PLAINTIFF'S EXHIBIT
DUP-455

DON'T SAY IT—WRITE IT

To B.W. Culpepper Location Bldg. 1

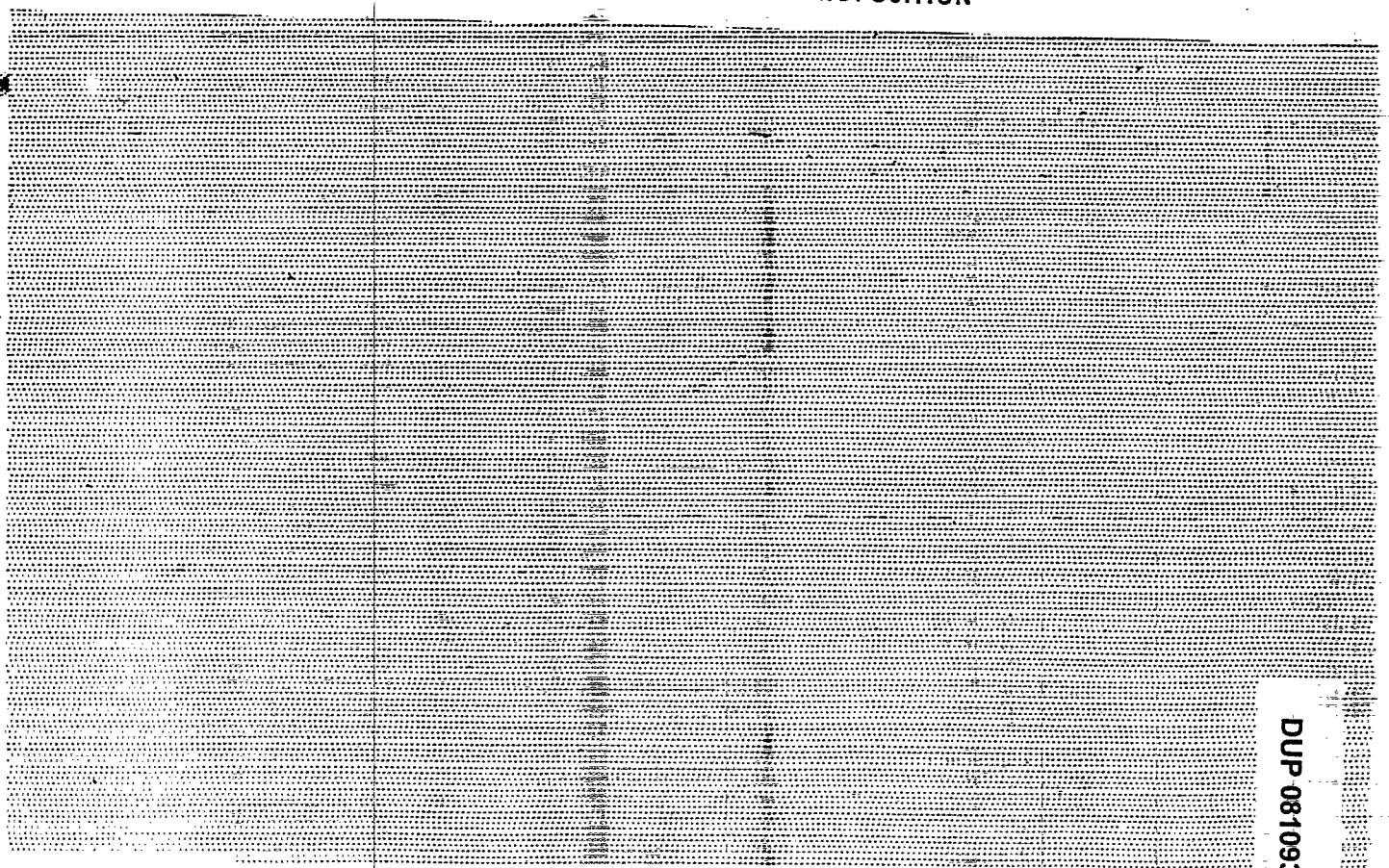
From J. M. KAYSER Location BLDG. 2 Phone No. 1397

Subject CARCINOGEN LIST Date 1/21/80

Attached is the latest carcinogen list from Wilmington.
Please discard any previous lists.

G-88 REV. 10-62

SAFE LIVING IS A LIFETIME PROPOSITION



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DUPONT USE ONLY

INDUSTRIAL CHEMICALS CLASSIFIED AS TO CARCINOGENICITY BY ACGIH, OSHA OR DU PONT

REVISED JANUARY 1980

INDUSTRIAL CHEMICAL[1]	ATMOSPHERIC CONCENTRATION[2]			CARCINOGEN CLASSIFICATION[3]	
	AEL	TLV®	OSHA LIMIT	ACGIH	OSHA
Acetylaminofluorene [53-96-3]				Not currently listed. (A1 in last Documentation of TLVs)	Cancer-suspect (>1% a.i.)
**Acrylonitrile [107-13-1]	Lowest practical concentration, not to exceed 2 ppm (Haskell recommendation of 4/21/78)	—	2 ppm TWA, 10 ppm ceiling	A1b (intended change)	Cancer hazard
4-Aminodiphenyl (para-xenylamine) [92-67-1]	2 ug/m^3	--		A1b	Cancer-suspect (>0.1% a.i.)
**3-Amino-1,2,4-triazole (3AT) [61-02-5]		--		A2	
**ortho-Anisidine [90-04-0]	0.1 ppm	0.1 ppm, 0.5 mg/m^3 (ortho, para isomers)	0.5 mg/m^3		
Antimony trioxide production		0.5 mg/m^3 as Sb		A2 (intended change) ("cigarette smoking can enhance the incidence of respiratory cancers")	

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INDUSTRIAL CHEMICAL[1]	ATMOSPHERIC CONCENTRATION[2]			CARCINOGEN CLASSIFICATION[3]	
	AEL	TLV®	OSHA LIMIT	ACGIH	OSHA
Arsenic, inorganic; refers to "copper aceto-arsenite and all inorganic compounds containing arsenic except arsine"			10 ug/m^3, measured as arsenic, averaged over 8 hrs; for all occupational exposures other than in agriculture, in application of pestiqides, in treatment of wood, and in utilization of arsenically preserved wood		Cancer hazard
Arsenic trioxide production		-- (intended change)		A2 (intended change)	
Asbestos		Asbestos (intended change) Amosite 0.5 fibers/cc Chrysotile 2 fibers/cc Crocidolite 0.2 fibers/cc Tremolite 0.5 fibers/cc Other forms 2 fibers/cc	OSHA, limit of 2 fibers >5 um, per cc for TWA and 10 fibers, >5 um, per cc for ceiling concentration. NIOSH recommends TWA = 0.1 fibers, >5 um, per cc (OSHR, 12/30/76).	A1a, all forms ("cigarette smoking can enhance the incidence of respiratory cancers")	"...may cause bodily harm" (chrysotile, amosite, crocidolite, tremolite, anthophyllite, actinolite; fibers >5 um, length according to specified measurements[4])
*Benzene [71-43-2]	10 ppm	10 ppm	OSHA's proposed permanent standard of 1 ppm rejected by Appeals Court 10/5/78; U.S. Supreme Court agreed to review case (OSHR 3/1/79).	A2	Cancer hazard

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INDUSTRIAL CHEMICALS CLASSIFIED AS TO CARCINOGENICITY BY ACGIH, OSHA OR DU PONT

REVISED JANUARY 1980 Page3

INDUSTRIAL CHEMICAL[1]		ATMOSPHERIC CONCENTRATION[2]			CARCINOGEN CLASSIFICATION[3]	
		AEL	TLV®	OSHA LIMIT	ACGIH	OSHA
Benzidine (salts implied)			-- (as benzidine production)		A1b (as benzidine production)	Cancer-suspect (>0.1% a.i.)
Benz(a)pyrene	[50-32-8]		--		A2	
Beryllium	[7440-41-7]		2 ug/m^3	2 ug/m^3	A2	
Cadmium oxide production			-- (intended change)	NIOSH, TWA[5] for Cd & Cd compounds = ≤0.04 mg/m^3	A2	
**Carbon tetrachloride	[56-23-5]	10 ppm/12 hr. TWA	5 ppm (intended change)	10 ppm NIOSH, TWA[5] = ≤2 ppm	A2 (intended change)	
**Chloroform	[67-66-3]	10 ppm	10 ppm	50 ppm NIOSH, TWA[5] = ≤2 ppm	A2	
bis(Chloromethyl)ether	[542-88-1]		0.001 ppm		A1a	Cancer-suspect (>0.1% a.i.)
Chloromethyl methyl ether -- See Methyl chloromethyl ether						
Chromite ore processing (chromate)			0.05 mg/m^3, as Cr		A1a	

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DUPONT USE ONLY

INDUSTRIAL CHEMICALS CLASSIFIED AS TO CARCINOGENICITY BY ACGIH, OSHA OR DU PONT

REVISED JANUARY 1980 Page4

INDUSTRIAL CHEMICAL[1]		ATMOSPHERIC CONCENTRATION[2]			CARCINOGEN CLASSIFICATION[3]	
		AEL	TLV®	OSHA LIMIT	ACGIH	OSHA
Chromium VI (hexavalent chromium) -- See also specific compounds			0.05 mg/m^3 (as Cr) certain water insoluble Cr VI compounds; 0.5 mg/m^3 (as Cr) for water soluble Cr VI compounds. (1979 intended change)	1 mg/m^3 (insoluble Cr salt; the only other limit is 0.5 mg/m^3 for "soluble chromic, chromous salts as Cr")	A1a (certain water insoluble CrVI compounds)	NIOSH recommends chromium (VI) "be considered to be carcinogenic unless [it can be demonstrated that only non-carcinogenic chromium (VI) compounds are present"; also recommends emergency standard (OSHR 11/11/76)
*Chromium dioxide	[12018-01-8]	0.05 mg/m^3 (as Cr) or 0.08 mg (as CrO_2) - considered analogous to Cr VI (Haskell recommendation of 3/16/78)				
Coke oven emissions				Maximum permissible exposure[6] = 150 ug/m^3 per 8 hrs.	See: Particulate polycyclic aromatic hydrocarbons	Cancer hazard
*ortho-Dianisidine	[119-90-4]	10 ug/m^3				
1,2-Dibromo-3-chloropropane	[96-12-8]			1 ppb		Cancer hazard

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DUPONT USE ONLY

INDUSTRIAL CHEMICALS CLASSIFIED AS TO CARCINOGENICITY BY ACGIH, OSHA OR DU PONT

INDUSTRIAL CHEMICAL[1]	ATMOSPHERIC CONCENTRATION[2]			CARCINOGEN CLASSIFICATION[3]	
	AEL	TLV®	OSHA LIMIT	ACGIH	OSHA
3,3'-Dichlorobenzidine (salts also specified by OSHA)		--		A2	Cancer-suspect (>1% a.i. including salts)
**1,4-Dichloro-2-butene [764-41-0]					
4-Dimethylaminoazobenzene [60-11-7]				Not currently listed (A1 in last Documentation of TLVs)	Carcinogen (>1% a.i.)
**Dimethylcarbamyl chloride (DMCC) [79-44-7]	0.5 ppb	--		A2	
**1,1-Dimethyl hydrazine [57-14-7]		0.5 ppm	0.5 ppm	A2	
**Dimethyl sulfate [77-78-1]		0.1 ppm (0.5 mg/m^3)	1ppm	A2	
**2,4-Dinitrotoluene [121-14-2]	1.5 mg/m^3	1.5 mg/m^3 (isomers not specified)	1.5 mg/m^3 (isomers not specified)		
**Dioxane [123-91-1]		25 ppm (1979 intended change)	100 ppm NIOSH recommends limit = 1 ppm (OSHR 12/1/77)		
**Epichlorhydrin [106-89-8]		2 ppm (10 mg/m^3) (intended change)	5 ppm NIOSH recommends TWA = 2 mg/m^3 (OSHR 12/9/76)	A2	

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DUPONT USE ONLY

INDUSTRIAL CHEMICALS CLASSIFIED AS TO CARCINOGENICITY BY ACGIH, OSHA OR DU PONT

INDUSTRIAL CHEMICAL[1]	ATMOSPHERIC CONCENTRATION[2]			CARCINOGEN CLASSIFICATION[3]	
	AEL	TLV®	OSHA LIMIT	ACGIH	OSHA
**Ethylene dibromide (EDB) [106-93-4]		-- (intended change)	NIOSH recommends atmospheric limit = 1 mg/m^3 (0.13 ppm) as ceiling limit determined by sampling period of 15 min. (OSHR 11/24/77); OSHA recommends limiting exposure to "lowest possible concentration" (OSHR 12/15/77)	A1b	
**Ethylene thiourea [96-45-71]					
Ethyleneimine (ethylene imine; aziridine) [151-56-4]		0.5 ppm	0.5 ppm		Cancer-suspect (≥1% a.i.)
Hexachlorobutadiene [87-68-3]		--		A2 (intended change)	
**Hexamethylphosphoramide (HMPA) [680-31-9]	0.5 ppb	--		A2	
**Hydrazine [302-01-2]	0.5 ppm/12 hr. TWA	0.1 ppm (0.1 mg/m^3)	1 ppm	A2	
**N-(2-hydroxyethyl)ethyleneimine (1-aziridine ethanol) [1072-52-2]					
*Lead chromate [11119-70-3]		0.05 mg/m^3 as Cr		A2	
~~Methyl-chloromethyl-ether [107-30-2]~~		--		A1b (intended change)	Cancer-suspect (≥0.1% a.i.)

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INDUSTRIAL CHEMICALS CLASSIFIED AS TO CARCINOGENICITY BY ACGIH, OSHA OR DU PONT

REVISED JANUARY 1980 Page7

INDUSTRIAL CHEMICAL[1]	ATMOSPHERIC CONCENTRATION[2]			CARCINOGEN CLASSIFICATION[3]	
	AEL	TLV®	OSHA LIMIT	ACGIH	OSHA
**4,4'-Methylene bis(2-chloroaniline) [101-14-4]		0.02 ppm		A2	Dropped by OSHA (FR 8/20/76) but NIOSH recommends emergency standard (OSHR 11/11/76)
Monomethyl hydrazine [60-34-4]		C 0.2 ppm (C = ceiling)	C 0.2 ppm (C = ceiling)	A2	
Methyl iodide [74-88-4]		2 ppm (1979 intended change)		A2 (1979 intended change)	
alpha-Naphthylamine [134-32-7]					Cancer-suspect (≥1% a.i.)
beta-Naphthylamine [91-59-8]		--		A1b	Cancer-suspect (≥0.1% a.i.)
Nickel sulfide roasting, fume & dust		1.0 mg/m^3 as Ni	NIOSH recommends for inorganic nickel TWA ≤15 ug/m^3 (OSHR 7/21/77)	A1a	
4-Nitrobiphenyl (4-nitrodiphenyl) [92-93-3]		--		A1b	Cancer-suspect (≥0.1% a.i.)
**2-Nitronaphthalene [581-89-5]					
2-Nitropropane [79-46-9]		C 25 ppm (C = ceiling)	25 ppm	A2	
Nitrosamines		--		A2	

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INDUSTRIAL CHEMICALS CLASSIFIED AS TO CARCINOGENICITY BY ACGIH, OSHA OR DU PONT

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INDUSTRIAL CHEMICAL[1]	ATMOSPHERIC CONCENTRATION[2] AEL	TLV®	OSHA LIMIT	CARCINOGEN CLASSIFICATION[3] ACGIH	OSHA
N-nitrosodimethylamine (or dimethyl-nitrosamine) [62-75-9]		--		A2	Cancer-suspect (>1% a.i.)
**Oxydianiline [101-80-4]	0.1 mg/m^3				
Particulate polycyclic aromatic hydrocarbons (PPAH)		0.2 mg/m^3, as benzene solubles		A1a	See: Coke oven emissions
**Phenyl glycidyl ether [122-60-1]	0.75 ppm	10 ppm	10ppm		
n-Phenyl-beta-naphthylamine [135-88-6]		--		A2 (intended change)	
Propane sultone [1120-71-4]		--		A2	
**beta-Propiolactone [57-57-8]		0.5 ppm (1979 intended change)		A2	Cancer-suspect (>1% a.i.)
**Propylenelmine (2-methyl aziridine) [75-55-8]		2 ppm			
*Tetrachloroethylene [127-18-4]		100 ppm	100 ppm		
**Tetramethyl thiourea [2782-91-4]					
**Thiourea [62-56-6]					
**Toluene-2,4-diamine (m-tolylene-diamine; (MTD; Pontamine Developer TD; 2,4-diaminotoluene) [59-80-7]	0.25 mg/m^3				
*o-Toluidine [95-53-4]	5 ppm	5 ppm	5 ppm		

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INDUSTRIAL CHEMICALS CLASSIFIED AS TO CARCINOGENICITY BY ACGIH, OSHA OR DU PONT

INDUSTRIAL CHEMICAL[1]	ATMOSPHERIC CONCENTRATION[2]			CARCINOGEN CLASSIFICATION[3]	
	AEL	TLV®	OSHA LIMIT	ACGIH	OSHA
**2,3,4-Trichloro-1-butene [2431-50-7]	0.2 ppm				
*Trichloroethylene [79-01-6]		100 ppm	100 ppm		
Vinyl bromide [593-60-2]		5 ppm (intended change)		A2 (1978 intended change)	
Vinyl chloride [75-01-4]		5 ppm (intended change)	OSHA has defined permissible exposure as ≤1 ppm average in any 8-hr period, ≤5 ppm average in any 15 min period, no direct liquid contact.	A1a (1978 intended change)	Cancer-suspect
Vinyl cyclohexene dioxide [4223-10-3]		10 ppm		A2	
*Zinc chromate [1328-67-2]		0.05 mg/m^3 as Cr		A2	

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[1] INDUSTRIAL CHEMICAL: Underlining of chemical denotes addition or change in listing. The bracket number shown in the form [xxxxx-xx-x] for specific chemicals is the unique Chemical Abstracts registry number for that substance according to Chemical Abstracts indexing practice. To cite ortho-anisidine as an example, note that the ninth Collective Index gives five registry numbers for different isomers, many more for various complexes, and indexes studies of "anisidine" under the para isomer.

[2] ATMOSPHERIC CONCENTRATION: Values, here given as eight-hour time-weighted average (TWA) concentrations unless otherwise stated, are:

- Acceptable Exposure Limits (AEL) values recommended by Haskell Laboratory's AEL Committee as analogous to the TLVes (see directly below). The AEL recommendations may be interim and are designed for Du Pont operations.
- Threshold Limit Values (TLVes) "refer to airborne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effect ... [The] Threshold Limit Value - Time-Weighted Average (TLV-TWA) [is] the time-weighted average concentration for a normal 8-hour workday or 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect ... The TLV-TWA should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations ... [The] Threshold Limit Value-Ceiling (TLV-C) [is] the concentration that should not be exceeded even instantaneously."
- OSHA values are regulatory if formally adopted by the Occupational Safety and Health Administration (OSHA). Advisory values from the National Institute of Occupational Safety and Health are listed for additional information.

[3] CARCINOGEN CLASSIFICATION:

- Du Pont definitions (classified items are marked with asterisks):
  - Human carcinogen as: "a substance which has been shown by valid, statistically significant epidemiological evidence to be a carcinogen to man."
  - Experimental carcinogen as: "a substance shown by valid, statistically significant experimental evidence to induce cancer in mammals."
  - Suspected carcinogen as: "a substance for which there exists moderate, but inconclusive, evidence that it is a human or experimental carcinogen." (Letter, E. A. Gee to Heads of Departments, 2/17/75)

INDUSTRIAL CHEMICALS CLASSIFIED AS TO CARCINOGENICITY BY ACGIH, OSHA OR DU PONT

- American Conference of Governmental Industrial Hygienists (ACGIH; 1979 TLV® Booklet) has categorized certain carcinogens:
  - A1a. "Substances ... recognized to have carcinogenic or cocarcinogenic potential, with an assigned TLV."
  - A1b. "Substances ... recognized to have carcinogenic potential without an assigned TLV ... For the substances in 1b, no exposure or contact by any route - respiratory, skin or oral, as detected by the most sensitive methods - shall be permitted. The worker should be properly equipped to insure virtually no contact with the carcinogen."
  - A2 "Chemical substances or substances associated with industrial processes, which are suspect of inducing cancer, based on either (1) limited epidemiologic evidence, exclusive of clinical reports of single cases, or (2) demonstration of carcinogenesis in one or more animal species by appropriate methods ... Worker exposure by all routes should be carefully controlled to levels consistent with the animal and human experience data (see Documentation), including those substances with a listed TLV."

  ACGIH lists The Committee Guidelines for the Classification of Experimental Animal Carcinogens on pp. 41-44 of the 1979 TLV® booklet.

- Occupational Safety and Health Administration (OSHA) has issued standards for "Toxic and Hazardous Substances"; that categorize certain materials as "cancer-suspect" or "cancer hazard." See 29CFR 1910.100-1910.1500 and subsequent revisions in FR, also "Occupational Safety and Health Reporter," (Bureau of National Affairs, Washington, DC, Reference File 31:8301 and pertinent pages in this section).

[4] Asbestos fibers, "method of measurement. All determinations of airborne concentrations of asbestos fibers shall be made by the membrane filter method at 400-450 x (magnification) (4 millimeter objective) with phase contrast illumination." 29CFR 1910.1001, 7/1/75.

[5] Maximum time-weighted average exposure (TWA) for up to a 10-hour workday, 40-hour workweek, as recommended to OSHA by NIOSH in their Criteria Document or other communications. (Sampling limits individually specified, as two hour and one hour for carbon tetrachloride and chloroform.)

[6] This limit for coke oven emissions defined in terms of benzene-soluble fraction of total particulate matter (BSFTPM). See Part V, Section C, in standard (which contains 14 definitions "in order to establish a working vocabulary").

Abbreviations

a.i. = Active Ingredient
CFR = Code of Federal Regulations (U.S.)
FR = Federal Register (U.S.)
NIOSH = National Institute of Occupational Safety and Health
OSHR = Occupational Safety & Health Reporter (Bureau of National Affairs)

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