TO: Distribution CRP DATE: 12/10/89

FROM: Charles R. Parnell SUBJECT: VCSA MEETING

The following information was recorded at the September 28-29, 1989, meeting of the Vinyl Chloride Safety Association. There were sixty-nine company representatives at the meeting which was held in Cambridge, Mass. The majority of the reports or handouts that were distributed are not included in this report. These documents are available upon request.

I. CASE STUDIES (TRUE CONFESSIONS)

A. EXPLOSION IN A PVC REACTOR

David DiPiero (Georgia Gulf) reported on a fire/explosion in PVC Reactor #220. This incident occurred at 7:30 AM, 2/2/89. A dark cloud of smoke from the east end of the poly room was observed. Smoke filled the working area, however no source was known. An electrical motor was suspected. No alarms or vapor detection occurred. No VCM background reading occurred. The fire soon burned itself out and an investigation began. Reactor #220 was down for maintenance and how been cleared by operations. The investigation revealed that the operator failed to follow proper clearing procedures and VC vapors remained in Reactor #220. When the agitator was bumped (shaft was bent), a blade struck a temperature probe and caused ignition.

B. INCIDENT AT EDC-CRACKING UNIT

1. INCIDENT

Herbert Deuschl (Wacker) reported on an explosion and fire at a EDC/CRACKING UNIT. On December 11, 1988, at 9:28 AM, a pipe ruptured in the eastern coil of the double-piped cracking furnace. The damage was noticed by a plant operator. Because of a change in temperature, he went into the plant and saw smoke coming out of the flue gas stack. He immediately pressed the "emergency stop". The fire alarm was given at approximately the same time, 9:31 AM. Due to the pipe rupture, the gas mixture of HCL/VC/EDC escaped into the combustion chamber of the cracking furnace, which

is heated with natural gas. There the gas mixture was ignited and HCL with soot was set free. The emergency stop system shut the entire VC Plant down. All units were separated by remote valves and the security position was taken.

Due to the pressure rise in the combustion chamber, the excess pressure release flap valve opened consistently. This allowed the escaping gases to reach the water guns. During the cooling-down phase the remaining unburned gases detonated when air entered the furnace. This lead to more significant damage to the ceramic lining of the furnace, than the damage to the pipe.

2. MEASURES TAKEN TO PREVENT GREATER DAMAGE

The fire department, arriving at the scene of the accident after 3 minutes, ascertained that no person was injured and started at once to build up water walls to fight the HCL gases. Following the initial escape of approximate 1 ton of HCL gas from the flue gas stack, no other gas was detected. Estimations are that two million gallons of water was sprayed during the time of action from 9:35 AM until 11:51 AM. Most of the water was showered directly in front of the flap valve, covering the slowly degassing furnace and the connected plant units. Observation trips to the periphery of the plant also indicated on ill effects.

3. CONSEQUENCES

The above damages lead to a breakdown of VCM production for several days, from December 11 until December 15. The effects on the environment were maintained within reasonable limits, so it was not necessary to report an "occurrence of failure" to the communities. The first assumption of HCL emission amounted to 1 ton. The actual calculation indicated an emission of 12.5 tons of HCL in about 2 hours. However, most of the escaping HCL was neutralized by the water walls.

Two days following the incident 2 cases of affected health (irritation of the respiratory

tract) became known. All symptoms ceased after a few days, and according to the medical report, will leave no injuries to health.

Within the company no more injuries are known and solely the persons working at the residual waste incinerator, located at the lee-side of the EDC plant, needed to wear gas masks for a short period of time.

There was no danger of polluting the rivers, because the water used to build up the water walls was led directly to the waste water facilities.

4. ANALYSIS ON THE CAUSES

According to our department for material testing, the reason for this incident is undoubtable a high
temperature corrosion due to a local overheating of the pipes (made of material Inconel 600). The investigations for the final analysis have not been completed thus an official conclusion has not been filed.

C. 1988 EXPLOSION IN A VCM PLANT (Update)

Harold Houden (Norsk Hydro) gave an update on an 1988 explosion in a VCM Plant (see attached report).

II. EMERGENCY RELIEF DESIGN (W. J. JANECEK - DOW)

Mr. Janecek discussed a technology developed by The Institute for Emergency Relief Systems (DIERS). This system has been proposed for implementation in existing Dow operations and new operations.

Dow started to implement DIERS technology in 1984 with the formation of a Pressure Relief Emphasis Team which goes by its natural acronym of PRET.

The team was given a charter to identify, develop, communicate, and implement technology and tools to enable qualified engineers from the organization to efficiently design appropriate relief systems for emergency pressure relief. They have recently reviewed that charter or mission statement and find it still valid.

One of the first things done was to find out where Dow was, where Dow needed to go, or where Dow was headed. A package was put together of round-robin or design problems. The problem sets included a flow diagram and equipment sketch along with a "textbook" description of problem statements. The description included vessel size, maximum allowable working pressure, normal temperatures, vessel contents, etc. The credible or relief scenario was also given. Runaway reactions were specifically excluded. The sets were sent to six major areas and asked that experienced people size the appropriate reliefs for the example problems. They were to use any applicable location or site - specific criteria. A range of answers returned that were surprising. For example, the calculated sizes ranged from as much as a 3K4 to a 6Q8 for the same problem. The answers for another problem ranged from as much as 3K4 to 3 - 8T10 or one 12W16. Considerable variations in maximum allowable piping lengths occurred. In addition, it was found that checking for two-phase flow possibilities was not uniform. Credits for insulation varied from location to location. There were some questionable evaluations of physical properties for mixtures, and in some of the sizes. There were no right or wrong answers to these problems and the conclusions above are the reasons for noted variations.

At the same time that all of the above was being evaluated, the DIERS technology was really starting to emerge, be summarized, and made available to the general public. This includes the two-phase work that was done by Fauske and Associates. In addition, SAFIRE and FAI's VSP were commercially available.

In the presentation to management, the team included a simple schematic of what this VSP analytical device looks like, and brief details on how it works. We made management aware of the advantages of the VSP: that is quicker, cheaper, and more accurate than the ARC for most of our needs. It does not require detail knowledge of the specific chemistry added to kinetics and the thermodynamics of your problem. It can be used to design early intervention systems to prevent run-way reactions or gather base-case data. Also, the base-case data can be used to design a new relief system. When one wants to make a slight catalyst change, change the order of addition, or change the overall recipe, the effects of the proposed change on relief system requirements can be determined by comparing the two cases.

The team made the following recommendations to management for implementation:

1. Adopt a "Reviewer System"
2. Train the Necessary People
3. Use the New Techniques on all New Projects
4. Develop Plans for Evaluating existing Facilities.

III. GROUPO PRIMEX SAFETY PROGRAM (JORGE Z. MONTANO)

Mr. Montano reported on a safety program that was implemented by Groupo Primex in 1985. This program addresses not only personal injury, but also property damage. The program involves numerous reports including the following: 1 - proportion of Accidents Report; 2 - Accident/Incident Investigation Report; 3 - Calculation of the Price of Nonconformance with the Requirements Report; 4 - Table of Priorities for Correction of Unsafe Conditions Report; 5 - Check List for Area Inspection Report; 6 -Observation of Activities Report; 7 - Incident Reminder Report and others. Mr. Montano's report also included a bar graph indicating most importantly a damage reduction of 67 percent.

IV. DELAWARE's RISK MANAGEMENT PROGRAM REGULATION (BURLEY MELTON - FORMOSA)

Mr. Melton reported that Delaware House Bill No. 555 created the Extremely Hazardous Substances Risk Management Act (EHSRMA) with the goal of preventing catastrophic events caused by chemical substances.

Significant concepts defined in the Act include:

- A Catastrophic Event is an event that will cause death or permanent disability to a person just beyond the facility boundary as the result of a single, short-term exposure.
- A toxic substances shall be classified as an Extremely Hazardous Substances if its calculated Substance Hazard Index (SHI) exceeds 8000. SHI is calculated by dividing the equilibrium vapor concentration at 20'C

by the Acute Toxicity Concentration (ATC). ATC is defined as the lowest reported concentration that will cause death or permanent disability from a one-hour exposure. Thus, the SHI is a reflection of both the toxicity and dispersibility the toxic substance.

- The Sufficient Quantity (SQ) is that amount of an EHS that will cause a catastrophic event.

- The consequences of releases of toxic EHSs shall be determined via atmospheric dispersion calculations assuming average atmospheric conditions for Delaware.

- Toxic dose/response relationships are to be used assuming average individuals.

- SQs are to be calculated assuming a distance of 100 meters between the release point and the facility boundary. SQs can be adjusted upwards where this separation distance exceeds 100 meters.

It is required by Delaware law that regulations be promulgated to implement the Extremely Hazardous Substances Risk Management Act. The purpose of this report is to communicate proposed technical bases for the identification of an EHS and the calculation of an SQ for a toxic substance.

V. UPDATE - SHORT STOP SYSTEMS (FRANK BORRILLI - GEORGIA GULF)

Mr. Borrilli reported that a survey of the VCSA member companies was conducted to gather information on stand-by chemical addition systems used to terminate PVC polymerization reactions commonly referred to as SHORT-STOP SYSTEMS. The last VCSA survey of this information was made in 1984. A questionnaire was prepared and submitted to 31 member companies. The questionnaire was designed to provide information on the design features of the systems, frequency of maintenance, and effectiveness of the system in preventing releases of VCM to the atmosphere during abnormal operating conditions. Seventeen members provided information on their systems.

Of the seventeen operators indicating the use of short-stop systems, 16 reported installations on 37 m3 or larger suspension reactors. Five operators indicated that they also had systems on reactors under 37 m3. Two operators reported experience with short-stop systems on reactors in emulsion service.

On an average, the systems are reported to have effectively stopped 2-5 reactions annually. One system was reported to be activated only two times in the past 15 years.

Six operators indicated occurrences of releases due to failure of the system, but the release occurred at a frequency of one occurrence in 3-6 years for these systems.

VI. TCLP/TOC IMPACT (JOE LEDVINA - VISTA)

Mr. Ledvina reported that TC (Toxicity Characteristic) is a proposed procedure to determine if a waste is hazardous. Its implications can be: 1) More waste will be considered hazardous, 2) More investment for VCM/PVC Producers, 3) Additional operating and disposal cost, and 4) Additional administrative requirements.

The management of waste in the USA is controlled under one of two ACTS. RCRA which is the RESOURCE CONSERVATION AND RECOVERY ACT OF 1976 and HSWA which is the HAZARDOUS AND SOLID WASTE ACT of 1984.

Hazardous Waste is defined as wastes (solid, liquid, sludges, containerized gases) that are either specifically listed in RCRA or meet a characteristic. Characteristic wastes are defined as ignitable, reactive corrosive or E.P. TOXIC.

The old E.P. TOXICITY regulation involves 6 pesticides and 8 metals. The new regulations would involve 31 organics, 8 metals and 6 pesticides. Including in the list of organic compounds are EDC (700ppb), Chloroform (6ppm), HCB (20ppb), HCBD (500ppb), PER (700ppb), TRI (5 ppb) and VC (200).

Wastes that may be hazardous because of the new TC regulations are

- PVC; PVC SCRAP
- BURNABLE LIQUIDS

- o WASTEWATER
- o EXCAVATED SOIL
- o RECOVERED GROUNDWATER

VII. A COMPANY'S SUPERFUND EXPERIENCE (JEFF SOMMERMANN - FORMASA)

Mr. Sommermann reported that Formosa Plastics Corporation of Delaware purchased a Delaware City PVC site from Stauffer Chemical Company, May, 1981. Stauffer Chemical owned this facility from 1966 to 1981.

EPA Region III conducted an inspection and water sampling of the site after one of the domestic water supply wells on Stauffer's property adjacent to the site became contaminated. Analysis revealed serious contamination of the shallow groundwater under the site. High levels of VCM, EDC and Trichloroethylene were detected.

Following the above finding, Formosa Plastics and Stauffer Chemical contracted Roux & Associates to perform hydro-geologic investigation to identify the sources of the ground water contamination. Investigation revealed a plume of contamination consisting of VCM, EDC, and TRICHLOROETHYLENE in the water table underneath parts of the active PVC plant manufacturing process.

In May, 1984 EPA Region III and Delaware Dept. of Natural Resources and Environmental Control entered into a Consent Order with Stauffer and FPC to perform a Feasibility Study to implement the necessary remedial actions.

In June, 1986 the Feasibility Study is submitted to EPA for approval. The FS is released for public comment on July 25, 1986. EPA Region III issues a RECORD OF DECISION (ROD) on September 30, 1986. On January 23, 1987 FPC accepts the Record of Decision and begins preliminary design work. Sludge recovery commences on October 15, 1987.

VIII. CORROSION/THICKNESS TESTING IN CRITICAL SERVICES (GEORGE LAHDE - BFG)

Mr. Lahde discussed the various programs used by most chemical companies, to test for corrosion in critical

COMPANY	STATE	REGION	PRODUCT	INITIATED	CONCLUDED	$ SETTLEMENT	MISC.
A) CASES SETTLED WITH $ PENALTIES:							
AIR PRODUCTS	KY	4		10/78	12/78	$ 24,000	
AIR PRODUCTS	KY	4		5/80	3/83	125,000	
BORDEN	LA	6	VC	6/83	2/88	416,666	
BORDEN	LA	6	VC	3/83	2/88	416,666	
BORDEN	MASS	1	PVC	4/81	5/85	90,000	
CONOCO	MISS	4	PVC	1/80	8/85	100,000	
CONOCO	OKLA	6	PVC	3/83	8/85	125,000	
CONOCO	LA	6	VC	6/83	8/85	100,000	
DOW	TX	6	VC	6/85	3/87	105,000	
GA-PAC	LA	6	PVC	9/84	1/86	625,000	
GOODRICH	KY	4		3/80	2/87	123,500	
GOODRICH		4		10/80	9/87	335,500	
GOODRICH	LA	6		3/86	6/87	75,000	
GOODYEAR/GOODRICH	LA	6		9/83	6/87	395,000	
OCCIDENTAL	NJ	2	PVC	2/85	7/87	490,000	
OCCIDENTAL	LA	6	PVC	3/83	8/87	75,000	
OCCIDENTAL	LA	6	PVC	6/86	10/87	425,000	
PPG	LA	6	VC	9/83	8/87	225,000	
SHELL	LA	6	VC	6/83	6/85	50,000	
TENNECO	NJ	2	PVC	2/80	6/82	50,000	
UCC	NJ	2		10/80	10/83	30,000	
UCC	TX	6		9/85	6/87	142,000	
TOTAL '89						$4,543,332	
(88 TOTAL)						(3,534,500)	
(87 TOTAL)						(3,309,500)	
(86 TOTAL)						(1,916,000)	

SL 089378

U.S. EPA NESHAP LITIGATION - AS OF 9/11/89

COMPANY	STATE	REGION	PRODUCT	INITIATED	CONCLUDED	
B) CASES SETTLED WITHOUT $ PENALTIES:						
BORDEN	ILL	5		10/80	7/82	)
CERTAINTEED	LA	6		1/79	3/80	) WITHDRAWN BY EPA
DIAM.-SHAM.	DEL	3		11/80	6/82	)
FORMOSA	DEL	3		12/84	4/85	)
CONOCO		6		10/78	11/79	) DISMISSED BY EPA
PPG		6		10/78	3/80	)
VULCAN		6			3/80	)--DECLINED BY EPA
GA-PAC		6		12/83	5/85	)--SETTLED WITH CONSENT DECREE
C) CASES PENDING:						
DOW	LA	6	VC	11/84		
ETHYL	LA	6	VC	3/82		
FORMOSA	LA	6		10/83		
OCCIDENTAL	PA	3	PVC	8/89		

SI 089379

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STATE NESHAP PENALTIES (in USA)

PLANT CODE	STATE	PROD. MFGD.	YEAR	PAID	NUMBER OF EXCEEDANCES							
					ROL	STRPPD RESIN	STRPPD WASTWAT	RECOVERY VENT	RVD	MV	OTHER	TOTAL
1	CA			$ 700							1 *	1
2	FL	PVC	81-86	$ 81,000		3	1	5	4	2	2 **	17
			88	$ 17,000				1	2	1		4
3	KY	PVC	85	$ 1,500					3			3
4	LA	VC	87	$ 12,500				20	3	1		24
			88	$ 15,400				21	1			22
5	LA		87	$130,000		ALL PAST EXCEEDANCES						?
6	LA	PVC	86	$ 10,000					31			31
			87	$ 25,000	574	31			5			610
7	MS	PVC	87	$ 2,000					1	1		2
8	MS	PVC	86	$ 4,000						2		2
9	TX	VC	87	$ 5,000				1				1
			88	$ 6,000					1		1***	2
10	TX	PVC	80-85	$200,000	500	13			4			517
			88	$ 500				1				1
11	PA	PVC	80-81	$ 1,500		ALL PAST EXCEEDANCES						?
			82-83	$ 2,125		ALL PAST EXCEEDANCES						?
			83-85	$ 6,000		25		39				64
			86-87	$ 5,000		12	1	31	1			45
			87	$ 31,500		20	1	16	4			41
12	?	PVC	86	$ 4,000						2		2
TOTAL				$560,725	1074	104	3	135	60	9	4	1389

* AMB AIR STAND ** UNKNOWN *** LEAK DETECT/PREV PROGRAM

NOTE: FOUR OTHER PLANTS REPORTED NO PENALTIES PAID TO STATES

1. Educate the public about the safety and performance of vinyl chloride.

2. Create new market place opportunities for vinyl chloride.

3. Research new market opportunities.

4. Defend VC from attacks from other competitors and regulatory agencies.

XII. BUSINESS MEETING

The Treasurer's report was given and New Officers were elected. Joe Ledvina was elected as the new Chairman.

The site of the 1990 VCSA meeting was voted to be Bermuda.

XIII. HURRICANE/STORM PREPAREDNESS (JOHN YONGE - SHINTECH)

Mr. Yonge reported on a generic Hurricane Plan used by Shintech. A six page outline is available upon request.

XIV. DOW SAFETY PROGRAM - "SAFE WORKING STYLE" (JACK LIPPMAN)

Mr. Lippman reported that since 1983, Dow's Texas Operations had not shown an improvement in its total injuries performance. An intense survey was made throughout its facilities (over 7,000 employees) looking for a system change. A cross-sectional group was formed and produced the "Safe Working Style Program". This program addresses the human errors that cause over 70% of the safety incidents. The "Safe Working Style" concept is Dow's Texas Operations vision of safety of the nineties.

MEETING CLOSED

Distribution:

Lamar White
Dick Holliday
F. Ortiz
Don Savoy
Bill Peard
Bob Byars
Jim Wyche
Don Pearson
Clark Graybill