number of accidents leveling off, they developed a program to address human errors. This program was developed based on the aviation industry safety programs.

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