

3/30/78
to 1009

ETHYL CORPORATION

INTER-OFFICE

To : T. R. Robinson, M.D.

Address : BRP

From : J. D. Watts

Address : BRT/BRP

Subject : Vinyl Chloride Monomer Survey -
Hydrocarbon Area

Date : Nov. 14, 1975

As part of the comprehensive survey, an industrial hygiene evaluation was made of the airborne contaminants associated with the production of vinyl chloride monomer.

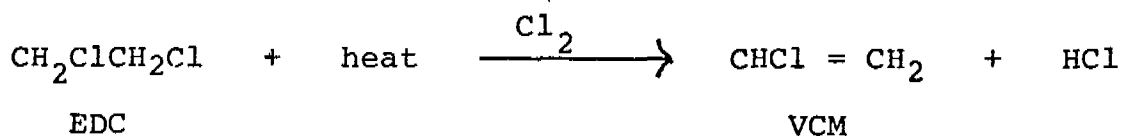
Summary and Recommendations

The environmental sampling scheme indicates that the levels of vinyl chloride monomer (VCM) are usually below the OSHA standard of 1.0 ppm on a time weighted basis. Furthermore, only five of 21 samples collected (24%) exceeded the action level of 0.5 ppm. Also, the levels of many other hydrocarbon contaminants (the spectrum from methyl chloride to perchloroethylene) were well below their respective standards.

The highest VCM concentrations were localized on the ground floor of the #2 EDC plant (compressor P23A) and in the rundown tank area. From an environmental standpoint and under restrictive operating conditions (production rates less than 50% of maximum), there appears to be no hygienic problem and thus, no additional control measures are recommended.

Description of Process - Recognition

Vinyl chloride monomer is used predominantly in the manufacture of polyvinyl chloride but is also utilized as an intermediate in the production of 1,1,1 trichloroethane. It is manufactured by the cracking of 1,2 dichloroethane (EDC) as shown in the following reaction:



The gas mixture from the furnace is quenched, partially condensed, and fractionated into VCM product, by-product HCl, and recovered EDC for recycle to the process.

Seven employees are potentially exposed to this cancer-suspect agent including the following operator job codes: control room (2), compressor house, tower, furnace cracking, tank car loader, and process attendant. The compressor house man and loading operator are potentially exposed to the higher VCM concentrations due to the collection of quality control samples and disconnecting tank car lines.

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Evaluation

Samples were collected at fixed station points (#2 EDC plant, control room, VCM/HCl column, and rundown tank area) at a sample rate of approximately 1.5 liters/minute. The hydrocarbon contaminants were adsorbed on activated charcoal with subsequent analysis by gas chromatography. The survey results are shown in the following appendix.

J. D. Watts
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Industrial Hygienist

JDW:sp

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Enclo.

A P P E N D I X

VCM Plant Survey Results

AREA: #2 EDC Plant (North)

Component	TLV (ppm)	Sampling Dates and Concentrations (ppm)			
		8/29	10/7	10/8	10/21
Benzene	10		< 0.04		
Butane		0.02		0.07	0.12
Carbon Tet	10	0.11			
Chloroform	25				
1,1 DCE	100	0.16			< 0.03
EDC	50	0.53	5.4	1.06	1.26
Ethyl Cl	1000	0.03	0.24	0.24	0.05
Methyl Cl	100		0.09	0.16	0.27
Methylene Cl	200				< 0.02
Per	100	0.15	0.06	0.06	< 0.01
Propane		0.21	0.06	0.34	1.8
Toluene	100	0.01		0.02	0.01
1,1,1 TCE	350	0.24			< 0.005
Tri	100	0.24	0.13	0.035	0.01
VCM	1	0.09	4.45 *	0.13	0.49
Vinylidene Cl	10	0.07	0.18		0.05
Unk ₁					x
Unk ₂					x
Unk ₃					x
Weather Conditions		PC, 85° ESE-E	Cloudy, 70°, NW	Cloudy-PC, 75°, vari- able	Clear, 76°, S

A P P E N D I X

VCM Plant Survey Results

AREA: #2 EDC Plant (Ground Floor)

Date	Location	Component	Concentration
10/7	South Compressor P28A	Benzene	< 0.04
		EDC	6.8
		Ethyl Cl	0.27
		Methyl Cl	0.08
		Per	0.06
		Propane	0.085
		Tri	0.095
10/8	Middle Compressor P28-C-P28D	VCM	0.78
		Vinylidene Cl	0.06
		Butane	0.07
		EDC	1.83
		Ethyl Cl	0.25
		Methyl Cl	0.16
		Per	0.04
		Propane	0.45
		Toluene	0.01
		Tri	0.04
		VCM	0.175

AREA: #2 EDC Plant

Component	10/7	10/8	10/17	Location
Benzene	< 0.04	0.075		Between Compressor
Butane			0.13	House & Production Unit
EDC	6.64	3.7	1.06	
Ethyl Cl	0.31	0.33	0.26	
Methyl Cl	0.085	0.19	0.32	
Methylene Cl			0.07	
Per	0.06	0.04		
Propane	0.37	0.97	5.08	
Toluene		0.02	0.01	
Tri	0.08	0.03		
Unk			x	
VCM	0.42	0.24	0.12	
Vinylidene Cl	0.02	0.02		

AREA: Control Room

Component	10/9	10/14	10/17	10/21
Benzene				
Butane	0.08		0.21	0.14
Carbon Tet		0.4		
Chloroform				
1,1 DCE		0.63	0.04	0.23
EDC	0.8	0.22	0.56	0.185
Ethyl Cl	1.8	0.02	0.4	0.06
Methyl Cl	1.85	0.15	3.06	2.37
Methylene Cl			0.14	< 0.06
Per	0.06	0.09		0.11
Propane	0.03	2.26	36.2	35.2
Toluene		0.02	0.05	0.04
1,1,1 TCE	< 0.025	0.51		0.26
Tri	0.05	0.11		0.05
VCM	0.15	0.03	0.135	0.19
Vinylidene Cl			0.04	< 0.01
Unk		x	x	x
Weather Conditions		Clear-PC, 80°, E-SE	Cloudy, 70° WNW-MW	Clear, 76°, S

AREA: VCM/HCl Column

Component	10/9	10/14	10/17	10/21
Butane	0.05	0.03	0.25	0.15
1,1 DCE			0.03	0.23
EDC	0.31		0.30	0.07
Ethyl Cl	0.34	0.02	0.295	0.03
Methyl Cl	0.20	0.06	0.06	0.24
Methylene Cl			0.28	0.07
Per	0.03	0.29		
Propane	1.06	0.25	0.59	0.09
Toluene		0.01	0.06	0.03
1,1,1 TCE	0.03	0.24		0.01
Tri	0.05	0.07		0.07
VCM	0.57	0.24	0.22	0.12
Vinylidene Cl			0.04	
Unk		x	x	x

AREA: VCM Rundown Tanks

Component	10/9	10/14	10/17	10/21
Butane	0.05	0.06	0.31	0.16
Carbon Tet		0.22		
1,1 DCE			< 0.01	< 0.03
EDC	0.66	0.05	0.06	0.12
Ethyl Cl	0.31	0.01	0.29	0.01
Methyl Cl	0.10	0.06	0.03	0.25
Methylene Cl			0.17	0.07
Per	0.02	0.55		
Propane	0.03	0.11	0.02	0.075
Toluene		0.01	0.05	0.01
1,1,1 TCE	< 0.02	0.06		0.01
Tri	0.07	0.08		0.02
VCM	1.98*	0.08	0.05	2.75*
Vinylidene Cl			< 0.01	
Unk		x	x	x