APPENDIX A

OSHA Permissible Exposure Limits

APPENDIX A.1: GENERAL TABLE OF PELs

LIMITS FOR AIR CONTAMINANTS

The permissible exposure levels (PELs) are 8-hour time-weighted averages (TWAs) unless otherwise noted; (C) designation denotes a ceiling limit. Concentrations are to be determined from breathing-zone air samples.

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m^3[c]	Skin
Acetaldehyde	75-07-0	200	360	
Acetic acid	64-19-7	10	25	
Acetic anhydride	108-24-7	5	20	
Acetone	67-64-1	1000	2400	
Acetonitrile	75-05-8	40	70	
2-Acetylaminofluorine; see 1910.1014	53-96-3			
Acetylene dichloride; see 1,2-Dichloroethylene				
Acetylene tetrabromide	79-27-6	1	14	
Acrolein	107-02-8	0.1	0.25	
Acrylamide	79-06-1		0.3	X
Acrylonitrile; see 1910.1045	107-13-1			
Aldrin	309-00-2		0.25	X
Allyl alcohol	107-18-6	2	5	X
Allyl chloride	107-05-1	1	3	
Allyl glycidyl ether (AGE)	106-92-3	(C) 10	(C) 45	
Allyl propyl disulfide	2179-59-1	2	12	

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m^3[c]	Skin
α-Alumina	1344-28-1			
Total dust			15	
Respirable fraction			5	
Aluminum metal (as Al)	7429-90-5			
Total dust			15	
Respirable fraction			5	
4-Aminodiphenyl; see 1910.1011	92-67-1			
2-Aminoethanol; see Ethanolamine				
2-Aminopyridine	504-29-0	0.5	2	
Ammonia	7664-41-7	50	35	
Ammonium sulfamate	7773-06-0			
Total dust			15	
Respirable fraction			5	
n-Amyl acetate	628-63-7	100	525	
sec-Amyl acetate	626-38-0	125	650	
Aniline and homologs	62-53-3	5	19	X
Anisidine (*o*-, *p*-isomers)	29191-52-4		0.5	X
Antimony and compounds (as Sb)	7440-36-0		0.5	
ANTU (α = naphthylthiourea)	86-88-4		0.3	
Arsenic, inorganic compounds (as As); see 1910.1018	7440-38-2		10 μg/m^3	
Arsenic, organic compounds (as As)	7440-38-2		0.5	
Arsine	7784-42-1	0.05	0.2	
Asbestos; see 1910.1001 for construction, see 1926.1101	varies with compound			
Azinphos-methyl	86-50-0		0.2	X
Barium, soluble compounds (as Ba)	7440-39-3		0.5	
Barium sulfate	7727-43-7			
Total dust			15	
Respirable fraction			5	
Benomyl	17804-35-2			
Total dust			15	
Respirable fraction			5	
Benzene; see 1910.1028 See Appendix A.2 for the limits applicable in the operations or sectors excluded in 1910.1028[d]	71-43-2			
Benzidine; see	1910.1010	92-87-5		
Benzo (*a*) pyrene; see Coal tar pitch volatiles				
p-Benzoquinone; see Quinone				
Benzoyl peroxide	94-36-0	5		
Benzyl chloride	100-44-7	1	5	
Beryllium and beryllium compounds (as Be)	7440-41-7		See Appendix A.2	

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m^{3}[c]	Skin
Biphenyl; see Diphenyl				
Bismuth telluride				
Undoped	1304-82-1			
Total dust			15	
Respirable fraction			5	
Boron oxide	1303-86-2			
Total dust			15	
Boron trifluoride	7637-07-2	(C)1	(C)3	
Bromine	7726-95-6	0.1	0.7	
Bromoform	75-25-2	0.5	5	X
Butadiene (1,3-Butadiene) see 1910.1051;1910.19	106-99-0	1–5 ppm STEL		
Butanethiol; see Butyl mercaptan				
2-Butanone (methyl ethyl ketone)	78-93-3	200	590	
2-Butoxyethanol	111-76-2	50	240	X
n-Butyl-acetate	123-86-4	150	710	
sec-Butyl acetate	105-46-4	200	950	
tert-Butyl-acetate	540-88-5	200	950	
n-Butyl alcohol	71-36-3	100	300	
sec-Butyl alcohol	78-92-2	150	450	
tert-Butyl alcohol	75-65-0	100	300	
Butylamine	109-73-9	(C) 5	(C) 15	X
tert-Butyl chromate [as CrO_3]	1189-85-1		(C) 0.1	X
n-Butyl glycidyl ether (BGE)	2426-08-6	50	270	
Butyl mercaptan	109-79-5	10	35	
p-tert-Butyltoluene	98-51-1	10	60	
Cadmium (as Cd); see 1910.1027	7440-43-9			
Calcium carbonate	1317-65-3			
Total dust			15	
Respirable fraction			5	
Calcium hydroxide	1305-62-0			
Total dust			15	
Respirable fraction			5	
Calcium oxide	1305-78-8		5	
Calcium silicate	1344-95-2			
Total dust			15	
Respirable fraction			5	
Calcium sulfate	7778-18-9			
Total dust			15	
Respirable fraction			5	
Camphor, synthetic	76-22-2		2	
Carbaryl (Sevin)	63-25-2		5	
Carbon black	1333-86-4		3.5	
Carbon dioxide	124-38-9	5000	9000	
Carbon disulfide	75-15-0		See Appendix A.2	

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m^3[c]	Skin
Carbon monoxide	630-08-0	50	55	
Carbon tetrachloride	56-23-5		See Appendix A.2	
Cellulose	9004-34-6			
Total dust			15	
Respirable fraction			5	
Chlordane	57-74-9		0.5	X
Chlorinated camphene	8001-35-2		0.5	X
Chlorinated diphenyl oxide	55720-99-5		0.5	
Chlorine	7782-50-5	(C) 1	(C) 3	
Chlorine dioxide	10049-04-4	0.1	0.3	
Chlorine trifluoride	7790-91-2	(C) 0.1	(C) 0.4	
Chloroacetaldehyde	107-20-0	(C) 1	(C) 3	
α-Chloroacetophenone (phenacyl chloride)	532-27-4	0.05	0.3	
Chlorobenzene	108-90-7	75	350	
o-Chlorobenzylidene malononitrile	2698-41-1	0.05	0.4	
Chlorobromomethane	74-97-5	200	1050	
2-Chloro-1,3-butadiene; see β-Chloroprene				
Chlorodiphenyl (42% Chlorine) (PCB)	53469-21-9		1	X
Chlorodiphenyl (54% Chlorine) (PCB)	11097-69-1		0.5	X
1-Chloro-2,3-epoxypropane; see Epichlorohydrin				
2-Chloroethanol; see Ethylene chlorohydrin				
Chloroethylene; see Vinyl chloride				
Chloroform (trichloromethane)	67-66-3	(C) 50	(C) 240	
bis (Chloromethyl) ether; see 1910.1008	542-88-1			
Chloromethyl methyl ether; see 1910.1006	107-30-2			
1-Chloro-1-nitropropane	600-25-9	20	100	
Chloropicrin	76-06-2	0.1	0.7	
β-Chloroprene	126-99-8	25	90	X
2-Chloro-6 (trichloromethyl) pyridine	1929-82-4			
Total dust			15	
Respirable fraction			5	
Chromic acid and chromates [as CrO (III)]	varies with compound		See Appendix A.2	
Chromium (II) compounds (as Cr)	7440-47-3		0.5	
Chromium (III) compounds (as Cr)	7440-47-3		0.5	
Chromium metal and insoluble salts (as Cr)	7440-47-3		1	
Chrysene; see Coal tar pitch volatiles				
Clopidol	2971-90-6			
Total dust			15	

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m³[c]	Skin
Respirable fraction			5	
Coal dust (less than 5% SiO_2), respirable fraction			See Appendix A.3	
Coal dust (greater than or equal to 5% SiO_2), respirable fraction			See Appendix A.3	
Coal tar pitch volatiles (benzene soluble fraction), anthracene, BaP, phenanthrene, acridine, chrysene, pyrene	65966-93-2		0.2	
Cobalt metal, dust, and fume (as Co)	7440-48-4		0.1	
Coke oven emissions; see 1910.1029			150 $\mu g/m^3$	
Copper	7440-50-8			
Fume (as Cu)			0.1	
Dusts and mists (as Cu)			1	
Cotton dust[e]; see 1910.1043 in cotton gin; see 1910.1046			200–750 $\mu g/m^3$	
Crag herbicide (Sesone)	136-78-7			
Total dust			15	
Respirable fraction			5	
Cresol, all isomers	1319-77-3	5	22	X
Crotonaldehyde	123-73-9 4170-30-3	2	6	
Cumene	98-82-8	50	245	X
Cyanides (as CN)	varies with compound	5		
Cyclohexane	110-82-7	300	1050	
Cyclohexanol	108-93-0	50	200	
Cyclohexanone	108-94-1	50	200	
Cyclohexene	110-83-8	300	1015	
Cyclopentadiene	542-92-7	75	200	
2,4-D (Dichlorophen oxyacetic acid)	94-75-7		10	
Decaborane	17702-41-9	0.05	0.3	X
Demeton (Systox)	8065-48-3		0.1	X
Diacetone alcohol (4-Hydroxy-4-methyl 2-pentanone)	123-42-2	50	240	
1,2-Diaminoethane; see Ethylenediamine				
Diazomethane	334-88-3	0.2	0.4	
Diborane	19287-45-7	0.1	0.1	
1,2-Dibromo-3-chloropropane (DBCP); see 1910.1044	96-12-8	1 ppb (parts per billion)		
1,2-Dibromoethane; see Ethylene dibromide				
Dibutyl phosphate	107-66-4	1	5	
Dibutyl phthalate	84-74-2		5	
o-Dichlorobenzene	95-50-1	(C) 50	(C) 300	

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m³[c]	Skin
p-Dichlorobenzene	106-46-7	75	450	
3,3′-Dichlorobenzidine; see 1910.1007	91-94-1			
Dichlorodifluoromethane	75-71-8	1000	4950	
1,3-Dichloro-5,	118-52-5		0.2	
5-dimethyl hydantoin				
Dichlorodiphenyltrichloroethane (DDT)	50-29-3		1	X
1,1-Dichloroethane	75-34-3	100	400	
1,2-Dichloroethane; see Ethylene dichloride				
1,2-Dichloroethylene	540-59-0	200	790	
Dichloroethyl ether	111-44-4	(C)15	(C)90	X
Dichloromethane; see Methylene chloride				
Dichloromonofluoromethane	75-43-4	1000	4200	
1,1-Dichloro-1-nitroethane	594-72-9	(C) 10	(C) 60	
1,2-Dichloropropane; see Propylene dichloride				
Dichlorotetrafluoroethane	76-14-2	1000	7000	
Dichlorvos (DDVP)	62-73-7		1	X
Dicyclopentadienyl iron	102-54-5			
Total dust			15	
Respirable fraction			5	
Dieldrin	60-57-1		0.25	X
Diethylamine	109-89-7	25	75	
2-Diethylaminoethanol	100-37-8	10	50	X
Diethyl ether; see Ethyl ether				
Difluorodibromomethane	75-61-6	100	860	
Diglycidyl ether (DGE)	2238-07-5	(C) 0.5	(C) 2.8	
Dihydroxybenzene; see Hydroquinone				
Diisobutyl ketone	108-83-8	50	290	
Diisopropylamine	108-18-9	5	20	X
4-Dimethylaminoazobenzene; see 1910.1015	60-11-7			
Dimethoxymethane; see Methylal				
Dimethyl acetamide	127-19-5	10	35	X
Dimethylamine	124-40-3	10	18	
Dimethylaminobenzene; see Xylidine				
Dimethylaniline (*N,N*-Dimethylaniline)	121-69-7	5	25	X
Dimethylbenzene; see Xylene				
Dimethyl-1,2-dibromo-2, 2-dichloroethylphosphate	300-76-5	3		
Dimethylformamide 2,6-Dimethyl-4-heptanone; see Diisobutyl ketone	68-12-2	10	30	X

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m^3[c]	Skin
1,1-Dimethylhydrazine	57-14-7	0.5	1	X
Dimethylphthalate	131-11-3		5	
Dimethyl sulfate	77-78-1	1	5	X
Dinitrobenzene (all isomers)			1	X
ortho	528-29-0			
meta	99-65-0			
para	100-25-4			
Dinitro-*o*-cresol	534-52-1		0.2	X
Dinitrotoluene	25321-14-6		1.5	X
Dioxane (Diethylene dioxide)	123-91-1	100	360	X
Diphenyl (biphenyl)	92-52-4	0.2	1	
Diphenylmethane diisocyanate; see Methylene bisphenyl isocyanate				
Dipropylene glycol methyl ether	34590-94-8	100	600	X
Di-*sec* octyl phthalate (Di-(2-ethylhexyl) phthalate)	117-81-7		5	
Emery	12415-34-8			
Total dust			15	
Respirable fraction			5	
Endrin	72-20-8		0.1	X
Epichlorohydrin	106-89-8	5	19	X
EPN 1,2-Epoxypropane; see Propylene oxide 2,3-Epoxy-1-propanol; see Glycidol	2104-64-5		0.5	X
Ethanethiol; see Ethyl mercaptan				
Ethanolamine	141-43-5	3	6	
2-Ethoxyethanol (cellosolve)	110-80-5	200	740	X
2-Ethoxyethyl acetate (cellosolve acetate)	111-15-9	100	540	X
Ethyl acetate	141-78-6	400	1400	
Ethyl acrylate	140-88-5	25	100	X
Ethyl alcohol (ethanol)	64-17-5	1000	1900	
Ethylamine	75-04-7	10		18
Ethyl amyl ketone (5-Methyl-3-heptanone)	541-85-5	25	130	
Ethyl benzene	100-41-4	100	435	
Ethyl bromide	74-96-4	200	890	
Ethyl butyl ketone (3-heptanone)	106-35-4	50	230	
Ethyl chloride	75-00-3	1000	2600	
Ethyl ether	60-29-7	400	1200	
Ethyl formate	109-94-4	100	300	
Ethyl mercaptan	75-08-1	(C) 10	(C) 25	
Ethyl silicate	78-10-4	100	850	
Ethylene chlorohydrin	107-07-3	5	16	X
Ethylenediamine	107-15-3	10	25	

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m^3[c]	Skin
Ethylene dibromide	106-93-4		See Appendix A.2	
Ethylene dichloride (1,2-Dichloroethane)	107-06-2		See Appendix A.2	
Ethylene glycol dinitrate	628-96-6	(C) 0.2	(C) 1	X
Ethylene glycol methyl acetate; see Methyl cellosolve acetate				
Ethyleneimine see 1910.1012	151-56-4			
Ethylene oxide; see 1910.1047	75-21-8	1		
Ethylidene chloride; see 1,1-Dichlorethane				
N-Ethylmorpholine	100-74-3	20	94	X
Ferbam	14484-64-1			
Total dust			15	
Ferrovanadium dust	12604-58-9		1	
Fluorides (as F)		See Appendix A.2	2.5	
Fluorine	7782-41-4	0.1	0.2	
Fluorotrichloromethane (trichlorofluoromethane)	75-69-4	1000	5600	
Formaldehyde; see 1910.1048	50-00-0	1		
Formic acid	64-18-6	5	9	
Furfural	98-01-1	5	20	X
Furfuryl alcohol	98-00-0	50	200	
Glycerin (mist)	56-81-5			
Total dust			15	
Respirable fraction			5	
Glycidol	556-52-5	50	150	
Glycol monoethyl ether; see 2-Ethoxyethanol				
Grain dust (oat, wheat barley)			10	
Graphite, natural respirable dust	7782-42-5		See Appendix A.3	
Graphite, synthetic				
Total dust			15	
Respirable fraction			5	
Guthion; see Azinphos methyl				
Gypsum	13397-24-5			
Total dust			15	
Respirable fraction			5	
Hafnium	7440-58-6		0.5	
Heptachlor	76-44-8		0.5	X
Heptane (*n*-Heptane)	142-82-5	500	2000	
Hexachloroethane	67-72-1	1	10	X
Hexachloronaphthalene	1335-87-1		0.2	X
n-Hexane	110-54-3	500	1800	
2-Hexanone (Methyl *n*-butyl ketone)	591-78-6	100	410	
Hexone (Methyl isobutyl ketone)	108-10-1	100	410	

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m^3[c]	Skin
sec-Hexyl acetate	108-84-9	50	300	
Hydrazine	302-01-2	1	1.3	X
Hydrogen bromide	10035-10-6	3	10	
Hydrogen chloride	7647-01-0	(C) 5	(C) 7	
Hydrogen cyanide	74-90-8	10	11	X
Hydrogen fluoride (as F)	7664-39-3		See Appendix A.2	
Hydrogen peroxide	7722-84-1	1	1.4	
Hydrogen selenide (as Se)	7783-07-5	0.05	0.2	
Hydrogen sulfide	7783-06-4		See Appendix A.2	
Hydroquinone	123-31-9	2		
Iodine	7553-56-2	(C) 0.1	(C) 1	
Iron oxide fume	1309-37-1		10	
Isomyl acetate	123-92-2	100	525	
Isomyl alcohol (primary and secondary)	123-51-3	100	360	
Isobutyl acetate	110-19-0	150	700	
Isobutyl alcohol	78-83-1	100	300	
Isophorone	78-59-1	25	140	
Isopropyl acetate	108-21-4	250	950	
Isopropyl alcohol	67-63-0	400	980	
Isopropylamine	75-31-0	5	12	
Isopropyl ether	108-20-3	500	2100	
Isopropyl glycidyl ether (IGE)	4016-14-2	50	240	
Kaolin	1332-58-7			
Total dust			15	
Respirable fraction			5	
Ketene	463-51-4	0.5	0.9	
Lead inorganic (as Pb); see 1910.1025 (for General Industry) or 1926.62 (for Construction)	7439-92-1		50 μg/m^3	
Limestone	1317-65-3			
Total dust			15	
Respirable fraction			5	
Lindane	58-89-9		0.5	X
Lithium hydride	7580-67-8		0.025	
LPG (Liquefied petroleum gas)	68476-85-7	1000	1800	
Magnesite	546-93-0			
Total dust			15	
Respirable fraction			5	
Magnesium oxide fume	1309-48-4			
Total particulate			15	
Malathion	121-75-5			
Total dust			15	X
Maleic anhydride	108-31-6	0.25	1	
Manganese compounds (as Mn)	7439-96-5		(C) 5	

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m³[c]	Skin
Manganese fume (as Mn)	7439-96-5		(C) 5	
Marble	1317-65-3			
Total dust			15	
Respirable fraction			5	
Mercury (aryl and inorganic) (as Hg)	7439-97-6		See Appendix A.2	
Mercury (organo) alkyl compounds (as Hg)	7439-97-6		See Appendix A.2	
Mercury (vapor) (as Hg)	7439-97-6		See Appendix A.2	
Mesityl oxide	141-79-7	25	100	
Methanethiol; see Methyl mercaptan				
Methoxychlor	72-43-5			
Total dust			15	
2-Methoxyethanol;(methyl cellosolve)	109-86-4	25	80	X
2-Methoxyethyl acetate (methyl cellosolve acetate)	110-49-6	25	120	X
Methyl acetate	79-20-9	200	610	
Methyl acetylene (propyne)	74-99-7	1000	1650	
Methyl acetylene propadiene mixture (MAPP)		1000	1800	
Methyl acrylate	96-33-3	10	35	X
Methylal (dimethoxymethane)	109-87-5	1000	3100	
Methyl alcohol	67-56-1	200	260	
Methylamine	74-89-5	10	12	
Methyl amyl alcohol; see Methyl isobutyl carbinol				
Methyl *n*-amyl ketone	110-43-0	100	465	
Methyl bromide	74-83-9	(C) 20	(C) 80	X
Methyl butyl ketone; see 2-Hexanone				
Methyl cellosolve; see 2-Methoxyethanol				
Methyl cellosolve acetate; see 2-Methoxyethyl acetate				
Methyl chloride	74-87-3		See Appendix A.2	
Methyl chloroform (1,1,1-Trichloroethane)	71-55-6	350	1900	
Methylcyclohexane	108-87-2	500	2000	
Methylcyclohexanol	25639-42-3	100	470	
o-Methylcyclohexanone	583-60-8	100	460	X
Methylene chloride	75-09-2		See Appendix A.2	
Methyl ethyl ketone (MEK); see 2-Butanone				
Methyl formate	107-31-3	100	250	
Methyl hydrazine (monomethyl hydrazine)	60-34-4	(C) 0.2	(C) 0.35	X
Methyl iodide	74-88-4	5	28	X
Methyl isoamyl ketone	110-12-3	100	475	

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m³[c]	Skin
Methyl isobutyl carbinol	108-11-2	25	100	X
Methyl isobutyl ketone; see Hexone				
Methyl isocyanate	624-83-9	0.02	0.05	X
Methyl mercaptan	74-93-1	(C) 10	(C) 20	
Methyl methacrylate	80-62-6	100	410	
Methyl propyl ketone; see 2-Pentanone				
α-Methyl styrene	98-83-9	(C) 100	(C) 480	
Methylene bisphenyl isocyanate (MDI)	101-68-8	(C) 0.02	(C) 0.2	
Mica; see Silicates				
Molybdenum (as Mo)	7439-98-7			
Soluble compounds			5	
Insoluble compounds				
Total dust			15	
Monomethyl aniline	100-61-8	2	9	X
Monomethyl hydrazine; see Methyl hydrazine				
Morpholine	110-91-8	20	70	X
Naphtha (coal tar)	8030-30-6	100	400	
Naphthalene	91-20-3	10	50	
α-Naphthylamine; see 1910.1004	134-32-7			
β-Naphthylamine; see 1910.1009	91-59-8			
Nickel carbonyl (as Ni)	13463-39-3	0.001	0.007	
Nickel, metal and insoluble compounds (as Ni)	7440-02-0		1	
Nickel, soluble compounds (as Ni)	7440-02-0		1	
Nicotine	54-11-5		0.5	X
Nitric acid	7697-37-2	2	5	
Nitric oxide	10102-43-9	25	30	
p-Nitroaniline	100-01-6	1	6	X
Nitrobenzene	98-95-3	1	5	X
p-Nitrochlorobenzene	100-00-5		1	X
4-Nitrobiphenyl; see 1910.1003	92-93-3			
Nitroethane	79-24-3	100	310	
Nitrogen dioxide	10102-44-0	(C) 5	(C) 9	
Nitrogen trifluoride	7783-54-2	10	29	
Nitroglycerin	55-63-0	(C) 0.2	(C) 2	X
Nitromethane	75-52-5	100	250	
1-Nitropropane	108-03-2	25	90	
2-Nitropropane	79-46-9	25	90	
N-Nitrosodimethylamine; see 1910.1016				
Nitrotoluene (all isomers)		5	30	X
o-isomer	88-72-2			
m-isomer	99-08-1			
p-isomer	99-99-0			

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m^3[c]	Skin
Nitrotrichloromethane; see Chloropicrin				
Octachloronaphthalene	2234-13-1		0.1	X
Octane	111-65-9	500	2350	
Oil mist, mineral	8012-95-1		5	
Osmium tetroxide (as Os)	20816-12-0		0.002	
Oxalic acid	144-62-7		1	
Oxygen difluoride	7783-41-7	0.05	0.1	
Ozone	10028-15-6	0.1	0.2	
Paraquat, respirable dust	4685-14-7 1910-42-5 2074-50-2		0.5	X
Parathion	56-38-2		0.1	X
Particulates not otherwise regulated (PNOR)[f]				
Total dust			15	
Respirable fraction			5	
PCB; see Chlorodiphenyl (42% and 54% chlorine)				
Pentaborane	19624-22-7	0.005	0.01	
Pentachloronaphthalene	1321-64-8		0.5	X
Pentachlorophenol	87-86-5		0.5	X
Pentaerythritol	115-77-5			
Total dust			15	
Respirable fraction			5	
Pentane	109-66-0	1000	2950	
2-Pentanone (Methyl propyl ketone)	107-87-9	200	700	
Perchloroethylene (tetrachloroethylene)	127-18-4		See Appendix A.2	
Perchloromethyl mercaptan	594-42-3	0.1	0.8	
Perchloryl fluoride	7616-94-6	3	13.5	
Perlite	93763-70-3			
Total dust			15	
Respirable fraction			5	
Petroleum distillates (naphtha) (rubber solvent)		500	2000	
Phenol	108-95-2	5	19	X
p-Phenylene diamine	106-50-3		0.1	X
Phenyl ether, vapor	101-84-8	1	7	
Phenyl ether-biphenyl mixture, vapor		1	7	
Phenylethylene; see Styrene				
Phenyl glycidyl ether (PGE)	122-60-1	10	60	
Phenylhydrazine	100-63-0	5	22	X
Phosdrin (Mevinphos)	7786-34-7		0.1	X
Phosgene (carbonyl chloride)	75-44-5	0.1	0.4	

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m^3[c]	Skin
Phosphine	7803-51-2	0.3	0.4	
Phosphoric acid	7664-38-2		1	
Phosphorus (yellow)	7723-14-0		0.1	
Phosphorus pentachloride	10026-13-8		1	
Phosphorus pentasulfide	1314-80-3		1	
Phosphorus trichloride	7719-12-2	0.5	3	
Phthalic anhydride	85-44-9	2	12	
Picloram	1918-02-1			
Total dust			15	
Respirable fraction			5	
Picric acid	88-89-1		0.1	X
Pindone (2-Pivalyl-1,3-indandione)	83-26-1		0.1	
Plaster of paris	26499-65-0			
Total dust			15	
Respirable fraction			5	
Platinum (as Pt)	7440-06-4			
Metal				
Soluble Salts			0.002	
Portland cement	65997-15-1			
Total dust			15	
Respirable fraction			5	
Propane	74-98-6	1000	1800	
beta-Propriolactone; see 1910.1013	57-57-8			
n-Propyl acetate	109-60-4	200	840	
n-Propyl alcohol	71-23-8	200	500	
n-Propyl nitrate	627-13-4	25	110	
Propylene dichloride	78-87-5	75	350	
Propylene imine	75-55-8	2	5	X
Propylene oxide	75-56-9	100	240	
Propyne; see Methyl acetylene				
Pyrethrum	8003-34-7		5	
Pyridine	110-86-1	5	15	
Quinone	106-51-4	0.1	0.4	
RDX: see Cyclonite				
Rhodium (as Rh), metal fume and insoluble compounds	7440-16-6		0.1	
Rhodium (as Rh), soluble compounds	7440-16-6		0.001	
Ronnel	299-84-3		15	
Rotenone	83-79-4		5	
Rouge				
Total dust			15	
Respirable fraction			5	
Selenium compounds (as Se)	7782-49-2		0.2	
Selenium hexafluoride (as Se)	7783-79-1	0.05	0.4	

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m³[c]	Skin
Silica, amorphous, diatomaceous earth, containing less than 1% crystalline silica	61790-53-2		See Appendix A.3	
Silica, amorphous, precipitated and gel	112926-00-8		See Appendix A.3	
Silica, crystalline cristobalite, respirable dust	14464-46-1		See Appendix A.3	
Silica, crystalline quartz, respirable dust	14808-60-7		See Appendix A.3	
Silica, crystalline tripoli (as quartz), respirable dust	1317-95-9		See Appendix A.3	
Silica, crystalline tridymite, respirable dust	15468-32-3		See Appendix A.3	
Silica, fused, respirable dust	60676-86-0		See Appendix A.3	
Silicates (less than 1% crystalline silica)				
Mica (respirable dust)	12001-26-2		See Appendix A.3	
Soapstone, total dust			See Appendix A.3	
Soapstone, respirable dust			See Appendix A.3	
Talc (containing asbestos):			See Appendix A.3	
use asbestos limit:				
see 29 CFR 1910.1001				
Talc (containing no asbestos), respirable dust	14807-96-6		See Appendix A.3	
Tremolite, asbestiform; see 1910.1001				
Silicon	7440-21-3			
Total dust			15	
Respirable fraction			5	
Silicon carbide	409-21-2			
Total dust			15	
Respirable fraction			5	
Silver, metal and soluble compounds (as Ag)	7440-22-4		0.01	
Soapstone; see Silicates				
Sodium fluoroacetate	62-74-8		0.05	X
Sodium hydroxide	1310-73-2		2	
Starch	9005-25-8			
Total dust			15	
Respirable fraction			5	
Stibine	7803-52-3	0.1	0.5	
Stoddard solvent	8052-41-3	500	2900	
Strychnine	57-24-9		0.15	
Styrene	100-42-5		See Appendix A.2	
Sucrose	57-50-1			
Total dust			15	
Respirable fraction			5	
Sulfur dioxide	7446-09-5	5	13	

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m^3[c]	Skin
Sulfur hexafluoride	2551-62-4	1000	6000	
Sulfuric acid	7664-93-9		1	
Sulfur monochloride	10025-67-9	1	6	
Sulfur pentafluoride	5714-22-7	0.025	0.25	
Sulfuryl fluoride	2699-79-8	5	20	
Systox; see Demeton 2,4,5-T (2,4,5-trichlorophenoxyacetic acid)	93-76-5		10	
Talc; see Silicates				
Tantalum, metal and oxide dust	7440-25-7		5	
TEDP (Sulfotep)	3689-24-5		0.2	X
Tellurium and compounds (as Te)	13494-80-9		0.1	
Tellurium hexafluoride (as Te)	7783-80-4	0.02	0.2	
Temephos	3383-96-8			
Total dust			15	
Respirable fraction			5	
TEPP (Tetraethyl pyrophosphate)	107-49-3		0.05	X
Terphenylis	26140-60-3	(C) 1	(C) 9	
1,1,1,2-Tetrachloro-2, 2-difluoroethane	76-11-9	500	4170	
1,1,2,2-Tetrachloro-1, 2-difluoroethane	76-12-0	500	4170	
1,1,2,2-Tetrachloroethane	79-34-5	5	35	X
Tetrachoroethylene; see Perchloroethylene				
Tetrachloromethane; see Carbon tetrachloride				
Tetrachloronaphthalene	1335-88-2		2	X
Tetraethyl lead (as Pb)	78-00-2		0.075	X
Tetrahydrofuran	109-99-9	200	590	
Tetramethyl lead, (as Pb)	75-74-1		0.075	X
Tetramethyl succinonitrile	3333-52-6	0.5	3	X
Tetranitromethane	509-14-8	1	8	
Tetryl (2,4,6-Trinitro-phenylmethylnitramine)	479-45-8		1.5	X
Thallium, soluble compounds (as TI)	7440-28-0		0.1	X
4,4′-Thiobis (6-*tert*, Butyl-*m*-cresol)	96-69-5			
Total dust			15	
Respirable fraction			5	
Thiram	137-26-8		5	
Tin, inorganic compounds (except oxides) (as Sn)	7440-31-5		2	
Tin, organic compounds (as Sn)	7440-31-5		0.1	
Titanium dioxide	13463-67-7			
Total dust			15	
Toluene	108-88-3		See Appendix A.2	
Toluene-2,4-diisocyanate (TDI)	584-84-9	(C) 0.02	(C) 0.14	

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m³[c]	Skin
o-Toluidine	95-53-4	5	22	X
Toxaphene; see Chlorinated camphene				
Tremolite; see Silicates				
Tributyl phosphate	126-73-8		5	
1,1,1-Trichloroethane; see Methyl chloroform				
1,1,2-Trichloroethane	79-00-5	10	45	X
Trichloroethylene	79-01-6		See Appendix A.2	
Trichloromethane; see Chloroform				
Trichloronaphthalene	1321-65-9		5	X
1,2,3-Trichloropropane	96-18-4	50	300	
1,1,2-Trichloro-1,2, 2-trifluoroethane	76-13-1	1000	7600	
Triethylamine	121-44-8	25	100	
Trifluorobromomethane	75-63-8	1000	6100	
2,4,6-Trinitrophenyl; see Picric acid				
2,4,6-Trinitrophenylmethyl nitramine; see Tetryl				
2,4,6-Trinitrotoluene (TNT)	118-96-7		1.5	X
Triorthocresyl phosphate	78-30-8		0.1	
Triphenyl phosphate	115-86-6		3	
Turpentine	8006-64-2	100	560	
Uranium (as U)	7440-61-1			
Soluble compounds			0.05	
Insoluble compounds			0.05	
Vanadium	1314-62-1			
Respirable dust (as V_2O_5)			(C) 0.5	
Fume (as V_2O_5)			(C) 0.1	
Vegetable oil mist				
Total dust			15	
Respirable fraction			5	
Vinyl benzene; see Styrene				
Vinyl chloride; see 1910.1017	75-01-4			
Vinyl cyanide; see Acrylonitrile				
Vinyl toluene	25013-15-4	100	480	
Warfarin	81-81-2		0.1	
Xylenes (*o*-, *m*-, *p*-isomers)	1330-20-7	100	435	
Xylidine	1300-73-8	5	25	X
Yttrium	7440-65-5		1	
Zinc chloride fume	7646-85-7		1	
Zinc oxide fume	1314-13-2		5	
Zinc oxide	1314-13-2			
Total dust			15	
Respirable fraction			5	
Zinc stearate	557-05-1			

Substance	CAS No.[a]	permissible exposure level ppm[b]	mg/m³[c]	Skin
Total dust			15	
Respirable fraction			5	
Zirconium compounds (as Zr)	7440-67-7		5	

[a]The CAS number is for information only. Enforcement is based on the substance name. For an entry covering more than one metal compound measured as the metal, the CAS number for the metal is given, not CAS numbers for the individual compounds.
[b]Parts of vapor or gas per million parts of contaminated air by volume at 25 C and 760 torr.
[c]Milligrams of substance per cubic meter of air. When entry is in this column only, the value is exact; when listed with a ppm entry, it is approximate.
[d]The final benzene standard in 1910.1028 applies to all occupational exposures to benzene except in some circumstances the distribution and sale of fuels, sealed containers and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures; for the excepted subsegments, the benzene limits in Appendix A.2 apply. See 1910.1028 for specific circumstances.
[e]This 8-hour TWA applies to respirable dust as measured by a vertical elutriator cotton dust sampler or equivalent instrument. The time-weighted average applies to the cotton waste-processing operations of waste recycling (sorting, blending, cleaning, and willowing) and garnetting. See also 1910.1043 for cotton dust limits applicable to other sectors.
[f]All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by the "Particulates Not Otherwise Regulated" (PNOR) limit, which is the same as the inert or nuisance dust limit of Appendix A.3.
Source: Code of Federal Regulations 29 CFR 1910.1000. 54 FR 36767, Sept. 5, 1989; 54 FR 41244, Oct. 6, 1989; 55 FR 3724, Feb. 5, 1990; 55 FR 12819, Apr. 6, 1990; 55 FR 19259, May 9, 1990; 55 FR 46950, Nov. 8, 1990; 57 FR 29204, July 1, 1992; 57 FR 42388, Sept. 14, 1992; 58 FR 35340, June 30, 1993.; 61 FR 56746, Nov. 4, 1996.

APPENDIX A.2: PELs AND STELs FOR SOME SPECIALIZED MATERIALS

Substance	8-hour time-weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift: Concentration	Maximum duration
Benzene[a] (Z37.40-1969)	10 ppm	25 ppm	50 ppm	10 minutes
Beryllium and beryllium compounds (Z37.29-1970)	0.2 $\mu g/m^3$		2 $\mu g/m^3$	15 minutes
Cadmium dust[b] (Z37.5-1970)	0.2 mg/m³	0.6 mg/m³		
Cadmium fume[b] (Z37.5-1970)	0.1 mg/m³	0.3 mg/m³		
Carbon disulfide (Z37.3-1968)	20 ppm	30 ppm	100 ppm	30 minutes
Carbon tetrachloride (Z37.17-1967)	10 ppm	25 ppm	200 ppm	5 minutes in any 4 hours
Chromic acid and chromates (Z37-7-1971)		1 mg/10 m³		
Ethylene dibromide (Z37.31-1970)	20 ppm	30 ppm	50 ppm	5 minutes

Substance	8-hour time-weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift: Concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift: Maximum duration
Ethylene dichloride (Z37.21-1969)	50 ppm	100 ppm	200 ppm	5 minutes in any 3 hours
Fluoride as dust (Z37.28-1969)	2.5 mg/m^3			
Formaldehyde: see 1910.1048				
Hydrogen fluoride (Z37.28-1969)	3 ppm			
Hydrogen sulfide (Z37.2-1966)		20 ppm	50 ppm	10 minutes once only, if no other measurable exposure occurs
Mercury (Z37.8-1971)		1 mg/10m^3		
Methyl chloride (Z37.18-1969)	100 ppm	200 ppm	300 ppm	5 minutes in any 3 hours
Methylene chloride: see 1910.1052	25 ppm		125 ppm	15 minutes in any 3 hours
Organo (alkyl) mercury (Z37.30-1969)	0.01 mg/m^3	0.04 mg/m^3		
Styrene (Z37.15-1969)	100 ppm	200 ppm	600 ppm	5 minutes in any 3 hours
Tetrachloroethylene (Z37.22-1967)	100 ppm	200 ppm	300 ppm	5 minutes in any 3 hours
Toluene (Z37.12-1967)	200 ppm	300 ppm	500 ppm	10 minutes
Trichloroethylene (Z37.19-1967)	100 ppm	200 ppm	300 ppm	5 minutes in any 2 hours

[a]This standard applies to the industry segments exempt from the 1-ppm 8-hour TWA and 5-ppm STEL of the benzene standard at 1910.1028.

[b]This standard applies to any operations or sectors for which the cadmium standard, 1910.1027, is stayed or otherwise not in effect.

Source: Code of Federal Regulations 29 CFR 1910.1000. 57 FR 42388, Sept. 14, 1992; 58 FR 21781, Apr. 23, 1993; 58 FR 35340, June 30, 1993; 62 FR 1493, Jan. 10, 1997.

APPENDIX A.3: PELs FOR MINERAL DUSTS

Substance	mppcf[a]	mg/m^3
Silica		
Crystalline		
Quartz (respirable)	$\frac{250^b}{\%SiO_2 + 5}$	$\frac{10\ mg/m^{3d}}{\%SiO_2 + 2}$
Quartz (total dust)		$\frac{80\ mg/m^3}{\%SiO_2 + 2}$
Cristobalite: Use $\frac{1}{2}$ the value calculated from the count or mass formulas for quartz		

Substance	mppcf[a]	mg/m^3
Tridymite: Use $\frac{1}{2}$ the value calculated from the formulas for quartz		
Amorphous, including natural diatomaceous earth	20	
Silicates (less than 1% crystalline silica)		
Mica	20	
Soapstone	20	
Talc (not containing asbestos)	20[c]	
Talc (containing asbestos). Use asbestos limit		
Tremolite, asbestiform (see 29 CFR 1910.1001)		
Portland cement	50	
Graphite (natural)	15	
Coal Dust[e]		
Respirable fraction less than 5% SiO_2	$\frac{2.4 \text{ mg/m}^3}{\%SiO_2 + 2}$	
Respirable fraction greater than 5% SiO_2	$\frac{10 \text{ mg/m}^3}{\%SiO_2 + 2}$	
Inert or nuisance dust[d]		
Respirable fraction	15	5 mg/m^3
Total dust	50	15 mg/m^3

Note: Conversion factors – mppcf × 35.3 = million particles per cubic meter = particles per cc.
[a]Millions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.
[b]The percentage of crystalline silica in the formula is the amount determined from airborne samples, except in those instances in which other methods have been shown to be applicable.
[c]Containing less than 1% quartz; if 1% quartz or more, use the quartz limit.
[d]All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by this limit, which is the same as the "Particulates not Otherwise Regulated" (PNOR) limit in the table of Appendix A.1.
[e]Both concentration and percent quartz for the application of this limit are to be determined from the fraction passing a size selector with the following characteristics:

Aerodynamic diameter (unit density sphere)	% passing selector
2	90
2.5	75
3.5	50
5.0	25
10	0

The measurements under this note refer to the use of an AEC (now NRC) instrument. The respirable fraction of coal dust is determined with an MRE: the figure corresponding to that of 2.4 mg/m^3 in the table for coal dust is 4.5 mg/m^3.

APPENDIX B

Medical Treatment

- Treatment of INFECTION
- Application of ANTISEPTICS during second or subsequent visit of medical personnel
- Treatment of SECOND- OR THIRD-DEGREE BURN(S)
- Application of SUTURES (stitches)
- Removal of FOREIGN BODIES EMBEDDED IN EYE
- Removal of FOREIGN BODIES from wound if procedure is COMPLICATED because of depth of embedment, size, or location
- Use of PRESCRIPTION MEDICATIONS (except a single dose administered on first visit for minor injury or discomfort)
- Use of hot or cold SOAKING THERAPY during second or subsequent visit to medical personnel
- Application of hot or cold COMPRESS(ES) during second or subsequent visit to medical personnel
- CUTTING AWAY DEAD SKIN (surgical debridement)
- Application of HEAT THERAPY during second or subsequent visit to medical personnel
- Use of WHIRLPOOL BATH THERAPY during second or subsequent visit to medical personnel
- POSITIVE X-RAY DIAGNOSIS (fractures, broken bones, etc.)
- ADMISSION TO A HOSPITAL or equivalent medical facility for treatment

Source: Recordkeeping, 1978.

APPENDIX C

First-Aid Treatment

- Application of BANDAGE(S) during first visit to medical personnel
- Application of BUTTERFLY ADHESIVE DRESSING(S) or STERISTRIP(S) in lieu of sutures
- Use of ELASTIC BANDAGE(S) during first visit to medical personnel
- Removal of FOREIGN BODIES NOT EMBEDDED IN EYE if only irrigation is required
- Removal of FOREIGN BODIES from wound if procedure is UNCOMPLICATED, and is, for example, by tweezers or other simple technique
- Using a NON-PRESCRIPTION medication at NON-PRESCRIPTION STRENGTH (For medications available in both prescription and non-prescription form, a recommendation by a physician or other licensed health care professional to use a non-prescription medication at prescription strength is considered medical treatment for recordkeeping purposes)
- SOAKING THERAPY on initial visit to medical personnel or removal of bandages by SOAKING
- Application of hot or cold COMPRESS(ES) during first visit to medical personnel
- Using MASSAGES (physical therapy or chiropractic treatment are considered medical treatment for recordkeeping purposes)
- Using any non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc.
- Application of HEAT THERAPY during first visit to medical personnel
- OBSERVATION of injury during visit to medical personnel
- Cleaning, flushing, or soaking wounds on the skin surface
- Using temporary immobilization devices while transporting an accident victim (splints, slings, neck collars, or back boards)
- Drilling a fingernail or toenail to relieve pressure, or draining fluids from blisters
- Using eye patches
- Drinking fluids for relief of heat stress.

The following procedure, by itself, is not considered medical treatment:

- Administration of TETANUS SHOT(S) or BOOSTER(S). However, these shots are often given in conjunction with the more serious injuries; consequently, injuries requiring tetanus shots may be recordable for other reasons.

Source: Code of Federal Regulations 1904.7(b)(5)(i)(C)

APPENDIX D

Classification of Medical Treatment

OCCUPATIONAL SKIN DISEASES OR DISORDERS

Examples: Contact dermatitis, eczema, or rash caused by primary irritants and sensitizers or poisonous plants; oil acne; chrome ulcers; chemical burns or inflammations; etc.

DUST DISEASES OF THE LUNGS (PNEUMOCONIOSES)

Examples: Silicosis, asbestosis and other asbestos-related diseases, coal worker's pneumoconiosis, byssinosis, siderosis, and pneumoconioses.

RESPIRATORY CONDITIONS DUE TO TOXIC AGENTS

Examples: Pneumonitis, pharyngitis, rhinitis, or acute congestion due to chemicals, dusts, gases, or fumes; farmer's lung; etc.

POISONING (SYSTEMIC EFFECT OF TOXIC MATERIALS)

Examples: Poisoning by lead, mercury, cadmium, arsenic, or other metals; poisoning by carbon monoxide, hydrogen sulfide, or other gases; poisoning by benzol, carbon tetrachloride, or other organic solvents; poisoning by insecticide sprays such as parathion or lead arsenate; poisoning by other chemicals such as formaldehyde, plastics, or resins, etc.

DISORDERS DUE TO PHYSICAL AGENTS (OTHER THAN TOXIC MATERIALS)

Examples: Heatstroke, sunstroke, heat exhaustion, and other effects of environmental heat; freezing, frostbite, and effects of exposure to low temperatures; caisson disease; effects of ionizing radiation (isotopes, X-rays, radium); effects of nonionizing radiation (welding flash, ultraviolet rays, microwaves, sunburn); etc.

DISORDERS ASSOCIATED WITH REPEATED TRAUMA

Examples: Noise-induced hearing loss; synovitis, tenosynovitis, and bursitis; Raynaud's phenomena; and other conditions due to repeated motion, vibration, or pressure.

ALL OTHER OCCUPATIONAL ILLNESSES

Examples: Anthrax, brucellosis, infectious hepatitis, malignant and benign tumor, food poisoning, histoplasmosis, coccidioidomycosis, etc.

APPENDIX E

Highly Hazardous Chemicals, Toxics, and Reactives

This appendix contains a list of toxic and reactive highly hazardous chemicals that present a potential for a catastrophic event at or above the threshold quantity. List is current as of January 1, 2009 (OSHA Standard 29 CFR 1910.119, APP.A).

Chemical name	CAS[a]	TQ[b]
Acetaldehyde	75-07-0	2500
Acrolein (2-propenal)	107-02-8	150
Acrylyl chloride	814-68-6	250
Alkylaluminums	Varies	5000
Allyl chloride	107-05-1	1000
Allylamine	107-11-9	1000
Ammonia, anhydrous	7664-41-7	10,000
Ammonia solutions (greater than 44% ammonia by weight)	7664-41-7	15,000
Ammonium perchlorate	7790-98-9	7500
Ammonium permanganate	7787-36-2	7500
Arsine (also called arsenic hydride)	7784-42-1	100
Bis (chloromethyl) ether	542-88-1	100
Boron trichloride	10294-34-5	2500
Boron trifluoride	7637-07-2	250
Bromine	7726-95-6	1500
Bromine chloride	13863-41-7	1500
Bromine pentafluoride	7789-30-2	2500
Bromine trifluoride	7787-71-5	15,000
3-Bromopropyne (also called propargyl bromide)	106-96-7	100
Butyl hydroperoxide (tertiary)	75-91-2	5000
Butyl perbenzoate (tertiary)	614-45-9	7500
Carbonyl chloride (see Phosgene)	75-44-5	100
Carbonyl fluoride	353-50-4	2500

Chemical name	CAS[a]	TQ[b]
Cellulose nitrate (concentration greater than 12.6% nitrogen)	9004-70-0	2500
Chlorine	7782-50-5	1500
Chlorine dioxide	10049-04-4	1000
Chlorine pentrafluoride	13637-63-3	1000
Chlorine trifluoride	7790-91-2	1000
Chlorodiethylaluminum (also called diethylaluminum chloride)	96-10-6	5000
1-Chloro-2,4-dinitrobenzene	97-00-7	5000
Chloromethyl methyl ether	107-30-2	500
Chloropicrin	76-06-2	500
Chloropicrin and methyl bromide mixture	None	1500
Chloropicrin and methyl chloride mixture	None	1500
Cumene hydroperoxide	80-15-9	5000
Cyanogen	460-19-5	2500
Cyanogen chloride	506-77-4	500
Cyanuric fluoride	675-14-9	100
Diacetyl peroxide (concentration greater than 70%)	110-22-5	5000
Diazomethane	334-88-3	500
Dibenzoyl peroxide	94-36-0	7500
Diborane	19287-45-7	100
Dibutyl peroxide (tertiary)	110-05-4	5000
Dichloroacetylene	7572-29-4	250
Dichlorosilane	4109-96-0	2500
Diethylzinc	557-20-0	10,000
Diisopropyl peroxydicarbonate	105-64-6	7500
Dilauroyl peroxide	105-74-8	7500
Dimethyldichlorosilane	75-78-5	1000
1,1-Dimethylhydrazine	57-14-7	1000
Dimethylamine, anhydrous	124-40-3	2500
2,4-Dinitroaniline	97-02-9	5000
Ethyl methyl ketone peroxide (also methyl ethyl ketone peroxide; concentration greater than 60%)	1338-23-4	5000
Ethyl nitrite	109-95-5	5000
Ethylamine	75-04-7	7500
Ethylene fluorohydrin	371-62-0	100
Ethylene oxide	75-21-8	5000
Ethyleneimine	151-56-4	1000
Fluorine	7782-41-4	1000
Formaldehyde (formalin)	50-00-0	1000
Furan	110-00-9	500
Hexafluoroacetone	684-16-2	5000
Hydrochloric acid, anhydrous	7647-01-0	5000
Hydrofluoric acid, anhydrous	7664-39-3	1000
Hydrogen bromide	10035-10-6	5000
Hydrogen chloride	7647-01-0	5000
Hydrogen cyanide, anhydrous	74-90-8	1000

Chemical name	CAS[a]	TQ[b]
Hydrogen fluoride	7664-39-3	1000
Hydrogen peroxide (52% by weight or greater)	7722-84-1	7500
Hydrogen selenide	7783-07-5	150
Hydrogen sulfide	7783-06-4	1500
Hydroxylamine	7803-49-8	2500
Iron, pentacarbonyl	13463-40-6	250
Isopropylamine	75-31-0	5000
Ketene	463-51-4	100
Methacrylaldehyde	78-85-3	1000
Methacryloyl chloride	920-46-7	150
Methacryloyloxyethyl isocyanate	30674-80-7	100
Methyl acrylonitrile	126-98-7	250
Methylamine, anhydrous	74-89-5	1000
Methyl bromide	74-83-9	2500
Methyl chloride	74-87-3	15,000
Methyl chloroformate	79-22-1	500
Methyl ethyl ketone peroxide (concentration greater than 60%)	1338-23-4	5000
Methyl fluoroacetate	453-18-9	100
Methyl fluorosulfate	421-20-5	100
Methyl hydrazine	60-34-4	100
Methyl iodide	74-88-4	7500
Methyl isocyanate	624-83-9	250
Methyl mercaptan	74-93-1	5000
Methyl vinyl ketone	79-84-4	100
Methyltrichlorosilane	75-79-6	500
Nickel carbonyl (nickel tetracarbonyl)	13463-39-3	150
Nitric acid (94.5% by weight or greater)	7697-37-2	500
Nitric oxide	10102-43-9	250
Nitroaniline (paranitroaniline)	100-01-6	5000
Nitrogen dioxide	10102-44-0	250
Nitrogen oxides (NO; NO_2; N_2O_4; N_2O_3)	10102-44-0	250
Nitrogen tetroxide (also called nitrogen peroxide)	10544-72-6	250
Nitrogen trifluoride	7783-54-2	5000
Nitrogen trioxide	10544-73-7	250
Nitromethane	75-52-5	2500
Oleum (65 to 80% by weight; also called fuming sulfuric acid)	8014-94-7	1000
Osmium tetroxide	20816-12-0	100
Oxygen difluoride (fluorine monoxide)	7783-41-7	100
Ozone	10028-15-6	100
Pentaborane	19624-22-7	100
Peracetic acid (concentration greater than 60% acetic acid; also called peroxyacetic acid)	79-21-0	1000
Perchloric acid (concentration greater than 60% by weight)	7601-90-3	5000
Perchloromethyl mercaptan	594-42-3	150
Perchloryl fluoride	7616-94-6	5000

Chemical name	CAS[a]	TQ[b]
Peroxyacetic acid (concentration greater than 60% acetic acid; also called peracetic acid)	79-21-0	1000
Phosgene (also called carbonyl chloride)	75-44-5	100
Phosphine (hydrogen phosphide)	7803-51-2	100
Phosphorus oxychloride (also called phosphoryl chloride)	10025-87-3	1000
Phosphorus trichloride	7719-12-2	1000
Phosphoryl chloride (also called phosphorus oxychloride)	10025-87-3	1000
Propargyl bromide	106-96-7	100
Propyl nitrate	627-3-4	2500
Sarin	107-44-8	100
Selenium hexafluoride	7783-79-1	1000
Stibine (antimony hydride)	7803-52-3	500
Sulfur dioxide (liquid)	7446-09-5	1000
Sulfur pentafluoride	5714-22-7	250
Sulfur tetrafluoride	7783-60-0	250
Sulfur trioxide (also called sulfuric anhydride)	7446-11-9	1000
Sulfuric anhydride (also called sulfur trioxide)	7446-11-9	1000
Tellurium hexafluoride	7783-80-4	250
Tetrafluoroethylene	116-14-3	5000
Tetrafluorohydrazine	10036-47-2	5000
Tetramethyl lead	75-74-1	1000
Thionyl chloride	7719-09-7	250
Trichloro (chloromethyl) silane	1558-25-4	100
Trichloro (dichlorophenyl) silane	27137-85-5	2500
Trichlorosilane	10025-78-2	5000
Trifluorochloroethylene	79-38-9	10,000
Trimethyoxysilane	2487-90-3	1500

[a]Chemical Abstracts Service number.
[b]Threshold quantity in pounds (amount necessary to be covered by this standard). OSHA Std 1910.119, Appendix A. 57 FR 7847, Mar. 4, 1992.

APPENDIX F

North American Industry Classification System (NAICS) Code

PRINCIPAL MANUFACTURING CATEGORIES

NAICS 3-digit Subsector Code	Description
212	Mining
221	Utilities
311	Food manufacturing
312	Beverage and tobacco product manufacturing
313	Textile mills
314	Textile product mills
315	Apparel manufacturing
316	Leather and allied product manufacturing
321	Wood product manufacturing
322	Paper manufacturing
323	Printing and related support activities
324	Petroleum and coal products manufacturing
325	Chemical manufacturing
326	Plastics and rubber products manufacturing
327	Nonmetallic mineral product manufacturing
331	Primary metal manufacturing
332	Fabricated metal product manufacturing
333	Machinery manufacturing
334	Computer and electronic product manufacturing
335	Electrical equipment, appliance, and component manufacturing
336	Transportation equipment manufacturing
337	Furniture and related product manufacturing
339	Miscellaneous manufacturing
424	Merchant wholesalers, nondurable goods
425	Wholesale electronic markets and agent brokers
511	Publishing
512	Publishing
519	Publishing
562	Hazardous waste
Misc. Mfg Codes	Includes some of the 6-digit NAICS numbers in the categories of: 1119, 1133, 2111, 4883, 5417, and 8114. Make sure to look up the full 6-digit NAICS number
Federal Facilities	All required to report regardless of NAICS

PARTIALLY EXEMPT INDUSTRIES

Employers classified in the following NAICS 4-Digit Industry Groups are not required to keep general OSHA injury and illness records unless asked by OSHA, the Bureau of Labor Statistics (BLS), or an authorized state agency. Fatalities or workplace incidents that result in the hospitalization of three or more employees must still be reported.

NAICS Code and Industry Description							
4412	Other motor vehicle dealers	5151	Radio and television broadcasting	5412	Accounting, tax preparation, bookkeeping, and payroll services	6213	Offices of other health practitioners
4431	Electronics and appliance stores	5172	Wireless telecommunications carriers (except satellite)	5413	Architectural, engineering, and related services	6214	Outpatient care centers
4461	Health and personal care stores	5173	Telecommunications resellers	5414	Specialized design services	6215	Medical and diagnostic laboratories
4471	Gasoline stations	5179	Other telecommunications	5415	Computer systems design and related services	6244	Child day care services
4481	Clothing stores	5181	Internet service providers and web search portals	5416	Management, scientific, and technical consulting services	7114	Agents and managers for artists, athletes, entertainers, and other public figures
4482	Shoe stores	5182	Data processing, hosting, and related services	5417	Scientific research and development services	7115	Independent artists, writers, and performers
4483	Jewelry, luggage, and leather goods stores	5191	Other information services	5418	Advertising and related services	7213	Rooming and boarding houses
4511	Sporting goods, hobby, and musical instrument stores	5211	Monetary authorities-central bank	5511	Management of companies and enterprises	7221	Full-service restaurants
4512	Book, periodical, and music stores	5221	Depository credit intermediation	5611	Office administrative services	7222	Limited-service eating places
4531	Florists	5222	Nondepository credit intermediation	5614	Business support services	7224	Drinking places (alcoholic beverages)

NAICS Code and Industry Description							
4532	Office supplies, stationery, and gift stores	5223	Activities related to credit intermediation	5615	Travel arrangement and reservation services	8112	Electronic and precision equipment repair and maintenance
4812	Nonscheduled air transportation	5231	Securities and commodity contracts intermediation and brokerage	5616	Investigation and security services	8114	Personal and household goods repair and maintenance
4861	Pipeline transportation of crude oil	5232	Securities and commodity exchanges	6111	Elementary and secondary schools	8121	Personal care services
4862	Pipeline transportation of natural gas	5239	Other financial investment activities	6112	Junior colleges	8122	Death care services
4869	Other pipeline transportation	5241	Insurance carriers	6113	Colleges, universities, and professional schools	8131	Religious organizations
4879	Scenic and sightseeing transportation, other	5242	Agencies, brokerages, and other insurance related activities	6114	Business schools and computer and management training	8132	Grantmaking and giving services
4885	Freight transportation arrangement	5251	Insurance and employee benefit funds	6115	Technical and trade schools	8133	Social advocacy organizations
5111	Newspaper, periodical, book, and directory publishers	5259	Other investment pools and funds	6116	Other schools and instruction	8134	Civic and social organizations
5112	Software publishers	5312	Offices of real estate agents and brokers	6117	Educational support services	8139	Business, professional, labor, political, and similar organizations
5121	Motion picture and video industries	5331	Lessors of nonfinancial intangible assets (except copyrighted works)	6211	Office of physicians		
5122	Sound recording industries	5411	Legal services	6212	Offices of dentists		

APPENDIX G

States Having Federally Approved[1] State Plans for Occupational Safety and Health Standards and Enforcement

Alaska
Arizona
California
Connecticut[2]
Hawaii
Illinois[2]
Indiana
Iowa
Kentucky
Maryland
Maine[2]
Michigan
Minnesota
Nevada
New Jersey[2]
New Mexico
New York[2]
North Carolina
Oregon
South Carolina
Tennessee
Utah
Vermont
Virginia
Washington
Wyoming
Also, Puerto Rico and the Virgin Islands

[1]Approved by authority of Section 18.b of Public Law 91–596. The list is current as of October 2017.
[2]The Connecticut, Illinois, Maine, New Jersey, New York, and the Virgin Islands plans cover the public sector only (state, local government, and municipal employees only). The federal OSHA agency covers enforcement for private sector employees in these six State Plans.

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Glossary

ACGIH American Conference of Governmental Industrial Hygienists.

ADA Americans with Disabilities Act (of 1990).

Aggravating factor In the study of loss incident causation, a circumstance that makes the outcome of a loss incident more severe.

AIDS Acquired immunodeficiency syndrome. A terminal illness or condition resulting from exposure to the HIV virus. (*See also* HIV.)

AIHA American Industrial Hygiene Association.

AL Action level.

amp Ampere.

ANSI American National Standards Institute.

Anti tie-down Means of preventing a control panel from being tied down and thus rendering the machine unsafe.

Anti two-block device Mechanism for preventing a crane hook block from being drawn up to the point at which it contacts the boom point.

API American Petroleum Institute.

ASH Action on Smoking and Health.

ASME American Society of Mechanical Engineers.

Asphyxiants Substances that prevent oxygen from reaching the body cells.

ASSE American Society of Safety Engineers.

ASTM American Society for Testing and Materials.

AWS American Welding Society.

Barrier guard In machine guarding terminology, a rigid partition on a machine to prevent any part of the operator's or any other's body from entering the danger zone. (Compare with Shield guard.)

BCSP Board of Certified Safety Professionals

BLEVE Boiling liquid expanding vapor explosion.

Block Mechanical assembly containing one or more freely rotating pulleys.

Block and Bleed *See* Double block and bleed.

Block and tackle Assembly consisting of (usually two) blocks reeved together to achieve mechanical advantage.

Bloodborne pathogens Term used in the OSHA standards to refer principally to the HIV and HBV viruses.

Boom Long pivoting structure or arm on a crane.

Brake monitor Device that monitors stopping time or ram overtravel every time the clutch disengages on a part-revolution mechanical press.

Bridge crane Industrial crane that accesses loads by means of a bridge that travels on parallel overhead rails and by means of a trolley that travels back and forth on the bridge.

Bridgeplate Support surface for the transition between dock and a vehicle being loaded; dockboard.

C Ceiling value; maximum acceptable exposure concentration.

Carcinogen A substance that causes or is suspected of causing cancer.

CAS Chemical Abstracts Service number, a reference list for chemical substances.

CDZ Controlled Decking Zone. In steel erection, an area of a new floor having exposed edges and subject to prescribed precautions for workers who must work in these defined areas.

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act.

CIH Certified Industrial Hygienist.

Combustible Having a flashpoint higher than 100°F.

Combustible Dust Any combustible material in a finely divided form.

CPSC Consumer Product Safety Commission.

CSP Certified Safety Professional.

DAFWII Days Away From Work Injury and Illness Case Rate; a standard occupational safety and health index for comparing industry safety records. The DAFWII is comparable to the DART, except that the DAFWII counts only cases involving *days away* from work.

DART Days Away, Restricted, or Transferred Rate; a standard occupational safety and health index for comparing industry safety records. The DART rate counts both injuries and illnesses and does not include fatalities. The DART rate has largely replaced the LWDI as a measure of a firm's safety record.

dB Decibel(s).

dBA Decibel, by the A-weighted scale.

DEHP di-2-ethylhexyl phthalate.

Detector tube Small (usually glass) tube installed in-line in a flexible tube connected to an air-sampling pump. The tube contains a material that changes color in quantifiable layers to provide a measure of the concentration of the particular air contaminant being tested.

Distal cause Secondary or indirect cause of a loss incident, such as a deficient management policy. Distal causes create and shape proximal causes.

Dockboard Support surface for the transition between a dock and a vehicle being loaded; a bridgeplate.

Dosimeter Instrument worn on the person to collect a cumulative measure of exposure over a specified time period; used especially for TWAs. (*See also* TWA.)

Double block and bleed Method of positive isolation of fluids in which two successive valves are closed and between the two closed valves a small "bleeder" valve is opened to relieve pressure that might build up if one of the closed valves were to leak.

EEOC Equal Employment Opportunity Commission.

Egregious violation Glaring or flagrant safety violation that invokes high penalties from OSHA.

Energy isolation device Device for positively locking off a source of energy to a machine or other equipment.

Engulfment Capture and sinking of a person in a dry granular solid material that has fluidlike qualities.

EPA Environmental Protection Agency.

Epidemiology Statistical study of populations of victims of various diseases or disorders.

EPOs Emergency power-offs.

Ergonomics Study of human capability in relation to the work environment.

Experience rating Insurance rating based on a company's claim history.

Extra-hazardous employer In some states, a Workers' Compensation Commission designation given to certain establishments in which the rate of lost workday injuries and illnesses exceed certain defined averages for the industry. The designation results in extra duties for the employer and follow-up consultation to determine whether the firm has complied with the extra duties.

Fail-safe principles Principles of engineering design that consider the consequences of component failure within the system.

Fault-tree analysis Logic diagram used to analyze probabilities associated with various causes and their adverse effects.

FCAW Flux core arc welding.

Fibrillation Rapid, irregular convulsions of the heart; the condition is induced by electric shock, especially when the shock is from alternating current.

Flammable Having a flashpoint lower than 100°F.

Flashback In welding terminology, the phenomenon that occurs when an oxygen/fuel gas flame begins to propagate back into the mixing chamber of the welding torch or welding gas manifold.

Flux In soldering and welding, a material that melts along with the metal and is used to facilitate the process by combining with impurities and preventing oxidation.

FMEA Failure modes and effects analysis.

Full revolution In presswork terminology, a type of mechanical press drive in which the ram is tripped by a positive engagement of the flywheel and cannot be disengaged midstroke.

Fume Tiny particles of resolidified vapors of substances that are normally solids. Metal fumes are often encountered in welding operations.

Gate In presswork terminology, a temporary barrier that closes to protect the operator during the dangerous part of the machine cycle. Type A closes at the beginning of the cycle and stays closed for the entire cycle. Type B closes at the beginning of the cycle, then reopens during the less dangerous portion of the stroke (e.g., when the ram starts back up and the dies begin to reopen).

GFCI Ground-fault circuit interrupter.

GHS Globally Harmonized System.

GMAW Gas metal arc welding (also known as *MIG*).

Gross load Total load being supported by the system, including both the payload and the equipment being used to move it. In the case of a hoist mechanism, gross load equals the weight of the payload plus the weight of the load block.

Ground Object or conductor that has zero voltage potential from ground potential; in electrical wiring terminology, "ground" usually refers to the noncurrent-carrying conductor that is intended to ground unwanted voltage, sometimes called the ground*ing* conductor. Sometimes "ground" is used to refer to the current-carrying neutral conductor; sometimes called the ground*ed* conductor.

GTAW Gas tungsten arc welding (also known as TIG).

HAZMAT Hazardous material.

HBV Hepatitis B virus.

HIV Human immunodeficiency virus.

Hot In electrical wiring terminology, the current-carrying conductor that has a significant voltage potential from ground potential.

Hydrostatic test Periodic test performed on fire extinguishers to verify the integrity of the shell to contain adequate pressures.

Hz Hertz (cycles per second).

IBP Initial boiling point.

ICHD Industrial chemical hazards database.

IDL Immediately dangerous to life.

IDLH Immediately dangerous to life or health.

Impairment A physical or mental handicap that qualifies under the Americans with Disabilities Act (ADA) for protecting the worker from discrimination in employment.

Incidence rate Rate of job-related injuries and illnesses, including total-recordable-cases, fatalities, lost-workday-cases, number-of-lost-workdays, specific-hazards, lost-workday-injuries, days-away-restricted-or-transferred, and days-away-from-work-injury-and-illness-case rates.

Interlock Switch, usually electrical, that turns off power to a machine whenever a guard is removed or a gate opened or some other safety device is disabled.

Irreversibility *See* Point of irreversibility.

Irritants Substances that inflame surfaces of parts of the body by their corrosive action.

JCP Job candidate profile; a screening test used in job placement testing.

Kickback Accidental engagement between the material and a rotating tool that causes the material to be thrown back at the operator, or alternatively, if the material is fixed, causes the tool, such as a hand-held circular saw, to be jerked out of control.

Lay In wire rope terminology, the length, measured along the core of a wire rope, required for one strand to make one complete revolution (twist) about the core.

LBW Laser beam welding.

LEL Lower explosive limit (for flammable vapors); the percent concentration in air below which the mixture is too lean to ignite.

LFL Lower flammable limit (for flammable vapors); the lowest concentration of a material that will propagate a flame. The LFL is usually expressed as a percent by volume of the material in air. The term is used somewhat interchangeably with LEL and is applied to the control of fires around dip tanks.

Load block Pulley assembly to which the load is attached.

Lockout Method of assuring that machines being serviced are not turned back on prematurely. The power switch or control box is locked out by the maintenance person performing the service. Only the maintenance person performing the service has the key to the lock. Multiple maintenance personnel each have their own locks so that all locks must be removed before the machine can be returned to service. Lockout is considered more reliable than "tagout."

Lost workday According to OSHA definition and current terminology, a "lost" workday includes both days away from work and days in which the worker is temporarily transferred to another job within the firm because of a workplace injury or illness.

LPG Liquefied petroleum gas.

LWDI Lost-workday incidence rate (for injuries only, not illnesses); a standard occupational safety and health index for comparing industry safety records. The LWDI was formerly used by OSHA Compliance Officers to determine whether a particular firm should receive a full

inspection. Later the LWDI became an index for nationwide decision making in determining industry (SIC) priorities for inspection. (*See also* DART.)

ma Milliampere.

MAC Maximum acceptable ceiling concentration.

MAPP gas Commercially available welding fuel gas used as a somewhat safer substitute for acetylene when lower welding temperatures are acceptable for the process.

Mechanical advantage Favorable ratio of output force to the required input force for a mechanism.

MIG Metal inert gas (welding); also known as GMAW.

Mitigating factor In the study of loss-incident causation, a circumstance that makes the outcome of a loss incident less severe.

MSD Musculoskeletal disorder.

MSHA Mine Safety and Health Administration.

Mutagens Substances that affect chromosomes and are thus a hazard to the species.

NAICS North American Industry Classification System; a system of codes for classifying industries. (*See also* SIC.)

NEC *National Electrical Code®*.

NEP National Emphasis Program.

Neutral In electrical wiring terminology, the current-carrying conductor that is at ground or near-ground potential; sometimes called the grounded conductor.

NFPA National Fire Protection Association.

NIOSH National Institute for Occupational Safety and Health.

Nip point Position at which moving parts meet and can draw clothing or body parts into the machine. Examples are points at which gears mesh, chains engage sprockets, or belts engage pulleys.

Nomex Commercially available material used in clothing and personal protective equipment for welders.

Nominal Generally, a specification or dimension before safety factor has been applied. (*See also* Rated.)

NOx Oxides of nitrogen (e.g., NO, NO_2, N_2O).

NRR Noise Reduction Rating.

NSC National Safety Council.

OBI Open-back inclinable, a type of mechanical power press used in high-speed blanking operations.

OSHA Occupational Safety and Health Administration.

PAH Polycyclic aromatic hydrocarbon. Some PAHs may be carcinogenic, teratogenic, or mutagenic. PAHs may be found in metalworking fluids.

Part revolution In presswork terminology, a type of mechanical press drive in which the flywheel is equipped with a friction clutch and can be disengaged midstroke and a brake applied to stop the ram.

Parts of rope Mechanical advantage provided by block and tackle; number of lines supporting the load block.

Payload Weight of the load exclusive of the vehicle, material-handling device, or other equipment being used to move the load.

PE Registered professional engineer.

PEL Permissible exposure limit.

Pharmacokinetics Study of the absorption, disposition, metabolism, and elimination of chemicals in the body.

Plugging Using reverse torque as a brake to stop the travel of a crane hoist.

Point of irreversibility In the study of loss-incident causation, the point in the causal diagram that, if reached, will definitely result in a loss incident.

Power rail Fixed electrical conductor for delivering continuous power to a moving device.

PPE Personal protective equipment.

Proximal cause Direct hazard; a primary, immediate cause of a loss incident.

Pullback Method of safeguarding the point of operation of a press by a mechanical linkage between the action of the press ram and a set of wristlets worn by the operator. As the ram descends, the linkage pulls the operator's hands away from the danger zone. Pullbacks are sometimes called "pull-outs."

Rail clamp In industrial crane terminology, a device for clamping a crane bridge to the rail on which it is traveling; the clamp is used to prevent drifting of the bridge under wind loading.

Rated Describes a specification or dimension for which a safety factor has already been applied. (*See also* Nominal.)

RCRA Resource Conservation and Recovery Act.

Reeving Threading of ropes through pulleys.

RELs Recommended Exposure Levels; levels recommended by NIOSH.

Risk assessment code (RAC) A U.S. Air Force classification system for accidents that is based on both mishap severity and mishap probability of occurrence.

Roadmap approach A method of filing documents in which a central file tells where within the plant to find various other required documents.

ROPS Rollover protective structures.

RSEW Resistance seam welding.

RSW Resistance spot welding.

SARA Superfund Amendments and Reauthorization Act.

SAW Submerged arc welding.

SCBA Self-contained breathing apparatus.

SDS Safety data sheet.

SHARP Safety and Health Achievement Recognition Program.

Sheave Pulley used in a hoisting arrangement, especially when several pulleys are used together to achieve mechanical advantage.

Shield guard In machine guarding terminology, a barrier to protect against flying chips or sparks flying out of a machine. (*Compare with* Barrier guard.)

SIC Standard industrial classification. (*See also* NAICS, which is superseding the SIC system of classification.)

Slag In welding, the nonmetallic molten, then solid, residue that consists of solidified flux combined with impurities.

Sling In material-handling terminology, the wire rope, chain, or other connector (not to be confused with the hoist rope itself) used to attach a load to the crane, hoist, helicopter, or other lifting device.

SLM Sound-level meter.

SMAW Shielded metal arc welding (also known as stick electrode welding).

Sphere of control In a loss-incident causation diagram, the region prior to the point of irreversibility.

Spreader In power saw terminology, a device to maintain separation between the two walls of a cut to assure that the saw blade will not accidentally reengage the material that has already been cut and thus result in a kickback.

STEL Short-term exposure limit.

Strand In wire rope terminology, any of several bundles of wires that are twisted about the core of the wire rope.

Sweep Obsolete (no longer legally recognized) method of safeguarding a press. Sweeps are mechanically linked to the press ram mechanism and strike and brush away the operator's arms or other objects in the area of the entrance to the danger zone.

Switch loading Filling a tank with a material different from that which it contained previously. Switch loading usually refers to the switching of flammable/combustible fuels to be transported in a tank truck.

TAG Popular test method for determining flashpoint.

Tagout Method of assuring that machines being serviced are not turned back on prematurely. A tag placed on the power switch warns operators and others not to turn on the machine until the tag is removed by the person performing the service. (*See also* Lockout.)

Teratogens Substances that have harmful effects on fetuses.

TIG Tungsten inert gas (welding); also known as GTAW.

TLV Threshold limit value.

Tongue gap On a wheel-type grinding machine, the clearance between the upper opening (tongue) guard and the grinding wheel. The maximum legal clearance is $\frac{1}{4}$ inch.

Tongue guard Adjustable plate attached to the upper edge of the opening that exposes the wheel on a grinding machine. The purpose is to contain flying fragments in the event of wheel failure.

TOSCA Toxic Substances Control Act.

Toxicology Study of the nature and effects of poisons.

TRC Total-Recordable-Cases; a standard occupational safety and health index for comparing industry safety records; the TRC counts all OSHA-recordable cases whether or not the cases involve lost workdays.

Tribology The study of the mechanisms and phenomena of friction; in safety, especially applies to the study of trips and falls.

Trip bar Bar that can be quickly and conveniently accessed by the operator or others nearby to deactivate or disengage a machine in an emergency. Also called a triprod.

Trip wire Flexible cable that can be pulled or otherwise quickly and conveniently accessed by the operator or others nearby to deactivate or disengage a machine in an emergency.

Trolley In industrial crane terminology, the assembly that travels back and forth on top of the bridge on an overhead bridge crane. The trolley carries the hoist mechanism.

TW Thermit welding.

TWA Time-weighted average.

Two-blocking Hazardous, accidental contact between blocks of sheaves that occurs when the hoist rope is drawn too far. The condition will quickly break the hoist rope, causing the load block and the load (if any) to fall.

UEL Upper explosive limit (for flammable vapors); percent concentration in air above which the mixture is too rich to ignite.

Vapors Gases of substances that are normally liquid or solid, usually liquid.

VPP Voluntary Protection Program.

WMSDs Workplace musculoskeletal disorders.

Workers' compensation Statutory compensation levels to be paid by the employer for various injuries that may be incurred by the worker.

Zero mechanical state State of a machine after any residual sources of energy have been relieved or restrained to render them harmless, after the machine has been turned off.

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