

WIPE SAMPLING POLICIES AND PROCEDURES

DRAFT

A. Introduction

1. This chapter contains policies and procedures on the use of wipe sampling in support of citations; e.g., Sanitation, 29 CFR 1910.141(g) (2) and (g) (4); Personal Protective Equipment, 29 CFR 1910.132(a); Carcinogen standards, 29 CFR 1910.1001-1910.1014; and Respiratory Protection, 29 CFR 1910.134(b) (5) and (b) (6).
- a. Wipe sampling is often needed to provide documentation of the presence of a toxic material or toxic materials in significant amounts.
- b. The terms "wipe sampling", "swipe sampling", and "smear sampling" have all been used synonymously to describe an industrial hygiene technique for assessing surface contamination. For the purposes of this Chapter, the technique will be termed "wipe sampling".

B. General

When using wipe sampling, professional judgment of the CSRO must be utilized on a case-by-case basis considering presence of health effects, contribution of skin absorption and/or gastrointestinal absorption to total dose considering air concentrations, etc.

C. Wipe Sampling to Support a Citation Under 29 CFR 1910.132(a)

1. There are two primary considerations in using wipe sampling in support of a citation for lack of protective clothing.

In both cases only a qualitative determination of presence or absence of the material is felt necessary.

- a. If the materials can be demonstrated to be present on the employee's skin using wipe sampling, and
- b. If either a potential for dermatitis exists or if the material can be significantly absorbed through the skin (see Table ____), a citation can be issued.
- c. If the material cannot be demonstrated as present using wipe sampling, or in other cases where in the professional judgment of the CSHO, health risk still exists, a citation can still be issued provided the CSHO can document the potential for a health risk.

2. The ACGIH TLV listing for substances was used to identify substances having a "skin notation" and substances were also identified having an LD₅₀ skin in rabbits of less than 0.340 gm/kg where data were available. The LD₅₀ (skin) data were used only to provide a relative ranking of toxicity via skin absorption. No attempt was made to extrapolate from these data to actual amount absorbed or actual amount constituting "significant risk". It should be further noted that LD₅₀ (skin) data are based on acute lethal effect (i.e., LD₅₀).

and if the CSHO has additional information to justify significance from a chronic skin absorption standpoint, such data should be utilized in determining if the resulting exposure presents a potential employee hazard.

3. The following technique shall be used for wipe sampling for purposes of establishing a citation under 29 CFR 1910.132(a):
 - a. Using a clean disposable glove, remove a round Whatman 41, 7 cm (2-inch) filter from the box.
 - b. Moisten the filter with isopropyl alcohol.
 - c. Wipe the arm or hand of the employee with the moistened filter. If possible, try to cover approximately 100 cm² of skin area.
 - d. Without allowing the filter to contact any surface, fold it with the exposed side in, and then over to form a 90° angle in the center of the filter.
 - e. Place the filter, angle first, into a clean glass vial, replace the top, seal and send with an OSHA 21.
 - f. A blank filter also moistened with alcohol should be submitted with the samples.

D. Wipe Sampling to Support a Citation Under 29 CFR 1910.141(g)(2) and (g)(4)

1. Contaminants (appearing in 29 CFR 1910.1000) were evaluated on a case-by-case basis to determine whether ingestion of the material would represent a significant risk and, if so, whether wipe sampling would be appropriate to support a citation under 29 CFR 1910.141(g)(2) and (g)(4).

Note: Isopropyl alcohol is recommended over water since substances that are soluble in water, but insoluble in alcohol are generally not absorbed through the skin. Conversely substances that are insoluble in water but soluble in alcohol are generally absorbable through the skin. (Provided molecular weight is not excessively high; i.e., above 300 gm/mole).

a. The following criteria were used:

<u>Category</u>	<u>Criteria</u>
Wipe sampling warranted	Carcinogen and suspect carcinogen (category I of the proposed carcinogen standard).
Wipe sampling warranted	Pesticides and serious health health hazards "significant potential" for gastrointestinal (G.I.) absorption.
Wipe sampling not warranted	"Other" health hazards with significant potential" for gastrointestinal absorption.
Wipe sampling not warranted	No "significant potential" for G.I absorption.

"Significant potential" is defined to be substances having an LD₅₀ for rates of less than 500 mg/kg where data were available. The LD₅₀ (oral) data were used only to provide a relative ranging of oral toxicity. No attempt was made to extrapolate from these data to actual amount absorbed or actual amount constituting "significant risk".

2. The CSBO should accurately document on the OSHA 91 the resulting values from wipe sampling to enable guidelines for specific contaminant levels to be developed in the future.

3. It should be noted that these data are based on acute lethal effect (i.e., LD₅₀) and, if the CSHO has additional information to justify potential hazard from a chronic G.I. absorption standpoint, such data should be utilized in determining if the resulting exposure presents a potential employee hazard.

4. Wipe sampling procedure.

Wipe sampling shall be conducted on surfaces which have frequent hand contact, such as lunch containers, lunch tables and chairs, drinking fountains, etc; as well as the hands, i.e. where, in the opinion of the CSHO, a potential exists for subsequent ingestion of the material via contamination of food or water. The method described in Section C. 3 of this chapter shall be used.

E. Wipe Sampling to Support Citations Under 29 CFR 1910.134(b)(5) and (e)(5) and 29 CFR 1910.134(b)(6)

In order of the Industrial Hygienist to determine how effective the fit, cleaning and storage programs are for respiratory, it is desirable to utilize wipe sampling. The method described in Section C.3 of this Chapter shall be used.

F. Wipe Sampling to Support Citations Under 29 CFR 1910.1003 Through .1016

Wipe samples may be used to document the presence of a carcinogenic substance regulated under the above-named standards, as appropriate. The techniques used are the same as described in Sections C.3 of this chapter.

G. Special Techniques for Field Analytical Evaluation of Wipe Samples for Carcinogenic Aromatic Amines

1. Wipe sampling procedure

A 100 cm² is wiped with a round Whatman 42, 7 cm (2-inch) diameter filter paper moistened with 5 drops of methanol (placed in center). As in the case of routine wipe sampling, polyethylene gloves shall be worn. This avoids contamination of the filter by the hands and the subsequent possibility for false positives, and prevents contact with the carcinogens.

2. Analysis

- a. After wiping the sample area, apply 3 drops of fluoroescamine (visualization reagent supplied by SLC Laboratory) to the filter. Place a drop upon an area of the filter which had not contacted the surface. This provides a blank adjacent to the test area.
- b. After a reaction time of 6 minutes, place the filter in the U.V. light viewing apparatus and irradiate with 366 nm U.V. light. Examine for color formation as indicated in the following:

Color of Fluorescent Derivative Upon
Irradiation With 366 nm Ultraviolet Light

<u>Cancer-Suspect Agent</u>	<u>Fluorogenic Reagent Fluoroescamine</u>
4,4'-Methyllene bis (2-chloroanilline)	Yellow
Benzidine	Yellow
3,3'-Dichlorobenzidine	Yellow
alpha-Napthylamine	Yellow
beta-Napthylamine	Yellow
4-Aminobiphenyl	Yellow

If the information of a color is observed on the filter used to wipe the surface, collect another sample using the same procedure and send it to the SIC Laboratory for confirmation testing.

- H. Table _____ in Chapter IX of this manual indicates on a substance-by-substance basis where wipe sampling would be appropriate for citations under 29 CFR 1910.132(a) or 29 CFR 1910.141(g)(2) and (g)(4). For citations under 29 CFR 1910.134 simple presence would establish risk or ineffectiveness of the respirator program elements.

Substance	TOXICITY CLASS		SKIN ABSORPTION POTENTIAL	
	[1910.147 (C)(2)]		[1910.133 (a)(3)]	
Abate	3	NO	NO	
Acetaldehyde	4	NO	NO	
Acetic Acid	4	NO	NO	
Acetic Anhydride	3	NO	NO	
Acetone	4	NO	NO	
Acetonitrile	4	NO	NO	
2-Acetylaminofluorene		Yes	NO	
Acetylene	4	NO	NO	
Acetylene Tetrabromide	3	NO	NO	
Acrolein	4	NO	NO	
Acrylamide - Skin ✓	2	Yes	Yes	
Acrylonitrile - Skin ✓	3	NO	Yes	
Aldrin - Skin ✓	2	Yes	Yes	
Alundum (AL203)	4	NO	NO	
Allyl Alcohol - Skin ✓	3	NO	Yes	
Allyl Chloride	4	NO	NO	
Allyl Glycidyl Ether ✓ (age) - Skin	4	NO	Yes	
Allyl Propyl Disulfide	4	NO	NO	
4-Aminodiphenyl - Skin ✓	1	Yes	Yes	
2-Aminopyridine	4	NO	NO	
Ammonia	4	NO	NO	

Note: This table will become part of
Chapter IX Table

Chemical Name	No.	Yes	No
Ammonium Chloride	7		
Ammonium Sulfamate	7		
N-nyl acetate	4		
Amyl acetate-Sec	4		
Aniline - Skin	2	yes	
Antidote (O.P. - Isomers)	4		
Skin	-		
Antimony & Compounds	3		
(As SG)			
Arter (a-Naphthyl Thiourea)	4		
Argon	4		
Arsenic & Compounds	1		
(As AS)			
Arsine	4		
Asbestos (All Forms)	1		
Asphalt (petroleum) Fumes	+		
Azinhpos Methyl - Skin	2	yes	
Barium (Soluble Compounds)	4		
Baygon (Propoxur)	2	yes	
Benzene - Skin	4		
Benzidine - Skin	1	yes	
Benzoyl Peroxide	4		
Benzo(a)pyrene	1		
Benzyl Chloride	4		
Beryllium and Compounds	2	yes	
Biphenyl (Biphenyl)	+		
Bis-Chloromethyl Ether	1	yes	

		WIPE SAMPLING CATEGORY	
Substance	TOXICITY CLASS	SKIN ABSORPTION POTENTIAL	
		S 1910.141 (2) 7	
Bismuth Telluride	4	NO	
Bismuth Telluride (Se-Dopad)	4	NO	
Borates, Tetra, Sodium Salt, Anhydrate	3	NO	
Borates, Tetra, Sodium Salt, Pentahydrate	3	NO	
Boron Oxide	4	NO	
Boron Tribromide	4	NO	
Boron Trifluoride	4	NO	
Bromine	4	NO	
Bromine Pentafluoride	4	NO	
Bromochloromethane	4	NO	
Bromoform - Skin	3	NO	yes
Butadiene (1,3-Butadiene)	4	NO	
Butane	4	NO	
2-Butanone (MEK)	4	NO	
2-Butoxethanol (Butyl Cellosolve) - Skin	2	YES	
N-Butyl Acetate	4	NO	
Sec-Butyl Acetate	4	NO	
Tert-Butyl Acetate	4	NO	
N-Butyl Alcohol - Skin	3	NO	yes
Sec-Butyl Alcohol	4	NO	
Tert-Butyl Alcohol	4	NO	
Tert-Butyl Chromate (As CR03) - Skin	2	YES	yes

Substance	WIDE SAMPLING CATEGORY	
	TOXICITY CLASS [1910.141(G)(2)]	SKIN ABSORPTION POTENTIAL [1910.132(2)]
N-Butyl Glycidyl Ether (RGE)	4	NO
N-Butyl Lactate	4	NO
Butyl Mercaptan	4	NO
P-Tert-Butyl Toluene	4	NO
Butylamine - Skin	3	NO
Cadmium (Dust & Salts)	2	yes
Cadmium Oxide (fume)	2	yes
Calcium Arsenate As AS	2	yes
Calcium Carbonate	4	NO
Calcium Cyanamide	4	NO
Calcium Hydroxide	4	NO
Calcium Oxide	4	NO
Camphor, Synthetic	4	NO
Caprolactam Dust	4	NO
Caprolactam Vapor	4	NO
Captan (Difolatan) Skin	2	yes
Captan	4	NO
Carbaryl (Sevin)	2	yes
Carbofuran (Furadan)	3	NO
Carbon Black	4	NO
Carbon Dioxide	4	NO
Carbon Disulfide-Skin	3	NO
Carbon Monoxide	4	NO

WIPE SAMPLING CATEGORY		
Substance	TOXICITY CLASS	SKIN ABSORPTION POTENTIAL
	[1910.141(GX2)7]	[1910.132(GX)3]
Carbon Tetrabromide	4 NO	
Carbon Tetrachloride-Skin	1 YES	yes
Catechol (Pyrocatechol)	4 NO	
Cellulose (Paper Fiber)	4 NO	
Cesium Hydroxide	4 NO	
Chlordane - Skin	3 NO	yes
Chlorinated Camphene - Solid - Skin - Liquid	3 NO	yes
Chlorinated Diphenyl Oxide	3 NO	NO
Chlorine	4 NO	
Chlorine Dioxide	4 NO	
Chlorine Trifluoride	4 NO	
1-Chloro-1-Nitropropane	3 NO	
2-Chloro-6-(Trichloro- methyl) Pyridine	4 NO	
Chloroacetaldehyde	4 NO	
α-Chloroacetophenone (Phenacyl chloride)	4 NO	
Chlorobenzene	4 NO	
O-Chlorobenzylidene Malononitrile - Skin	4 NO	yes
Chlorobromomethane	4 NO	
Chlorodifluoromethane (F22)	4 NO	
Chlorodiphenyl (42% Cl) Skin	3 NO	
Chlorodiphenyl (54% Cl) Skin	1 YES	

Substance	WIDE SAMPLING CATEGORY	
	TOXICITY CLASSES (1910.1414)(2)	SKIN ABSORPTION POTENTIAL (1910.1322)
Chloroform	4	ND
Chloropicrin	4	ND
-Chloroprene - Skin	4	ND
Chlorpyrifos (Dursban) Skin	3	ND
O-Chlorostyrene	4	ND
O-Chlorotoluene - Skin	4	ND
Chromates, Certain Insol. Forms	4	ND
Chromic Acid & Chromates		
Chromium, Sol. Chromates Salts		
Clopidol (Coyden)	4	ND
Coal Tar Pitch Volatiles	4	ND
Cobalt, Metal, Fume & Dust	4	ND
-Copper Dusts. & Mists	4	ND
-Copper Fume	4	ND
Corundum (AL2O3)	4	ND
Cotton Dust (Raw)	4	ND
Crag Herbicide (Sesone)	3	ND
Cresol (All Isomers) Skin	4	ND
Crotonaldehyde	4	ND
Cruformate (Ruelene)	3	ND
Cumene - Skin	4	ND
Cyanamida	3	ND
Cyanides (As CN)-Skin	4	ND

Substance		TOXICITY CLASS		DATE	
		5/10/10/12/13/14		1/13/14	
Cyanogen	4	NO			
Cyclohexane	4	NO			
Cyclohexanol	4	NO			
-Cyclohexanone	4	NO			
Cyclohexene	4	NO			
Cyclohexylamine-Skin	2	YES	yes		
Cyclopentadiene	4	NO			
2,4-D(2,4-Dichlorophenoxy-Acetic Acid)	2	YES			
DDT - Skin	2	YES	yes		
-Decaborane - Skin	3	NO	yes		
Demeton (Systox)-Skin	3	NO	yes		
-Di-Sec, Octyl Phthalate	4	NO	NO		
Diacetone Alcohol	4	NO			
Diazinon - Skin	1	YES	yes		
-Diazomethane	4	NO			
-Dibogane	4	NO			
Dibrom	3	NO	NO		
2-N-Dibutylaminoethanol Skin	4	NO			
-1,2-Dibromoethane (Ethylenedibromide) Skin	2	YES	yes		
Dibutyl Phosphate	4	NO			
Dibutylphthalate	4	NO			
Dichloroacetylene	4	NO			
1,1-Dichloro-1-Nitroethane	4	NO			

Substance	TOXICITY CLASS		SKIN ABSORPTION POTENTIAL
	[1910.141/21(2) 7(4)(d)]		
- 1,3-Dichloro-5,5-Dimethylhydantoin	4	NO	
O-Dichlorobenzene	4	NO	
P-Dichlorobenzene	4	NO	
3,3-Dichlorobenzidine-Skin	1	yes	yes
Dichlorodifluoromethane (F12)	4	NO	
1,1-Dichloroethane	4	NO	
1,2-Dichloroethane (Ethylene Dichloride)	4	NO	
Dichloroethyl Ether - Skin	4	NO	yes
1,2-Dichloroethylene	4	NO	
Dichloromonofluoromethane (F21)	4	NO	
Dichlorotetrafluoroethane	4	NO	
Dichlorvos (DDVP)-Skin	2	yes	yes
Dicrotophos (Bidrin)-Skin	3	NO	yes
Dicyclopentadiene	4	NO	
Dicyclopentadienyl-Iron	4	NO	
Dieldrin-Skin	2	yes	yes
Diethylamine	4	NO	
Diethylaminoethanol-Skin	4	NO	yes
Diethylene Triamine-Skin	4	NO	yes
Diethylphthalate	4	NO	
Difluorodibromomethane	4	NO	
Diglycidyl Ether (DGE)	2	yes	
Diisobutyl Ketone	4	NO	

Substance	TOXICITY CLASS		SKIN ABSORPTION POTENTIAL	
	(1910, 1412, 2)		(1910, 1323)	
Diisopropylamine-Skin	4	NO	YES	
Dimethyl Acetamide-Skin	2	YES	YES	
4-Dimethyl Aminoazobenzene	1	YES	YES	
Dimethyl Sulfate-Skin	1	YES	YES	
Dimethylamine	3	NO		
Dimethylaniline-Skin	3	NO	YES	
Dimethylformamide-Skin	3	NO	YES	
1,1-Dimethylhydrazine-Skin	2	YES	YES	
Dimethylphthalate	4	NO		
Dinitro-O-Cresol-Skin	2	YES	YES	
Dinitrobenzene (All Isomers) - Skin	3	NO	YES	
3,5-Dinitro-O-Toluamide (Zonalene)	4	NO		
Dinitrotoluene - Skin	3	NO	YES	
Dioxane Technical Grade Skin	2	YES	YES	
* Dioxathion (Delnau [®])	2	YES	YES	
Diphenylamine	4	NO		
Dipropylane Glycol Methyl Ether Skin	4	NO	YES	
Diquat	4	NO		
Disulfuram	4	NO		
Disyston-Skin	2	YES	YES	
2,6-Ditert-Butyl-P-Cresol	4	NO		
Dyfonate	2	YES		
Emery	4	NO		

Substance	TOXICITY CLASS	SKIN ABSORPTION POTENTIAL
	51910.141/242 (F3(1))	[1910.132(1)]
Endosulfan (Thiodan)-Skin	2 YES	YES
Endrin - Skin	2 YES	YES
Epichlorohydrin-Skin	4 NO	YES
EPN	4 NO	YES
EPN-Skin	4 NO	YES
Ethane	4 NO	
Ethanolamine	4 NO	
Ethion (Nialate)-Skin	3 NO	YES
2-Ethoxyethanol-Skin	3 NO	YES
2-Ethoxyethylacetate-Skin	4 NO	YES
Ethyl Acetate	4 NO	
Ethyl Acrylate-Skin	3 NO	YES
Ethyl Alcohol	4 NO	
Ethylamine	4 NO	
Ethyl Sec-Amyl Ketone	4 NO	
Ethylbenzene	4 NO	
Ethyl Bromide	4 NO	
Ethyl Butyl Ketone	4 NO	
Ethyl Chloride	4 NO	
Ethyl Ether	4 NO	
Ethyl Formate	4 NO	
Ethyl Mercaptan	4 NO	
Ethyl Silicate	4 NO	
Ethylene	4 NO	
Ethylene Chlorohydrin-Skin	2 YES	YES
Ethylene Diamine	4 NO	

TOXICITY CLASS SKIN ABSORPTION
[1910.141(2)(3)] 1 POTENTIAL
1910.132(2)

Substance			
Ethylene Glycol Dinitrate-Skin	3	NO	yes
Ethylene Glycol Monomethyl Etheracetate (Methyl Cellosolve Acetate)-Skin	3	NO	yes
Ethylene Glycol, Particulate	4	NO	
Ethylene Glycol, Vapor	4	NO	
Ethylene Oxide	4	NO	
Ethylennamine-Skin	1	yes	yes
Ethylidenenorbornene	3	NO	
N-Ethylmorpholine-Skin	3	NO	yes
✗ Fensulfotion(Dasanit)	2	yes	yes
Ferbam	4	NO	
Ferrovandium Dust	4	NO	
Fibrous Glass or Dust	4	NO	
Fluoride (As F)	3	NO	
Fluorine	4	NO	
Fluorotrichloromethane (F11)	4	NO	
Formaldehyde	2	yes	
Formanide	4	NO	
Formic Acid	4	NO	
Furfural-Skin	3	NO	yes
Furfuryl Alcohol-Skin	4	NO	yes
Gasoline	4	NO	
Germanium Tetrahydride	4	NO	

Substance	TOXICITY CLASS [1910.141 (CY 2)]	SKIN ABSORPTION POTENTIAL [1910.132 (A)]
Glutaraldehyde	3 NO	
Glutaraldehyde (Alkaline Activated)	3 NO	
Glycerin Mist	4 NO	
Glycidol	4 NO	
Graphite (Natural)	4 NO	
Graphite (Synthetic)	4 NO	
Gypsum	4 NO	
Hafnium	2 YES	
Helium	4 NO	
Heptachlor-Skin	3 NO	YES
Heptane	4 NO	
Hexachlorocyclopentadiene	3 NO	
Hexachloroethane-Skin	3 YES	YES
Hexachloronaphthalene-Skin	3 YES	YES
Hexafluoroacetone	3 YES	
N-Hexane	4 YES	
2-Hexanone (MBK)-Skin	3 YES	YES
Hexone (MIBK)-Skin	4 YES	YES
Hexylacetate-Sec	4 YES	
Hexylene Glycol	3 YES	
Hydrazine-Skin	1 YES	YES
Hydrogen	4 YES	
Hydrogen Bromide	4 YES	
Hydrogen Chloride	4 YES	
Hydrogen Cyanide-Skin	4 YES	YES

Substance	TOXICITY CLASS [190.141 (G/L)]	SKIN ABSORPTION POTENTIAL [190.132 (2)]
Hydrogen Fluoride	4	NO
Hydrogen Peroxide, 90%	4	NO
Hydrogen Selenide	4	NO
Hydrogen Sulfide	4	NO
Hydrogenated Terphenyls	4	NO
Hydroquinone	4	NO
Indene	4	NO
Indium & Compounds, As IN	3	NO
Iodine	4	NO
Iodoform	3	NO
Iron Oxide Fume	4	NO
Iron Pentacarbonyl	4	NO
Iron Salts, Soluble, As FE	4	NO
Isoamyl Acetate	4	NO
Isoamyl Alcohol	4	NO
Isobutyl Acetate	4	NO
Isobutyl Alcohol	3	NO
Isophorone	4	NO
Isophorone Diisocyanate Skin	3	NO
Isopropyl Acetate	4	NO
Isopropyl Alcohol-Skin	4	NO
Isopropylamine	4	NO
Isopropyl Ether	4	NO
Isopropyl Glycidyl Ether (IGE)	4	NO

Substance	TOXICITY CLASS		SKIN ABSORPTION	
	[1910.141 (a)(2)]		POTENTIAL	
			(1910.132(a))	
Kaolin	4	NO		
Katana	4	NO		
Lead Arsenate, As PB	2	YES		
Lead, Inorg., Fumes & Dusts, As PB	3	NO		
Limestone	4	NO		
Lindane-Skin	2	YES	yes	
Lithium Hydride	3	NO		
LPG (Liquified Petroleum Gas)	4	NO		
Magnesite	4	NO		
Magnesium Oxide Fume	4	NO		
Malathion-Skin	3	NO	yes	
Maleic Anhydride	2	YES		
Manganese and Compounds	3	NO		
Manganese Cyclopentadienyl Tricarbonyl-Skin	3	NO	yes	
Marble	4	NO		
Mercury (Alkyl Compounds) Skin As Hg	2	YES	yes	
Mercury (inorganic) As Hg Skin All forms except alkyl	2	YES	yes	
Mesityl Oxide	4	NO		
Methane	4	NO		
Methomyl (Lannate)-Skin	3	NO	yes	
Methoxychlor	3	NO	NO	
2-Methoxyethanol-Skin (Methyl Cellosolve)	3	NO	yes	

Substance	TOXICITY CLASS		SKIN ABSORPTION POTENTIAL [1910.132(a)]
	[1910.141(a)(2)]	1	
Methyl 2-Cyanoacrylate	4	NO (SH)	
Methyl Acetate	4	NO	
Methyl Acetylalane	4	NO	
Methyl Acetylene- Propadiene Mix (MAPP)	4	NO	
Methyl Acrylate-Skin	3	NO	yes
Methyl Acrylonitrile-Skin	3	NO	yes
Methyl Alcohol-Skin	3	NO	yes
Methyl Amine	4	NO	
Methyl Bromide-Skin	4	NO	yes
Methyl Chloride	4	NO	
Methyl Chloroform	4	NO	
Methyl Chloromethyl Ether	1	yes	
Methyl Cyclohexane	4	NO	
Methyl Cyclohexanol	4	NO	
O-Methyl Cyclohexanone	3	NO	
Skin			
Methyl Ethyl Ketone	2	yes	
Peroxide			
Methyl Formate	4	NO	
Methyl Iodide-Skin	2	yes	yes
Methyl Isoamyl Ketone	4	NO	
Methyl Isobutylcarbinol	4	NO	
Skin			
Methyl Isocyanate-Skin	2	yes	yes
Methyl Mercaptan	4	NO	
Methyl Methacrylate	4	NO	
Methyl N-Amyl Ketone	4	NO	

Substance	TOXICITY CLASS [1910.141 (G)(2)]	SKIN ABSORPTION POTENTIAL [1910.132 (a)]
Methyl Parathion-Skin	2	yes
Methyl Silicate	2	yes
α-Methyl Styrene	3	no
Methylal	4	no
Methylcyclopentadienyl Manganese Tricarb (As Mn) Skin	3	yes
Methyldemeton-Skin	2	yes
4,4-Methylene Bis (2-Chloroaniline) (Moca) Skin	1	yes
Methylene Bis (4-Cyclohexylisocyanate)	2	yes
Methylene Bisphenyl Isocyanate (MDI)	2	yes
Methylene Chloride	4	no
Mica	4	no
Mineral Wool Fiber	4	no
Molybdenum, As MO (Insolubles)	3	no
Molybdenum, As MO (Solubles)	3	no
Monocrotophos (Azodrin)	3	no
Monomethyl Hydrazine-Skin	2	yes
Monomethyl Aniline-Skin	3	yes
Morpholine-Skin	3	yes
Naphtha (Coal Tar)	4	no
Naphthalene	4	no
α-Naphthylamine	2	yes

Neon
 Nickel (Soluble Compounds)
 Nickel Carbonyl
 Nickel, Metal and Insoluble Compounds
 Nicotine-Skin
 Nitric Acid
 Nitric Oxide
 P-Nitroaniline-Skin
 Nitrobenzene-Skin
 4-Nitrobiphenyl
 P-Nitrochlorobenzene-Skin
 Nitroethane
 Nitrogen
 Nitrogen Dioxide
 Nitrogen Trifluoride
 Nitroglycerin-Skin
 Nitromethane
 -1-Nitropropane
 2-Nitropropane
 N-Nitrosodimethylamine
 Skin
 Nitrotoluene-Skin
 Nitrous Oxide
 Nonane

FOOTNOTES

Substance	[1910.141A(2)]	POTENTIAL [1910.132(a)]
Octachloro Naphthalene Skin	3 NO ²⁴	yes
Octane	4 NO	
Oil Mist, Particulate	4 as	
Oil Mist, Vapor	4 NO	
Osmium Tetroxide, As OS	4 NO	
Oxalic Acid	3 NO	
Oxygen Difluoride	4 as	
Ozone	4 NO	
Paraffin Wax Fume	4 NO	
Paraquat-Skin	3 NO	yes
Parathion-Skin	2 yes	yes
Pentaborane		
Pentachloronaphthalene Skin	3 NO	yes
Pentachlorophenol-Skin	2 yes	yes
Pentaerythritol	4 as	
Pentane	4 NO	
2-Pentanone	4 NO	
Perchloroethylene-Skin	4 NO	yes
Perchloromethylmercaptan	4 NO	
Perchloryl Fluoride	3 NO	
Perlite	4 NO	
Petroleum Distillates (Naptha)	4 NO	
Phenol-Skin	2 yes	yes
Phenothiazine-Skin	3 NA	yes

Substance	[1910.141(gfz)] +	POTENTIAL	[1910.132(g)]
P-Phenylene Diamine-Skin	3	NO	yes
Phenyl Ether (Vapor)	3	NO	
Phenyl Ether-Diphenyl Mix (Vapor)	4	NO	
Phenylglycidyl Ether (PGE)	3	NO	
Phenylhydrazine-Skin	3	NO	yes
Phenylphosphine	4	NO	
Phorate (Thimat)-Skin	2	yes	yes
Phosdrin (Mevinphos)-Skin	2	yes	yes
Phosgene	4	NO	
Phosphine	4	NO	
Phosphoric Acid	4	NO	
Phosphorus (Yellow)	2	yes	
Phosphorus Pentachloride	4	NO	
Phosphorus Pentasulfide	4	NO	
Phosphorus Trichloride	4	NO	
Phthalic Anhydride	4	NO	
N-Phthalodinitrile	4	NO	
Picloram (Tordon)	1	NO	
Picric Acid-Skin	3	NO	yes
Pival	3	NO	
Plaster of Paris	4	NO	
Platinum (Soluble Salts) As Pt	4	NO	
Polytetrafluoroethylene Decomp. Products Var	4	NO	
Portland Cement	4	NO	

Substance	[1910.141(a)(2)]	NO	POTENTIAL	[1910.132(a)]
Potassium Hydroxide	3	NO		
Propane	4	NO		
Propargyl Alcohol-Skin	2	YES		YES
B-Propiolactone	1	YES		
N-Propyl Acetate	4	NO		
Propyl Alcohol-Skin	3	NO		YES
N-Propyl Nitrate	4	NO		
Propylene Dichloride	3	NO		
1,2-Propylene Glycol Dinitrate-Skin	3	NO		YES
Propylene Glycol Monomethyl Ether	4	NO		
Propylene Imine-Skin	2	YES		YES
Propylene Oxide	2	YES		
Pyrethrum	4	NO		
Pyridine	3	NO		
Quinone	2	YES		
RDX-Skin (Cyclotri- methylenes Trinitramine)	3	NO		
Resorcinol	4	NO		
Rhodium, Metal Fume & Dusts (As PM)	4	NO		
Rhodium, Soluble Salts	4	NO		
Ronnel	3	NO		
Rosin Core Solder Pyrolysis Products (As	4	NO		
Rotenone	2	YES		NO

TOXICITY CHARTS	SKIN ASSOCIATION
219/10.141912	POTENTIAL
219/10.1326	[1910.1326]

Rouge
Rubber Solvent
Selenium Compounds (As Se)
Selenium Hexafluoride, (As Se)
Silica (Amorphous)
Silica (Fused)
Silica (Quartz) Respirable
Silicon
Silicon Carbide
Silicon Tetrahydride (Silane)
Silver, Metal and Soluble compounds (As Ag)
Soapstone
Sodium Azide
Sodium Fluoroacetate (1080) - Skin
Sodium Hydroxide
Starch
Stibine
Stoddard Solvent
Strychnine
Styrene, Monomer
Subtilinsins (Proteolytic Enzymes)
Sucrose

STRESS

Substance	TOXICITY CLASS	SKIN ASSORPTIONAL POTENTIAL
	Σ1910.141/217	Σ1910.152/17
Sulfur Dioxide	4	NO
Sulfur Hexafluoride	4	NO
Sulfur Monochloride	4	NO
Sulfur Pentafluoride	4	NO
Sulfur Tetrafluoride	4	NO
Sulfuric Acid	4	NO
Sulfuryl Fluoride	4	NO
2,4,5-T	4	NO
Talc (Non-Asbestiform)	4	NO
Tantalum	4	NO
TEDP	2	YES
Tadp-Skin		
Teflon Decomposition Products	4	NO
Tellurium	3	NO
Tellurium Hexafluoride, As TE	4	NO
TEPP		
Tepp - Skin	2	YES
Terphenyls	4	NO
Tetra Methyl Lead (As PH) - Skin	3	YES
Tetra Methyl Succinonitrile Skin	4	YES
1,1,2,2-Tetrachloro-1,2- Difluoroethane	4	NO
1,1,1,2-Tetrachloro-2,2- Difluoroethane	4	NO
1,1,2,2-Tetrachloroethane Skin	4	YES

TOXICITY CLASS		SKIN ABSORPTION POTENTIAL	
Substance		[1910.141(a)(2)] [1910.102(a)]	
Tetrachloronaphthalene Skin	3 NO	yes	
Tetraethyl Lead (As Pb) Skin	2 yes	yes	
Tetrahydrofuran	4 NO		
Tetranitromethane	4 NO		
Tetryl-Skin	3 NO	yes	
Thallium (Soluble Compds) Skin	2 yes	yes	
4,4-Thiobis (6 Tert Butyl-M-Cresol)	4 NO		
Thiram	4 NO		
Tin (Inorganics, Except SNH4 and SNO2)	4 NO		
Tin (Organics) - Skin Skin As SN	2 2 3 yes	yes	
Tin Oxide	4 NO		
Titanium Dioxide	4 NO		
Toluene - Skin	4 NO	yes	
Toluene-2,4-Diisocyanate (TDI)	4 NO		
0-Toluidine-Skin	4 NO	yes	
Tributyl Phosphate	4 NO		
1,1,2-Trichloro-1,2,2- Trifluoroethane	4 NO		
1,2,4-Trichlorobenzene	4 NO		
1,1,2-Trichloroethane-Skin	3 NO	yes	
Trichloroethylene	4 NO		
Trichloronaphthalene-Skin	3 NO	yes	

Substance	TOXICITY CLAS.		SKIN ABSORPTION POTENTIAL	
	[1910.111(GX2)]		[1910.132(G)]	
1,2,3-Trichloropropane	4	NO		
1,1,2-Trichloro, 1,2,2-Trifluoroethane	4	NO		
Tricyclohexyltin Hydroxide (Plictran)	4	NO		
Triethylamine	4	NO		
Trifluoromethanobromomethane	4	NO		
Trimethylbenzene	4	NO		
Trinitrotoluene-Skin	3	NO	yes	
Triorthocresyl Phosphate	3	NO		
Triphenyl Phosphate	3	NO	NO	
Triphenylamine	4	NO		
Tungsten & Compounds, As W (Insoluble)	4	NO		
Tungsten & Compounds, As W (Soluble)	3	NO		
Turpentine	4	NO		
Uranium (Natural) Insoluble	3	NO		
Uranium (Natural) Soluble	3	NO		
Vanadium (V2O5) As Dust	4	NO		
Vanadium (V2O5) As Fume	4	NO		
Vinyl Acetate	3	NO		
Vinyl Bromide	4	NO		
Vinyl Chloride	1	YES		
Vinyl Cyclohexane Dioxide	1	YES		