Keppen

7,10 – Vinyl Chloride Safety Mtgs

Form B316(4/73)

BORDEN

INTER - COMPANY AND OFFICE CORRESPONDENCE

DATE: November 1, 1983

FROM: J. E. Barton

DIV./DEPT. PVC Production Manager

ADDRESS: Illiopolis, Il

TELEPHONE:

TO: All Concerned

SUBJECT: Minutes of Vinyl Chloride Safety Association Meeting October 20-21

The following are minutes from the Vinyl Chloride Safety Association Meeting held on October 20-21, 1983 in New Orleans.

The meeting opend by reviewing "Old Case Histories". Accidents which have happened in the past and have led to major changes in the VC and PVC industry.

In 1964 the Thompson Chemical Explosion killed 7, injured 22 and destroyed the building. The cause of the explosion and fire was a sight glass on a reactor which broke while being tightened under pressure. The sight glass had been replaced and was leaking, it was never hydrostated before recharging.

In 1968 a fire at the Hooker Burlington Bulk Process Plant caused major structural damage to the building, major piping and instrumentation damage. The fire was caused by a leaking flange on a transfer line between two reactors. Maintenance had replaced a control valve on the line and the line was never pressure checked before being put back in service. To add to their problems the line had no isolation valve and they had no plant fire protection group along with an inadequate water supply.

In 1972 a fire at the Goodyear Plaquemine Bulk Process Plant burned for 3 hours causing building, piping and instrumentation damage. The fire was caused by leaking gas igniting when the reactor dome blew off during the reaction. The dome was held in by a locking ring and how it became loose is not known. All the locking rings on reactors domes have been equipped with a wedge and proximity switch interlocked with the VC charge valve to prevent a reoccurrence.

In 1977 an explosion in a scrubber at PPG in Plaquemine leveled their entire Oxichlorination facility. The cause of the explosion is not known, however, excess oxygen is suspected. Computerized interlocks and oxygen monitoring equipment are used now to prevent a repeat.

At the BFG Plant in Altona 1.5 million pounds of liquid vinyl was dumped from a sphere when a maintenance man tried to close the bottom valve with a 2 X 4. He was working on the line downstream and the valve was leaking by. The 2 X 4 broke and the valve opened. There was no fire or explosion and the vinyl evaporated without incident. Sphere's today are being equipped with excess flow valves and remote operated fail safe valves to prevent similar incidents.

The meeting continued with the discussion of some "Current Case Histories".

On 7/30/83 The Formosa Plastics Plant at Baton Rouge had a fire at the VC loading station. The fire was caused when a hose ruptured while being purged with nitrogen. The fire was fed from the tank car because the excess flow valve was installed wrong. The fire burned under control for 5 days; the car could not be unloaded. Excess flow valves have been replaced with check valves on all tank cars.

At Occidental Chemical a man was killed while cleaning out a heat exchanger with an 18 foot flexible hose and a 2" rotating nozzle under 4200 pounds of pressure. It is not known why the hose bucked back out of the tube, but it struck the man in the throat and penetrated his chest before his helper could shut the equipment down. Predrilling tubes and using a lance instead of the flex line makes the job safer.

A Bulk Resin Hopper Truck being unloaded in Mishawaka, Indiana on 6/28/82 split and spread resin over 300 feet of unloading area. The truck ruptured at 14 psig on the guage while 2-15 psig relief valves never opened. The truck was rolled over in 1977 and the welded repair was done poorly causing the hopper to fail.

At Esso Chemical,in November 1982, a VCM line ruptured at a flange joint. The joint had corroided. A Monel flange was welded to a 304 stainless line with 308 welding rod. Piping standards were revised and job site inspections and Engineering approval were necessary before the job was accepted as compelte. I asked if anyone had experience with aluminum meters for VC service. No one uses aluminum meters because of possible corrosion, the same as copper. Stainless Steel is the one used.

At the PPG Plant in Lake Charles, La, a tank car loading pump exploded. The pump failed at the frame adapter and split the case. It was estiamted that 4000 psig was necessary to split the housing. The cause of the explosion was hydraulic pressure build-up caused by thermo expansion. The pump was blocked in full of liquid and there was no equalization line or relief valve on the pump.

In 1982, 5 Conoco VCM tank cars were involved in a derailment in Pittsburg, Texas. Three cars were in a creek and about 30% under water. The other two were on their sides but not in the creek. One of the cars was leaking into the water. There was no fire. The EPA and railroad officials were concerned about the contamination to the water in the creek which ran into a pasture some 300 yards away. Readings were taken at 300 yards and only 10 ppm was detected. The car that was leaking was supposed to be empty, but because of the angle it was hard to determine what the level was and because the leak was under water; impossible to plug. Four of the cars were full, three were pumped empty. The fourth could not be emptied because of damage and was vented under control until empty. Total loss was approximately 200,000 pounds of VCM and a frost bitten tree near where the car was vented.

In Austria in April of 1982 a railroad tank car of VCM ruptured while setting on a siding track waiting for the proper papers for unloading. There was no fire. The car had been overfilled, sent through several check points on it's way to Italy. The excess weight was not caught until it reached Italy where they were refused to let it in the country. The car was returned after several weeks for unloading. Tank cars in Europe are not required to have safety relief valves.

At lunch, Roy T. Gottesman introduced the VI (Vinyl Institute). He explained how the V.I. was formed to promote and protect the continued growth of the PVC/VCM industries. As a division of the Society of the Plastics Industry, the V.I. uses its resources to:

A. "Serve as the representative for the PVC/VCM Industry"
B. "Wage an affirmative public information campaign for the PVC/VCM Industry"
C. "Address the issues facing the PVC/VCM Industry"
D. "Conduct health and environmental research to promote the safe use of PVC products"

The Vinyl Institute staff consists of an executive director who is responsible for the operation of the organization. The executive director reports to an executive board staffed by representatives from member companies who found the Institute. These companies are:

1. Air Products and Chemicals, Inc.
2. Borden,Inc.
3. Certain Teed Corporation
4. Conoco Chemical Company
5. The Dow Chemical Company
6. The B.F. Goodrich Company
7. Occidental Petroleum Corporation
8. PPG Industries, Inc.
9. Shell Chemical Company
10. Tenneco, Inc.

After lunch the meeting continued with an update on Angio Sarconia by J.T. Barr of Air Products. The cases of Angio Saraconia peaked in the middle - late 70's and are now tapering off. The tapering off is believed to be due to changes in work practices, management changes, external changes like improved ventilation and inherent factors such as genetic makeup or delayed latency. There is 100 confirmed cases of Angio Sarconia throughout the world. Cases by countries are listed below:

1.	United States	30
2.	West Germany	21
3.	France	14
4.	Canada	10
5.	United Kingdom	8
6.	Sweeden	5
7.	Yugoslavia	4
8.	Italy	3
9.	Czechoslovakia	2
10.	Japan	2
11.	Norway	1

J. T. Vaughan from ICI discussed a survey that was made by the Insitute of Occupational Mecidine on PVC Dust. The survey showed the breathable dust was not visible to the naked eye and high intensity lights were used to show how much dust was in an area. Paste and Emulsion resins created a much greater hazard than suspension. The effect of breathing PVC dust is like smoking cigarettes; damage to the lungs is similar.

M. Nevill from Dow Chemical explained their area monitoring system consisted of a Beckman 6700 unit which had four, ten stream analyzers which pulled samples continuously. The cycle time is 50 minutes and all the readings are recorded and stored in the computer. Dow Chemical action level is 5 ppm. They use HNU Dectors to detect leaks. Personnel Monitoring is done by DuPont charcoal filter pumps. Physicals are given annually with twice per year over 10 years of service. The question was asked from the floor, "How many companies use badges for Personnel monitoring instead of pumps?" Eleven companies use badges while nineteen use pumps.

Next on the agenda was the responce to the valve position indicator switch questionnaire by J.H. McCulley of Conoco. See attachment A for the valve Position Switch Survey Form and a summary of the results. In brief, the primary cause of damage to position switches are bumping or knocking out of alignment by personnel. The second major cause of damage was water. The problems could be solved by monitoring valve position and not actuator position.

The last order of business for 10/20 was a presentation of B.F. Goodrich Chemicals Plant evacuation procedure; how to make one up if you don't have one and then how to train your employees. A plant evacuation procedure should be designed to carry out a specific action, to be carried out by shift personnel and prevent or minimize damage to personnel and equipment. Training procedures must include defining terms, establishing communication through command centers and how the police and news media are to be handled.

On 10/21 the meeting opened with the election of officers for next year. Dick Frohreich will assume the position of Chairman, Joe King was elected Vice Chairman, Dave Middleton, Program Chairman and J. Wallace, Secretary. The site for the 1984 meeting will be Pheonix, Arizonia

The meeting continued with a presentation by J.T. Vaughan of ICI on Safety Performance assessments. ICI selects a team consisting of a Senior Department Manager, an Engineer, an Area Supervisor, a Union Steward and an Operator all from one department. They then inspect another department making the tour with their counterposts. They do this once/year and it takes one full day. The team works from a check list and when the tour is finished they discuss their findings and recommend actions that could be taken. The question was raised on how to train and motivate employees. The concurrence of the group was that new employee training, regular supervisors safety training meetings, procedure update and retraining, safety counciling on the floor and internal inspections and audits were the bases for good safety performance. The group felt incentitive programs and other gimmicks should be changed every 6 months or they loose there effectiveness.

J. Wallace from Esso Chemical and A. Peterson from Georgia Pacific discussed Process Safety and the results of a questioner on "Run-Away Reaction Control and Emergency Power" (attachment B). The survey showed the three main causes of run-away reactions were charge error, power failure and improper formulations. Action level on a run away reaction was 5°F temperature rise on 10 pound pressure rise. The action taken started with manually putting the jacket on full cooling then bumping or completely killing the reaction with a short stop. If these two measures don't work then the reactor is vented to the recovery system or blown down to an empty vessel. Manual venting was a last resort. Most plants have some type of back-up power supply to disperse inhibitor by agitation during a power failure. Esco Chemical uses short, fast venting into their recovery system as a form of agitation to disperse their short stop.

Next on the agenda was an update on EPA court action. J. T. Barr reported that Air Products paid a civil suit in 1981 which amounted to $125,000 for 22 emissions. They had to agree to certain training for new employees, reviews with EPA on any releases, regardless of how minor once/year, and a review of all their records. If there were any violations they would be found $4500.00 per violation. This close control by EPA will be in effect for 2 years. Ethly Corporation had a civil suit of 2.54 million dollars for 98 releases dismissed by Judge Parker because they did not have to meet the EPA work practices standard;EPA is appealing. Bailey Barton reported that Borden civil suit at Leominster is pending court action after a move to dismiss was denied. Borden also has court action pending at Geismar on 34 releases between 1977 and 1983, along with 5 failure to report incidents within 10 days. B.F. Goodrich will go to court on 12/16 to answer for 18 releases at the combined locations of Calvert City and Louisville since 1978. Conoco is being sued for 6 releases at their Oklahoma City Plant since 1981 and 16 releases at the Lake Charles Plant. They have filed for dismissal.

W. C. Holbrook from B. F. Goodrich discussed some new regulatory measures which may go into effect. They are numerical values put on releases: 50#/million pounds of PVC per year and 25#/million pounds of VC per year. Exception reporting is another item under consideration along with extending the time of reporting without violation to more than 10 days.

The meeting ended with a discussion on handling VCM waste from small pilot plant. reactors (attachment C). J. Wallace from Esso Chemical tabulated the survey results. 65% of all pilot plant reactors are vented to the atmosphere through a 40' stack. 21% are recovered by the plant recovery system and the remaining 14% are incinerated.

J. E. Barton

JEB/der

cc: W. F. Gabel, R. Jepsen, S. Moll, W. T. Gerson, L. Bird, M. Thorsen
T. Allen, R. Shah, R. Landon

ATTACHMENT "A"

VALVE POSITION SWITCH SURVEY FORM

Note: Please fill out a separate survey form for each type of indicator.

Type of Indicator:

_____ Electromagnetic Limit Switch
_____ Inductive Proximity Switch (e.g. metal sensing)
_____ Capacitance Proximity Switch (e.g. any material)
_____ Hall Effect Proximity Switch (e.g. magnetic sensing)
_____ Photoelectric Position Switch (e.g. infrared)
_____ Potentiometer Displacement Sensor
_____ Optical Encode Displacement Sensor
_____ Other (explain): _____

Manufacturer(s): _____

Model Number(s) (if known): _____

Number of switches of this type:

_____ 1-5 _____ 6-20 _____ 21+

Typical number of operating cycles of these switches:

_____ per day _____ per week _____ per month _____ per year

Reliability of Position Switch (mean time between failure):

_____ Months _____ Years

Cause of Failure (e.g. bent indicator arm, slipped magnet, water in switch, shifting of switch by vibration, mechanical damage by personnel, other). Please list by frequency of occurrence: _____

Maintenance Performed (e.g. alignment, replacement, wiring): _____

Unusual Ambient Conditions (if applicable):

_____ Vibration _____ High/Low Temperatures
_____ Other: _____

Comments on Performance (e.g. good, poor): _____

Please return completed questionnaire as soon as possible to:
John H. McCulley, Jr., Conoco, Inc., Drawer 1267
Ponca City, OK 74603
Or bring response to the meeting in New Orleans.

BOR 000499

1983 VSCA MEETING

VALVE POSITION SWITCH SURVEY SUMMARY

A. Survey Participation

Total Number of Companies Responding	7
Total Number of Plants Responding	10+
Total Number of Forms Returned	26

B. Types of Switches Used

Electromechanical - 15/26	58%
Inductive Proximity - 6/26	23%
Hall Effect Proximity - 5/26	19%

C. Mean Time Between Failures (Months)

Type Switch	Min	Avg	Max
Electromechanical	1	16	60
Inductive Proximity	1	9	24
Hall Effect Proximity	2	7	10

D. Cause of Failure

	Electro-mechanical	Inductive Proximity	Hall Effect Proximity
Shifting	4	1	3
Mechanical Failure	2	-	-
Water	8	-	2
Damage by Personnel	5	5	3
Vibration	2	1	1
Bent Indicator Arm	2	1	1
Electrical Failure	-	-	2
Total	22	8	12

E. Maintenance Performed

Realign or Replace

1983 VCSA MEETING

VALVE POSITION SWITCH SURVEY

ELECTROMECHANICAL LIMIT SWITCHES

Manufacturer	Model Number	No. of Switches	Cycles per Day	Mean Time Between Failures	Cause of Failure	Maintenance Performed	Unusual Ambient Conditions	Comments on Performance
Proximity	-	21+	10	3 Years	Shifting of switch	Alignment	Vibration	Excellent
	V3L-3-D8	21+	20	X Years	Shifting of switch	Alignment	Vibration	Very Good
	V3L-139-08	21+	2	2 Years	Mechanical failure	Replacement	No	Fair
Microswitch	RX21 and 3RO21	21+	4	-	Cam indicator shifting and armature failure	Cam alignment and replacement Armature repair occasionally	No	Fair
Bettis	3R	21+	6	3 Years	Broken spring (rare)	Alignment	No	Good
Fisher Controls	304	21+	8	10 Months	Water in switch Shifting of switch	Alignment	No	Good
Jamesburg	069-0072-00	21+	4	1 Year	Water in switch	Replace switch	No	Good
Microswitch	EXAR and EXAR30	21+	4	6 Months	Mechanical damage by personnel Water in switch	Alignment Replacement of switch	No	Good
Microswitch	51ML1-7646	21+	8	3 Months	Bent indicator arm Water in switch	Alignment Replacement	No	Good
Microswitch	1CX42-7714 2CX3-7904	21+	8	10 Months	Mechanical damage by personnel	Replacement of feedback arm	No	Good
Bettis Switch	3R321AFC 3RO21AFC	21+	8	6 Months	Bent indicator arm Water in switch Mechanical damage by personnel	Alignment of cams and indicator arm Replacement of switches	No	Good, most problems caused by water and personnel
Yamatake-Honeywell	1LX5001 VCX5001	21+	<20	5 Years	Water in switch (2 or 3/Year) Mechanical damage (2 or 3/Year) by personnel	Alignment or replacement	No	Good
Microswitch	LSXA	21+	2	1 Month	Water in switch Vibration	Replacement	Deluge	Fair
Bettis	-	6-20	5	2 Months (w/o failure)	--	--	Vibration	Installed for only two months
Microswitch	-	21+	3-30	6 to 8 Months	Water in switch Shifting due to vibration	Repair (replace internals) Realign	Vibration High Humidity	Good. Some in service for eight years with no failure

1983 VCSA MEETING

VALVE POSITION SWITCH SURVEY

HALL EFFECT PROXIMITY SWITCH (MAGNETIC SENSING)

Manufacturer	Model Number	No. of Switches	Cycles per Day	Mean Time Between Failures	Cause of Failure	Maintenance Performed	Unusual Ambient Conditions	Comments on Performance
In house		21+	2	--	Slipped magnet Mechanical damage	Alignment or replacement	No	Good on automatic valves Fair on manual valves
Wesco	MS2A, MS2B	21+	16	8 Months	Water in switch Slipped magnet or loss of magnet	Replacement of switch Alignment of magnet	No	Good
Wesco	MS2AA00	21+	5,max 15/day	2 to 3 Months	Slipped magnet Water in switch Vibration	Alignment or replacement	Vibration and deluge water	Fair. Performance improved with new magnet bracket design.
Wesco	MS2-BB-00	21+	12	10 Months	Mechanical damage 30% Electrical failure 70%	Replacement	--	Average
In house	-	21+	12	8 Months	Bent indicator arm 10% Mechanical damage 60% Electrical failure 30%	Alignment of magnet arms and magnets	--	Fair performance, requires excessive maintenance

1983 VCSA MEETING

VALVE POSITION SWITCH SURVEY

INDUCTIVE PROXIMITY SWITCH (METAL SENSING)

Manufacturer	Model Number	No. of Switches	Cycles per Day	Mean Time Between Failures	Cause of Failure	Maintenance Performed	Unusual Ambient Conditions	Comments on Performance
Pepperl and Fuchs (Germany)	N7-2-12-GK-N	21+	2	X Years	Rent indicator arm (2/Year) Mechanical damage by personnel (1/Year)	Alignment	None	Satisfied
General Equipment and Manufacturing Co. Inc. (GO™)	211117	21+	2	+6 Months	None yet, installed 6 months ago	--	None	Good
Microswitch	6FR1-6	21+	16	3 Months	Mechanical damage by personnel	Alignment or replacement	None	Good
General Equipment and Manufacturing Co. Inc.	Series 20 and 40	21+	5, max of 15/day	1 Month	Vibration Mechanical damage	Alignment or replacement	Vibration and deluge water	Fair
General Equipment and Manufacturing Co. Inc.	257126 and 13929	-	8/year	Only in service a few months	Mechanical damage by personnel	Alignment Replace due to excessive dead band	--	Dead band has been a problem. Difficult to adjust position of the switches.
General Equipment and Manufacturing Co. Inc.	211536	21+	12	2 Years	Physical damage 95% Shifting of switch 5%	Replacement	--	Works well and is the most reliable position switch used in the plant.

ATTACHMENT "B"

VINYL CHLORIDE SAFETY ASSOCIATION 1983 MEETING

Run-Away Reaction Control Questionaire

1. Guidelines for response:

   a) Please enter the point at which initial action is taken for each of the following occurrences during a run-away. (N/A implies that no action is taken for this occurence.)

      (i) Reaction reaches _____°C above set temperature.
      (ii) Reaction reaches _____psig above set pressure.
      (iii) Others _____
      _____
      _____

   b) Is the response to the above situations automatic? (Y/N) _____

2. Causes:

   a) Please identify the three major causes (in order) of run-away batches:

      Charge error ___
      Mechanical failure ___
      Instrument failure ___
      Agitation loss ___
      Loss of cooling ___
      Formulation ___
      Others: _____ ___
      _____ ___
      _____ ___

3. Control techniques:

   a) Please indicate the order in which the following techniques are applied during a run-away (assuming previous steps were unsuccessful):

      Increase reactor cooling ___
      Add liquid-phase inhibitor ___
      Add vapour-phase inhibitor ___
      Dump a portion of the batch ___
      Vent to recovery system ___
      Vent to atmosphere ___
      Others: _____ ___
      _____ ___
      _____ ___

3. Control Techniques: (Continued)

b) If an inhibitor is used:

i) Does it control the reaction or kill it? _____
ii) How many discrete inhibitor injection systems are available? _____
iii) How is the inhibitor injected? Gravity _____
Pump _____
N_2 pressure _____
Other (specify) _____

c) Does the point at which the reaction runs away affect the control technique? If so, how?

_____
_____
_____

d) Are you completely satisfied with your inhibitor system, or would you like to see improvement?

_____

e) What areas would you like to see improved?

1) Reliability _____
2) Operability _____
3) Toxicity _____
4) Product usability _____
5) Other reasons and comments _____
_____
_____

4. Power supply:

a) How often is plant power interrupted, on average, per year resulting in loss of agitation? _____(times/yr)

b) If an extended power failure is experienced, how is agitation restored in order to disperse an inhibitor? (If used):

i) Back-up power supply _____
ii) Short, fast venting (ie burping) _____
iii) Other: _____ _____
iv) Reactor size _____

4. Power supply: (Continued)

c) If a back-up power supply is available for agitation:

i) What type is it?
(ie. steam, electrical, other) _____

ii) What percentage of normal agitation speed does it supply? _____(%)

d) Are you completely satisfied with your back-up agitation system, or would you like to see improvement? _____

What improvement would you like to see?

_____

_____

5. Frequency of use:

a) How many batches per year result in run-aways where some action is required? _____

b) What percentage of the above number of batches result in environmental emissions of VCM? _____(%)

Please send response by October 14, 1983 to:

Mr. M.J. Bate
Esso Chemical Canada Technology
Plastics Technology Centre
480 South Christina Street
Sarnia, Ontario
Canada
N7T 2P1

Or bring response to meeting in New Orleans.

M.J. Bate/jcd
0063J/jrw

ATTACHMENT "C"

VINYL CHLORIDE SAFETY ASSOCIATION 1983 MEETING

Small Pilot Reactor Environmental Questionaire

This study is aimed to evaluating sound, safe practices for residual monomer disposal from small pilot reactors. i.e., those up to 50 U.S. gallons (0.19 cu.m) which are not covered by the U.S. EPA National Emission Standard.

1. Do you have pilot reactors less than 50 gallons? _____

2. Are these coupled into the plant VCM recovery system? _____

3. If not coupled to plant, is this because of

   A. Remote location _____
   B. Safety concerns _____
   C. Other reasons _____

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4. A. Do you vent to atmosphere. _____
   B. If so, how high a stack. _____
   C. Do you take any measures to disperse the monomer during venting. _____
   D. Have you any details of ground level concentrations during venting. _____

5. Do you treat the vented monomer by

   A. Liquification by compression. _____
   B. Liquification by cooling. _____
   C. Carbon absorption. _____
   D. Liquid absorption. _____
   E. Flaring. _____
   F. Incineration and scrubbing. _____
   G. Catalytic destruction. _____
   H. Any other method. _____

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6. If absorbing do you

   A. Desorb and recover the monomer in situ. _____
   B. Move the absorbent to a treatment site. _____
   C. Treat the absorbent in another way. _____

.../2

7. Please comment on the safety, effectiveness and/or problems with your procedure.

8. Are there any local regulations covering this type of experimental equipment and/or emissions.

9. Plant location.

Please return completed questionaires by October 14th to:

Mr. J.R. Wallace
Esso Chemical Canada
Plastics Technology Centre
480 South Christina Street
Sarnia, Ontario
Canada
N7T 2P1

Or bring response to meeting in New Orleans.

J.R. Wallace/jcd
0063J/jrw