



CHEMICAL MANUFACTURERS ASSOCIATION

August 29, 1989

Dear Vinyl Chloride Panel Members:

The Illinois Environmental Protection Agency is proposing a listing of air toxics within the State of Illinois. Listed chemicals will be subject to control requirements at a future date.

Vinyl Chloride is one of the chemicals proposed for regulation by the Illinois EPA.

Several groups within CMA are considering providing comments on this proposed listing of air toxics. If you would like to provide comments or need additional information, please call me at 202/887-1293.

Sincerely,

A handwritten signature in cursive script, reading "Susan R. Howe".

Susan R. Howe
Manager
Vinyl Chloride Panel



**BASIS FOR SELECTION OF
AIR TOXICS CANDIDATES**

For Distribution by CMA
CHEMSTAR DIVISION
From Howe, Susan R
Ref. No. Vinyl Chloride
Date 8/30/89

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July 31, 1989

Legend for Selection Basis Entries

For carcinogens, the entries include:

- classification of carcinogenicity (source)
- classifications are either known or probable human carcinogens
- sources include one or more of the following sources,

NTP - National Toxicology Program
IARC - International Agency for Research on Cancer
EPA - U.S. EPA Carcinogen Assessment Group
ACGIH - American Conference of Governmental Industrial Hygienists

For non-carcinogenic air toxicants, the entries include:

- acute lethality value (lethality score)
- subacute value (subacute score)
- systemic (toxic) effect [severity of effects score] @ lowest toxic dose value [lowest toxic dose score] (integrated systemic toxicity score)

Abbreviations

mg/kg = milligrams per kilogram
mg/cu m = milligrams per cubic meter
ppm = parts per million
mg/kg-day = milligrams per kilogram per day
Cat = category

Basis for Selection of Air Toxics Candidates

<u>1</u>	<u>Option</u>			<u>Chemical</u>	<u>Selection Basis</u>
	<u>2</u>	<u>3</u>	<u>4</u>		
X				Acrylamide	Probable Human Carcinogen (ACGIH)
X	X	X	X	Acrylic acid	Air Toxicant, score = 7.00 Acute: 33.5 mg/kg (3) Subacute: 30 mg/cu m (2) Systemic: Lesions of nasal mucosa [mild effect on Cat. III organ = 2] @ 5 ppm [0.19 mg/kg-day = 4] (2.00)
X	X	X	X	Acrylonitrile	Probable Human Carcinogen (NTP, IARC, EPA, ACGIH)
X	X	X	X	Alkylated lead compounds	Listed by International Joint Commission
X	X	X	X	Aniline	Air Toxicant, score = 9.25 Acute: 250 mg/kg (2) Subacute: 10 mg/cu m (2) Systemic: Methemoglobinemia [definite effect on Cat. I organ = 7] @ 5 ppm [6.3 mg/kg-day = 3] (5.25)
X	X	X	X	Arsenic and compounds	Known Human Carcinogen (NTP, IARC, EPA)
X	X	X	X	Asbestos	Known Human Carcinogen (NTP, IARC, EPA, ACGIH)
X	X	X	X	Benzene	Known Human Carcinogen (NTP, IARC, EPA)
X	X	X	X	Benzo(a)pyrene	Listed by International Joint Commission
X	X	X	X	Biphenyl	Air Toxicant, score = 10.75 Acute: 2400 mg/kg (1) Subacute: 1.5 mg/cu m (3) Systemic: Central and peripheral nerve damage, liver damage leading to acute yellow atrophy [severe effect on Cat. I organ = 9] @ 5 mg/cu m [1.08 mg/kg-day = 3] (6.75)

Option				Chemical	Selection Basis
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>		
X	X	X		Boron trifluoride	Air Toxicant, score = 11.00 Acute: 1180 mg/cu m (2) Subacute: 3 mg/cu m (3) Systemic: Pneumonitis [mild effect on Cat. I organ = 6] @ 1.5 ppm [0.98 mg/kg-day = 4] (6.00)
X	X	X	X	1,3-Butadiene	Probable Human Carcinogen (NTP)
X	X	X	X	n-Butyl alcohol	Air Toxicant, score = 6.50 Acute: 790 mg/kg (1) Subacute: 150 mg/cu m (1) Systemic: Decreased hearing acuity [mild effect on Cat. I organ = 6] @ 80 ppm [7.5 mg/kg-day = 3] (4.50)
X	X	X	X	Cadmium and compounds	Probable Human Carcinogen (NTP, IARC, EPA)
X	X	X	X	Caprolactam	Air Toxicant, score = 6.00 Acute: 300 mg/cu m (3) Subacute: 1 mg-dust/cu m (3) Systemic: none recognized (0.00)
X	X	X	X	Carbon disulfide	Air Toxicant, score = 10.00 Acute: 25000 mg/cu m (1) Subacute: 30 mg/cu m (2) Systemic: Significant vascular, nervous system, and biochemical changes [definite effects on Cat. I organs = 7] @ 9 ppm [0.87 mg/kg-day = 4] (7.00)
X	X	X		Carbon tetrachloride	Probable Human Carcinogen (NTP, IARC, EPA, ACGIH)
X	X	X		Chlordane	Probable Human Carcinogen (EPA)
X	X	X	X	Chlorinated dibenzodioxins	Listed by International Joint Commission

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Option				Chemical	Selection Basis
1	2	3	4		
X	X	X	X	Chlorinated dibenzofurans	Listed by International Joint Commission
X	X	X		Chloroform	Probable Human Carcinogen (NTP, IARC, EPA, ACGIH)
X	X	X	X	Chromium and compounds	Known Human Carcinogen (NTP, IARC, EPA)
X	X	X	X	Coal tar volatiles	Known Human Carcinogen (ACGIH)
X	X			Cobalt and compounds	Air Toxicant, score = 9.00 Acute: no data (0) Subacute: 0.05 mg/cu m (3) Systemic: Lung injury [mild effects on Cat. I organ = 6] @ 0.1 ppm [0.0036 mg/kg-day = 4] (6.00)
X				p-Cresidine	Probable Human Carcinogen (NTP, IARC)
deleted				Cumene hydroperoxide	Air Toxicant, score = 4.75 Acute: 1365 mg/cu m (2) Subacute: no data (1) Systemic: Pulmonary edema [definite effect on Cat. I organ = 7] @ 304 mg/kg [304 mg/kg-day = 1] (1.75)
X				Cyclohexanone	Air Toxicant, score = 6.25 Acute: 32111 mg/cu m (0) Subacute: 100 mg/cu m (1) Systemic: Degenerative liver and kidney changes [definite effects on Cat. I organs = 7] @ 190 ppm (4.4 mg/kg-day = 3] (5.25)
X				2,4-D	Air Toxicant, score = 7.75 Acute: 370 mg/kg (2) Subacute: 10 mg/cu m (2) Systemic: Kidney injury [minor effect on Cat. I organ = 5] @ 5 mg/kg-day [5 mg/kg-day = 3] (3.75)

Option				Chemical	Selection Basis
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>		
X	X	X	X	DDT	Listed by International Joint Commission
X				4,4'-Diaminodiphenyl ether	Probable Human Carcinogen (NTP, IARC)
X	X			Dibutyl phthalate	Air Toxicant, score = 8.00 Acute: 8000 mg/kg (0) Subacute: 5 mg/cu m (2) Systemic: Polyneuritis [mild effect on Cat. I organ = 6] @ 1.7 mg/cu m [0.11 mg/kg-day = 4] (6.00)
X	X	X	X	p-Dichlorobenzene	Probable Human Carcinogen (NTP, EPA)
X	X	X	X	Dieldrin	Listed by International Joint Commission
X	X	X		Di(2-ethylhexyl) phthalate	Probable Human Carcinogen (NTP, IARC, EPA)
X				Dimethyl sulfate	Probable Human Carcinogen (NTP, IARC, EPA, ACGIH)
X				Dimethylamine	Air Toxicant, score = 6.50 Acute: 8371 mg/cu m (1) Subacute: 18 mg/cu m (2) Systemic: Liver damage [definite effect on Cat. I organ = 6] @ 97 ppm [12 mg/kg-day = 2] (3.00)
X	X	X		1,4-Dioxane	Probable Human Carcinogen (NTP, IARC, EPA)
X	X	X		Epichlorohydrin	Probable Human Carcinogen (NTP, IARC, EPA)
X	X			Ethyl acrylate	Air Toxicant, score = 6.00 Acute: 8925 mg/cu m (1) Subacute: 20 mg/cu m (2) Systemic: Drowsiness and headache [mild effects of Cat. I organs = 6] @ 50 ppm [27 mg/kg-day = 2] (3.00)

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Option				Chemical	Selection Basis
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>		
X	X	X	X	Ethylene	Air Toxicant, score = 8.00 Acute: 1090270 mg/cu m (0) Subacute: not listed (1) Systemic: Cholinesterase inhibition [definite effect on Cat. I organ = 7] @ 3 mg/kg [0.24 mg/kg-day = 4] (7.00)
X	X	X	X	Ethylene dichloride	Probable Human Carcinogen (NTP, IARC, EPA)
X	X	X	X	Ethylene oxide	Probable Human Carcinogen (NTP, IARC, EPA, ACGIH)
X				Fluorine	Air Toxicant, score = 6.00 Acute: 144 mg/cu m (3) Subacute: 2 mg/cu m (3) Systemic: none recognized (0.00)
X	X	X	X	Formaldehyde	Probable Human Carcinogen (NTP, IARC, EPA, ACGIH)
X	X	X	X	Hexachlorobenzene	Listed by International Joint Commission
X	X	X		Hexachlorocyclopentadiene	Air Toxicant, score = 13.00 Acute: 15 mg/cu m (3) Subacute: 0.1 mg/cu m (3) Systemic: Degenerative changes of liver and kidneys [definite effects on Cat. I organs = 7] @ 0.15 ppm [0.11 - 0.16 mg/kg-day = 4] (7.00)
X	X	X		Hydrazine	Probable Human Carcinogen (NTP, IARC, EPA, ACGIH)
X	X	X	X	Hydrogen fluoride	Air Toxicant, score = 11.00 Acute: 1040 mg/cu m (2) Subacute: 2.5 mg/cu m (3) Systemic: Lung injury [mild effects on Cat. I organ = 6] @ 17 ppm [0.53 mg/kg-day = 4] (6.00)

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Option				Chemical	Selection Basis
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>		
X	X			Isobutyraldehyde	Air Toxicant, score = 6.50 Acute: 39500 mg/cu m (1) Subacute: not listed (1) Systemic: Hemoglobinemia [mild effect on Cat. I organ = 6] @ 50 mg/kg [2.7 mg/kg-day = 3] (4.50)
X	X	X	X	Lead and compounds	Probable Human Carcinogen (NTP, EPA)
X	X	X	X	Maleic anhydride	Air Toxicant, score = 6.50 Acute: 400 mg/kg (2) Subacute: 1 mg/cu m (3) Systemic: Increased susceptibility to lung infection and bronchitis [mild effect on Cat. I organ = 6] @ undefined concentration [? mg/kg-day = 1] (1.50)
X	X	X	X	Mercury	Listed by International Joint Commission
X	X			Methyl methacrylate	Air Toxicant, score = 6.50 Acute: 15350 mg/cu m (1) Subacute: 410 mg/cu m (1) Systemic: CNS effects (decreased neuronal firing rate) [mild effect on Cat. I organ = 6] @ 400 ppm [2.3 mg/kg-day = 3] (4.50)
X	X	X		4,4'-Methylenebis (N,N'-dimethyl) benzeneamine	Probable Human Carcinogen (NTP)
X	X	X	X	Methylene chloride	Probable Human Carcinogen (NTP, EPA, ACGIH)
X				4,4'-Methylene dianiline	Probable Human Carcinogen (NTP)

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Option				Chemical	Selection Basis
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>		
X	X	X	X	Methylenebis(phenyl-isocyanate) (MBI)	Air Toxicant, score = 6.00 Acute: 178 mg/cu m (3) Subacute: not listed (1) Systemic: Pulmonary fibrosis [major effect on Cat. I organ = 8] @ undefined concentration [? mg/kg-day = 1] (2.00)
X	X	X	X	Mirex	Listed by International Joint Commission
X				Molybdenum trioxide	Air Toxicant, score = 7.75 Acute: 125 mg/kg (2) Subacute: 5 mg/cu m (2) Systemic: Pneumoconiosis [minor effect on Cat. I organ = 5] @ 10 mg/m ³ [1.3 mg/kg-day = 3] (3.75)
X	X	X	X	Nickel and compounds	Known Human Carcinogen (NTP, IARC, EPA, ACGIH)
X	X	X	X	Nitric acid	Air Toxicant, score = 6.50 Acute: 170 mg/cu m (3) Subacute: 5 mg/cu m (2) Systemic: Increased susceptibility to pulmonary infection [mild effect on Cat. I organ = 6] @ undefined concentration [? mg/kg-day = 1] (1.50)
X	X	X	X	2-Nitrophenol	Air Toxicant, score = 9.00 Acute: 334 mg/kg (2) Subacute: not listed (1) Systemic: CNS effects (disruption of reflexes) [mild effect of Cat. I organ = 6] @ 0.003 mg/kg-day [0.003 mg/kg-day = 4] (6.00)

Option				Chemical	Selection Basis
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>		
X	X			4-Nitrophenol	Air Toxicant, score = 9.00 Acute: 250 mg/kg (2) Subacute: not listed (1) Systemic: CNS effects (disruption of reflexes) [mild effects of Cat. I organ = 6] @ 0.00125 mg/kg-day [0.001 mg/kg-day = 4] (6.00)
X	X	X	X	2-Nitropropane	Probable Human Carcinogen (NTP, IARC)
X				Peracetic acid	Air Toxicant, score = 9.25 Acute: 450 mg/cu m (3) Subacute: not listed (1) Systemic: Chemical bronchopneumonia [definite effect on Cat. I organ = 7] @ 186 mg/cu m [3.2 mg/kg-day = 3] (5.25)
X	X	X	X	Phenol	Air Toxicant, score = 11.75 Acute: 316 mg/cu m (3) Subacute: 19 mg/cu m (2) Systemic: Severe damage to lung, heart, liver, and kidneys [severe effects on Cat. I organs = 9] @ 25 ppm [1.3 mg/kg-day = 3] (6.75)
X	X			Phosphorus	Air Toxicant, score = 9.00 Acute: 3.03 mg/kg (3) Subacute: 0.1 mg/cu m (3) Systemic: Bone changes [definite effects on Cat. III organs = 3] @ 0.05 mg/kg [0.05 mg/kg-day = 4] (3.00)
X	X	X	X	PCBs	Listed by International Joint Commission
X				Selenium and compounds	Air Toxicant, score = 8.00 Acute: 6700 mg/kg (0) Subacute: 0.2 mg/cu m (3) Systemic: CNS effects (socio-psychiatric disturbance) [minor effects of Cat. I organ = 5] @ 0.2 mg/cu m [0.02 mg/kg-day = 4] (5.00)

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Option				Chemical	Selection Basis
1	2	3	4		
X				Sodium fluoride	Air Toxicant, score = 8.00 Acute: 52 mg/kg (2) Subacute: 2.5 (for F) mg/cu m (3) Systemic: Bone injury (osteosclerosis) [definite effect on Cat. III organ = 3] @ 4 mg/cu m [0.26 mg/kg-day = 4] (3.00)
X	X	X	X	Sulfuric acid	Air Toxicant, score = 11.00 Acute: 510 mg/cu m (2) Subacute: 1 mg/cu m (3) Systemic: Slight pulmonary histopathology [mild effect on Cat. I organ = 6] @ 0.38 mg/cu m [0.061 mg/kg-day = 4] (6.00)
X	X	X	X	Tetrachloroethylene	Probable Human Carcinogen (NTP, EPA)
X	X	X	X	Toluene 2,4-diisocyanate (TDI)	Air Toxicant, score = 12.00 Acute: 95 mg/cu m (3) Subacute: 0.04 mg/cu m (3) Systemic: Sensitizer leading to respiratory difficulty [mild effect on Cat. I organ = 6] @ 0.01 ppm [0.0022 mg/kg-day = 4] (6.00)
X	X	X	X	Toxaphene	Listed by International Joint Commission
X	X	X	X	Trichloroethylene	Probable Human Carcinogen (EPA)
X	X	X	X	1,2,4-Trimethylbenzene	Air Toxicant, score = 6.50 Acute: 18000 mg/cu m (1) Subacute: 125 mg/cu m (1) Systemic: CNS (nervous anxiety) and respiratory difficulty [mild effect on Cat. I organ = 6] @ 10 - 60 ppm total hydrocarbons [1.5 mg/kg-day = 3] (4.50)

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Option				Chemical	Selection Basis
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>		
X	X			2,4,6-Trinitrotoluene	Air Toxicant, score = 10.00 Acute: 795 mg/kg (1) Subacute: 0.5 mg/kg (3) Systemic: Liver damage [mild effects on Cat. I organ = 6] @ 2.38 mg/cu m [0.15 mg/kg-day = 4] (6.00)
X	X	X	X	Vinyl chloride	Known Human Carcinogen (NTP, IARC, EPA, ACGIH)
X	X			Vinylidene chloride	Air Toxicant, score = 7.50 Acute: 25175 mg/cu m (1) Subacute: 20 mg/cu m (2) Systemic: Liver and kidney damage [mild effects on Cat. I organs = 6] @ 25 ppm [5.8 mg/kg-day = 3] (4.50)

LDM/A/014

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LDM/A/020/psf	

Systemic Toxicity Score - Severity of Effects Scoring
Distribution of Toxicity Endpoints

Score:	1	2	3	4	5	6	7	8	9
	subjective symptoms	- lesions of nasal mucosa - flu symptoms - dilation of blood vessels	- bladder stones - skin abnormalities - osteoporosis - reduced growth - osteosclerosis - minor blood changes	blood alteration	- decreased RBC - headache/nausea/dizziness - fatty degeneration of liver - loss of concentration - Cat. I organ injury - hepatic porphoria - pneumoconiosis - Cat. I organ dysfunction - increased Cat. I organ weight - decreased uptake of norepinephrine - dyspnea - exaggerated lung markings - Cat. I organ congestion - ulcers	- narcotic effect - histology of liver - euphoria - susceptible to pulmonary infection - depression - hearing loss - asthmatic bronchitis - histology of lung - hepatomegally - anemia - disruption of reflexes - hemoglobinemia - decreased pulmonary compliance - Cat. I organ degeneration - polyneuritis - pneumonitis - EKG changes - jaundice - nephritis	- decreased cholinesterase - hepatocellular vacuolization - significant biochemical changes - pulmonary edema - histology of brain - decreased birth weight with maternal effects - asthmatic sensitization - methemoglobinemia - kidney tubular damage - bronchopneumonia - hepatitis - fetal organ weight change - focal emphysema - polyneuropathy - chromosome aberration - decreased sperm production	- bone marrow suppression - Cat. I organ necrosis - pulmonary fibrosis - CNS deterioration - reversible teratogenesis - reproductive effects - neuro-psychiatric effects - fetal toxicity - convulsions - sterility - emphysema	- damage to multiple organs - hepatic atrophy - respiratory paralysis

Note: Reversible effects can lower score. Multiple organ effects can raise score.