Supplementary Tables:

Table 1. Chemicals with Adopted and/or Reviewed TLVs by ACGIH between 2008 -2018

Chemical Name CASRN	Threshold Limit Value *	Date Adopted (Year)*	Basis for TLV	References to Sentinel Studies Used to Form Recommendations for TLVs (Dates)	Genotoxicity Endpoints	Supporting Data						
						Raw	Statistically Transformed Retrievable	Statistically Transformed Irretrievable	Tabular	Graphic	Others	*ACGIH 7th Ed. Documrentation Page Number
Acetaldehyde [75-07-0]	25 ppm {45 mg/m^3} TLV-C	2014	Eye and URT irritation	Bergh and Karlsberg 1999; Bittersholl 1975; Brooks and Theruvathu 2005; Dellarco 1988; Dorman et al. 2008; Dreosti et al. 1981; Fang and Vaca 1997; Feron et al. 1982; Feron et al. 1991; Kayani and Parry 2010; Lam et al. 1986; Morris 1997; Muttray et al. 2009; O'Shea and Kaufman 1979; O'Shea and Kaufman	Ames tests - negative; SCE - positive	Summary Data only	No	No	No	No	None	Acetaldehyde 1-9, ACGIH 2014

				1981; Padmanabhan et al. 1983; Prieto et al. 2000; Shmunes and Kempton 1980; Silverman et al. 1946; Sim and Pattle 1957; Singh and Khan 1995; Sreenathan et al. 1982; Stanek et al. 2001; Teeguarden et al. 2008; WHO 1995; Wouterse n et al. 1986; Yu et al. 2010 (1946-2009)								
Acetamide [60-35-5]	1 ppm {2.42 mg/m^3}	2017	Liver damage; liver cancer	Fleishman et al. 1980; Jackson and Dessau 1961; Parodi et al. 1991; Shrivastava et al. 1974; Weisburger et al. 1969 (1961-1991)	Ames tests - negative	Summary Data only	No	No	No	No	None	Acetamide 1-4, ACGIH 2017
Acetic anhydride [108-24-7]	1 ppm {4.2	2011	URT irritation; eye	Baldi 1953; Mclaughl	Ames tests - negative; micronucle	Summary	No	No	No	No	None	Acetic anhydride 1-4,

	mg/m^3}		irritation	in 1946; Smyth et al. 1951 (1946-1953)	us assay - negative	Data only						ACGIH 2011
Acetone [67-64-1]	250 ppm {594 mg/m^3}	2015	URT irritation; eye irritation; CNS impairment	Burleigh-Flayer et al. 1997; Dalton et al. 1997a; Dalton et al. 1997b; Holden et al. 1998; Matsushita et al. 1969; Satoh et al. 1996; Wysocki et al. 1997 (1969-1998)	Ames tests - negative; SCE - negative; Chromosomal aberration - negative	Summary Data only	No	No	No	No	None	Acetone 1-9, ACGIH 2015
Acetophenone [98-86-2]	10 ppm {50 mg/m^3}	2009	URT irritation; CNS impairment; pregnancy loss	Browning 1965; NIOSH 1984; Ohkuma et al. 2002; Quevauller 1967; Smyth and Carpenter 1944; Smyth and Carpenter 1948; Thorsrud 2003 (1944-2002)	Ames tests - negative	Summary Data only	No	No	No	No	None	Acetophenone 1-5, ACGIH 2009
Acrylonitrile [107-13-1]	2 ppm {4.3 mg/m^3}	2015	CNS impairment; LRT irritation	Bigner et al. 1986; Blair et al. 1998; Dudley and Neal 1942; IARC 1979;	Ames tests - weakly positive	Summary Data only	No	No	No	No	None	Acrylonitrile 1-7, ACGIH 2016

				IARC 1982; Maltoni et al. 1987; Pouyatos et al. 2005; Rothman 1994; Sakurai and Kusumoto 1972; US EPA 1983; US NIOSH 1997; US NTP 2001; Ward and Starr 1993; Willhite and Smith 1981 (1942-2005)								
Aldicarb (116-06-3]	0.0006 ppm {0.005 mg/m^3}	2018	Cholinesterase inhibition	Carpenter and Smyth 1965; Carpenter CP and Smyth 1966; Dorough et al. 1970; Haines et al. 1971; Hamada 1988; Hansch and Leo 1979; Knaak et al. 1996; Lewis 1996; NRC 1977; Pozzani and Carpenter 1968;	Ames tests - negative; Chromosomal aberrations - positive; micronucleus assay - negative; SCE - positive	Summary Data only	No	No	No	No	None	Aldicarb 1-9, ACGIH 2018

				Rhone-Poulenc AG 1992; Weil and Carpenter 1963; Weil and Carpenter 1972; Weil and Carpenter 1974a Weil and Carpenter 1974b; Woodside et al. 1977 (1963-1992)								
Allyl bromide [106-95-6]	0.1 ppm {0.5 mg/m^3}	2012	URT irritation; eye irritation	Alarie et al. 1998; Bos et al. 1991; Lewis 2004; Nielsen and Bakbo 1985; Rabotnikova and Sarycheva 1970; US NTP 2008 (1985-2008)	Ames tests - equivocal; micronucleus assay - negative; Unscheduled DNA synthesis - positive;	Summary Data only	No	No	No	No	None	Allyl bromide 1-4, ACGIH 2012
Allyl chloride [107-05-1]	1 ppm {3 mg/m^3}	2011	URT irritation; eye irritation; liver and kidney damage	Dow Chemical Company, no date; Olsen et al. 1994; Rabotnikova and Sarycheva 1970; Torkelson et al. 1959; US NCI 1977; Van Duuren et al. 1979 (no	Ames tests - equivocal; Chromosomal aberration - positive; Unscheduled DNA synthesis - positive	Summary Data only	No	No	No	No	None	Allyl chloride 1-9, ACGIH 2011

				date-1994)								
Allyl methacrylate [96-05-9]	1 ppm {5.16 mg/m^3}	2018	Liver damage	Chevalier 2007; Elf Atochem 1984; Lewis 1996; Siddiqui and Hobis 1982 (1982-2007)	Ames tests - negative; Chromosomal aberration - negative	Summary Data only	No	No	No	No	None	Allyl methacrylate 1-4, ACGIH 2018
Aluminum metal [7429-90-5] and insoluble compounds	1 ppm RPM	**2008**	Pneumoconiosis; LRT irritation; neurotoxicity	Leonard and Gerber 1988; Pigott et al. 1981; Steinhagen et al. 1978; Stone et al. 1979; Townsend et al. 1985; Townsend et al. 1988 (1978-1988)	Genotoxicity studies are equivocal	Summary Data only	No	No	No	No	None	Aluminum 1-14, ACGIH 2008
Atrazine [1912-24-9] (and related symmetrical triazines)	5 ppm RPM	2014	Hematologic, reproductive, and developmental effects	Stevens et al. 1994; Stevens et al. 1999; US EPA 2001 (1994-2001)	Ames tests - negative; SCE - negative; Dominant-lethal assay - positive	Summary Data only	No	No	No	No	None	Atrazine 1-5, ACGIH 2014
Barium sulfate [7727-43-7]	3 ppm RPM	2014	Pneumoconiosis	Cullen et al. 2000; Doig 1976 (1976-2000)	Non-genotoxic	Summary Data only	No	No	No	No	None	Barium sulfate 1-4, ACGIH 2014
Bendiocarb [22781-23-3]	0.011 ppm {0.1 mg/m^3}	2018	Cholinesterase inhibitor	Adcock and Challis 1976; Drummond and Kemp 1976;	Ames tests - negative; Chromosomal aberrations - positive; SCE - positive;	Summary Data only	No	No	No	No	None	Bendiocarb 1-9, ACGIH 2018

				Hunter et al. 1981; Kemp and Hounsell 1974; Li et al. 2009; Sanderson and Hounsell 1972 (1972-2009)	Dominant-lethal assay - negative							
Benomyl [17804-35-2]	1 mg/m^3 RPM	2007	URT irritation; male reproductive system, testicular and embryo/fetal damage	Barnes et al. 1983; Bentley et al 2000; Bianchi-Santamaria et al. 1997; Carter and Laskey 1982; Carter et al. 1984; Dolara 1992; et al.; Edwards et al. 1991; DuPont 1966; Frame and Van Pelt 1990; Georgieva et al. 1990; Hardisty 1990; Hess et al. 1991; Kavlock et al. 1982; Lee 1977; Linder et al. 1988; Mailhes	Chromosomal aberrations - positive; SCE - positive; Dominant-lethal assay - negative; micronucleus assay - positive	Summary Data only	No	No	No	No	None	Benomyl 1-6, ACGIH 2014

				and Aardema 1992; McCarroll et al. 2002; Nakai et al. 2004; Penagos et al. 2004; Piatti et al. 1994; Sarrif et al. 1994; Trochimowicz et al. 1993; NIOSH 2004; van Joost et al. 1983; Von Burg 1993; Warheit et al. 1989; Zelesco et al. 1990 (1966-2004)								
Beryllium [7440-41-7] and compounds, as Be Soluble compounds Soluble and insoluble compounds	0.00005 mg/m^3 RPM	**2014**	Berylium sensitization; chonic berylium disease (beryliosis)	Curtis 1951; Deubner et al. 2001; Kelleher et al. 2001; Madl et al. 2007; Rosenman et al. 2005; Schuler et al. 2005; Stanton et al. 2006; Tinkle et al. 2003 (1951-2007)	Ames tests - negative; Chromosomal aberrations -weak positive; SCE - equivocal; micronucleus assay - negative	Summary Data only	No	No	Yes (1)	No	None	Beryllium 1-14, ACGIH 2014
Boron tribromide	0.7 ppm	2016	Respiratory tract	No Referenc	Not Reported	Summ	No	No	No	No	None	Boron tribromide

[10294-33-4]	{7.19 mg/m^3}		irritation; pneumonitis	es Provided		y Data only						1-2, ACGIH 2016
Boron trichloride [10294-34-5]	0.7 ppm {2.4 mg/m^3}	2016	Respiratory tract irritation; pneumonitis	Stokinger and Spiegl 1953; Stokinger 1981 (1953-1981)	Not Reported	Summary Data only	No	No	No	No	None	Boron trichloride 1-2, ACGIH 2016
Boron trifluoride [7637-07-2]	0.1 ppm	2016	Respiratory tract irritation; pneumonitis	Rusch et al. 1986; Rusch et al. 2008; Torkelson et al. 1961 (1961-2008)	Micronucleus test - positive	Summary Data only	No	No	No	No	None	Boron trifluoride 1-4, ACGIH 2016
Boron trifluoride ethers [109-63-7; 353-42-4], as BF_3	0.1 ppm	2018	Respiratory tract irritation; pneumonitis	Rusch et al. 1986; Rusch et al. 2008; Torkelson et al. 1961 (1961-2008)	Micronucleus test - positive	Summary Data only	No	No	No	No	None	Boron trifluoride ethers 1-4, ACGIH 2018
Bromoform [75-25-2]	0.5 ppm {5.2 mg/m^3}	2009	Liver damage; URT irritation; eye irritation	Aida et al. 1992; Bowman et al. 1978; Chu et al. 1980; Chu et al. 1982; Condie et al. 1983; Kroll et al. 1994a; Kroll et al. 1994b; NLM 2007; NTP 1988; von Oettingen 1955; Xu et al. 2002 (1955-	Ames tests - equivocal; Mouse lymphoma assay - positive; SCE - positive; Chromosomal aberrations - positive	Summary Data only	No	No	No	No	None	Bromoform 1-4, ACGIH 2009

				2002)								
1-Bromopropane [106-94-5]	0.1 ppm {0.5 mg/m^3}	**2014**	CNS impairment; peripheral neuropathy; hematologic effects; reproductive (male and female) and developmental toxicity	ClinTrials 1997; Elf AtoChem 1995a; Elf AtoChem 1995b; Huntington 2001; Ichihara et al. 2000; Ichihara et al. 2002; Ichihara et al. 2004a; Ichihara et al. 2004b; Li et al. 2010; Majersik et al. 2007; NTP 2011; Perrone et al. 2008; Samukawa et al. 2012; Sclar 1999; WIL 2001 (1997-2012)	Ames tests - equivocal; Dominant-lethal assay - negative; micronucleus assay - negative	Summary Data only	No	No	No	No	None	1-Bromopropane 1-11, ACGIH 2014
Butane, isomers [75-28-5; 106-97-8]	1000 ppm {2370 mg/m^3} TLV-STEL	2013	CNS impairment	Aranyi et al. 1986; Halder et al. 1986; Patti and Yant 1929; Stewart et al. 1977; Stoughton and Lamson 1936 (1929-	Ames tests - negative	Summary Data only	No	No	No	No	None	Butane, isomers 1-4, ACGIH 2017

				1986)								
Butenes, all isomers [106-98-9; 107-01-7; 590-18-1; 624-64-6; 25167-67-3] Isobutene [115-11-7]	50 ppm {238 mg/m^3}	2008	Body weight effects - all isomers; URT irritation - isobutene	ACC 2004; Boorman et al. 1990; Buckley et al. 1985; NTP 1998 (1985-2004)	Ames tests - negative	Summary Data only	No	No	No	No	None	Butene, isomers 1-9, ACGIH 2008
Butyl acetates, all isomers [105-46-4; 110-19-0; 123-86-4; 540-88-5]	251 ppm {574 mg/m^3}	2016	Eye and URT irritation	Abraham et al. 1996; Cain and Schmidt 2009; Hackett et al. 1983; Iregren et al. 1993; Kenney 1999; Kronevi et al. 1979; Nelson et al. 1943; Saillenfait et al. 2007; Schaper 1993; Stouten and Bogaerts 2002; Yang et al. 2007 (1943-2007)	Ames tests - negative	Summary Data only	No	No	Yes (1)	No	None	Butyl acetates, all isomers 1-9, ACGIH 2008
tert-Butyl hydroperoxide [75-91-2]	0.1 ppm {0.4mg/m^3}	2018	Eye and URT irritation; mutagenic effects; reproductive effects	Arts and Zwarl 1992; BASF 2010; Behl et al. 2012; Ben-Dyke and Hogan 1981;	Ames test - positive; Chromosomal aberrations - equivocal; Dominant-lethal assay - equivocal	Summary Data only	No	No	Yes (1)	No	None	tert-Butyl hydroperoxide 1-10, ACGIH 2018

				Fatemi et al. 2013; Kingery and Valerio 1982; Shivananjappa and Muralidhara 2013; TNO 1993; US NTP 2001 (1981-2013)								
Cadusafos [95465-99-9]	0.00009 ppm {0.001 mg/m^3}	2016	Cholinesterase inhibition	De Prospo 1986; McCarthy 1984; McCarthy 1987; Rand 1983; Shellenberger 1986; Weiner M; et al.: 1986 (1983-1987)	Ames tests - negative; CHO/HGPRT assay - negative; Chromosomal aberrations - negative; Unscheduled DNA synthesis assay - negative	Summary Data only	No	No	No	No	None	Cadusafos 1-8, ACGIH 2017
Calcium silicate, naturally occurring as Wollastonite [13983-17-0]	1 mg/m^3 RPM	2016	Pneumoconiosis; pulmonary function	Hanke et al. 1984; Huuskonen et al. 1983; Muhle et al. 1994; Stanton et al. 1981; Tsai and Morgan 1996 (1981-1996)	Chromosomal aberrations - positive; SCE - positive	Summary Data only	No	No	No	No	None	Calcium silicate 1-6, ACGIH 2016
Captafol [2425-06-1]	0.007 ppm {0.1 mg/m^3}	2017	Liver damage; kidneyt damage; dermal sensitization	Arimatsu 1970; Eisenlord et al. 1981; Hayes 1982;	Dominant-lethal assay - negative; Mutagenisis assays - negative;	Summary Data only	No	No	No	No	None	Captafol 1-6, ACGIH 2017

				Krieger 2001; Quest et al. 1993; Rademaker 1998; Royce 1993; Stoke 1979; Tamano et al. 1991; US EPA 2003 (1970-2001)	Chromosomal aberrations - positive; Unscheduled DNA synthesis assay - negative							
Carbaryl [63-25-2]	0.06 ppm {0.5 mg/m^3}	2008	Cholinesterase inhibition; male reproductivesystem damage; embryo damage	Best and Murray 1963; Carpenter et al. 1961; Smalley et al. 1968; Wills et al. 1968; Xia et al. 2005 (1961-2005)	Ames tests - weakly positive; Chromosomal aberrations - positive; SCE - positive; Unscheduled DNA synthesis assay - positive; micronucleus assay - positive	Summary Data only	No	No	No	No	None	Carbaryl 1-6, ACGIH 2008
Carbon black [1333-86-4]	3 mg/m^3 RPM	2011	Bronchitis	Gardiner et al. 2001; Harber et al. 2003; Knudson et al. 1983; Mauderly 1997; Puntoni et al. 2004; van Tongeren et al. 2002 (1983-2004)	"PAHs are tightly bound to CBs and this mechanism for particle-induced lung cancer in vivo is highly unlikely."	Summary Data only	No	No	No	No	None	Carbon black (CBs) 1-8, ACGIH 2011
Carbonyl sulfide [463-58-1]	5 ppm {12	2012	CNS impairment	Herr et al. 2007; Morgan	Ames tests - weakly positive	Summary	No	No	No	No	None	Carbonyl sulfide 1-4, ACGIH

	mg/m ^{3}}			et al. 2004; Roloff 1985; Sills et al. 2004 (1985-2007)		Data only						2012
Carfentrazone-ethyl [128639-02-1]	1 mg/m ^{3} RPM	2018	Liver damage; porphyrin effects	US EPA 1998 (1998)	Ames tests - negative; Chromosomal aberrations - negative; Unscheduled DNA synthesis assay - negative; micronucleus assay - negative	Summary Data only	No	No	No	No	None	Carfentrazone-ethyl 1-3, ACGIH 2018
Chlorine [7782-50-5]	0.1 ppm {0.29 mg/m ^{3}}	2018	Respiratory tract irritation; pulmonary edema	D'Alessandro et al. 1996; Evans 2005; IARC 1991; Malo et al. 1994; Rotman et al.1983; Wolf et al. 1995 (1983-2005)	"No studies of genotoxicity with gaseous chlorine were identified."	Summary Data only	No	No	No	No	None	Chlorine 1-7, ACGIH 2018
Chlorine dioxide [10049-04-4]	0.1 ppm {0.28 mg/m ^{3}} TLV-C	2018	Respiratory tract irritation; airway hyperreactivity; pulmonary edema	Dalhamm 1957; Ferris et al. 1967; Gloemme and Lundgren 1957; Hennebeger et al. 2005; Kennedy et al. 1991; Mehta et al. 2005; Paulet and Desbrou	Ames tests - positive; Chromosomal aberrations - negative; Comet assay - weak positive	Summary Data only	No	No	No	No	None	Chlorine dioxide 1-6, ACGIH 2018

				sses 1972; Toren et al. 1996a; Toren et al. 1996b (1957-2005)								
Chlorobromomethane [74-97-5]	200 ppm {1060 mg/m^3}	2009	CNS impairment	Highman et al. 1948; Torkelson et al. 1960 (1948-1960)	Ames tests - positive	Summary Data only	No	No	No	No	None	Chlorobromomethane 1-3, ACGIH 2009
1-Chloro-1-nitropropane [600-25-9]	2 ppm {10 mg/m^3}	2017	Eye irritation; URT irritation; pulmonary edema	Machle et al. 1945 (1945)	Ames tests - positive	Summary Data only	No	No	No	No	None	1-Chloro-1-nitropropane 1-2, ACGIH 2017
Chloroprene [126-99-8]	1 ppm {3.6 mg/m^3}	2017	Lung cancer; URT irritation; eye irritation	Bukowski 2009; Bulbulyan et al. 1998; Bulbulyan et al. 1999; Clary et al. 1978; Gooch and Hawn 1981; Himmelstein et al. 2004; Khachatryan 1972a; Khachatryan 1972b; Li et al. 1989; Marsh et al. 2007; Nystrom 1948; Pell 1978; Summer and Greim 1980;	Ames tests - equivocal; Chromosomal aberrations - equivocal; mirconucleus assay - equivocal	Summary Data only	No	No	No	No	None	Chloroprene 1-6, ACGIH 2017

				Trochimowicz et al. 1998; US NIOSH 1977; US NTP 1998; von Oettingen et al. 1936 (1936-2009)								
Chromium, [7440-47-3] and inorganic compounds Metallic chromium, as Cr(O); Trivalent chromium compounds, as Cr(III); Hexavalent chromium compounds, as Cr(VI) water and insoluble compounds	0.5 mg/m^3 as Cr(0); 0.003 mg/m^3 as Cr(III); 0.0002 mg/m^3 as Cr(VI); Chromyl chloride 0.0001 ppm	2018	Cr(0) - Respiratory tract irritation; Cr(III) - Respiratory tract irritation; asthma; Cr(IV) - Lung cancer; sinonasal cancer; Respiratory tract irritation; asthma	Bloomfield and Blum 1928; Crump et al. 2003; DaCosta et al. 1916; Derelanko et al. 1999; Gibb et al. 2000a; Gibb et al. 2000b; Gibb et al. 2015; Glasser et al. 1985; Glasser et al. 1990; Gross et al. 1968; Hanslian et al. 1967; Henderson et al. 1979; Huvinen et al. 1993; Huvinen et al. 1996; Huvinen et al. 2013;	Cr(0) - "no human studies were identified for carcinogenicity or genotoxicity of Cr(0)."; Cr(III) - Ames tests - weakly positive; Chromosomal aberrations - equivocal; SCE - equivocal; micronucleus assay - positive Cr(VI) - Ames tests - positive; Chromosomal aberrations - positive; SCE - positived; micronucleus assay - positive	Summary Data only	No	No	Yes (5)	No	None	Chromium [Cr(O); Cr(III); Cr(VI)] 1-30, ACGIH 2018

				IARC 1990; IPCS 1988; IPCS 2009; IPCS 2013; Johansson et al. 1980; Johansson et al. 1986a; Johansson et al. 1986b; Langard 1989; Langard 1990; Lieberman 1941; Lindberg and Hedenstiernsa 1983; Lucas and Kramkowski 1975; Luippold et al. 2003; Norseth 1986; Park et al. 1994; Park et al. 2004; Park et al. 2006; Polak et al. 1973; UK HSE 1989; US ATSDR 1989; US ATSDR 2012; US NIOSH 2013; US NTP 2010 (1916-2015)								

Citral [5392-40-5]	5 ppm {32 mg/m^3}	2010	Body weight effects; URT irritation; eye damage	Cardullo et al. 1989; Dieter et al. 1993; Engelstein et al. 1996; Frosch et al. 2002; Gaworski et al. 1992; Geldof et al. 1992; Heydorn et al. 2003; Hindle et al. 2007; Motoyoshi et al. 1979; NTP 2003; Nogueira et al. 1995; Rothenborg et al. 1997; Schnuch et al. 2007; Scolnik et al. 1994; Servadio et al. 1986; Steltenkamp et al. 1980 (1979-2007)	Ames tests - negative; SCE - positive; Chromosomal aberrations - negative; micronucleus assay - negative	Summary Data only	No	No	No	No	None	Citral 1-6, ACGIH 2014
Clopidol [2971-90-6]	3 mg/m^3 RPM	2013	Mutagenic effects	Bao et al. 1992; Jiang et al. 1999; McCollister et al. 1963a; McCollister et al. 1963b; Molello et al.	Ames tests - negative; Dominant-lethal assay - weak evidence; SCE - positive; micronucleus assay - positive	Summary Data only	No	No	No	No	None	Clopidol 1-3, ACGIH 2013

				undated; Woodhouse et al. 1965 (undated -1992)								
Cresol, all isomers [95-48-7; 106-44-5;108-39-4; 1319-77-3]	20 mg/m^3 RPM	2010	URT irritation	Altmann et al. 1986; Boutwell and Bosch 1959; Green 1975; Hirose et al. 1986; Koizumi et al. 2003; Larcan et al. 1974; NTP 1992; NTP 2008; Yanysheva et al. 1993 (1959-2008)	Ames tests - negative; SCE - negative; micronucleus assay - negative	Summary Data only	No	No	Yes (1)	No	None	Cresol, all isomers 1-3, ACGIH 2013
Cyanoacrylates, Ethyl [7085-85-0] (ECA) and Methyl (137-05-3] (MCA)	0.2 ppm {1 mg/m^3}	2018	Eye irritation; URT irritation; asthma	Bhargava et al. 2012; Bruze et al. 1995; Calnan 1979; Conde-Salazar and Guimaraens 1998; Constandt et al. 2005; Coover et al. 1990; de Fonseka 1976; Dean and Krenzelok 1989; Goodman et al.	ECA - Ames tests - negative MCA - Ames tests - positive in TA100, negative in all other strains	Summary Data only	No	No	No	No	None	Cyanoacrylates 1-8, ACGIH 2018

				2000; Kopp et al. 1985; Lee and London 1985; Lenzi et al. 1974; Lindstrom et al. 2013; Lozewicz et al. 1985; Margo and Trobe 1982; McGee et al. 1968; Nakazawa 1990; Quirce et al. 2001; Smith et al. 1985; Toriumi et al. 1990; Zumpino et al. 1982 (1974-2013)								
Cyanogen [460-19-5]	5 ppm {10.6 mg/m3} TLV-C	2016	Eye and URT irritation; pulmonary edema	Lewis et al. 1984; McNerney and Schrenk 1960; O'Neil et al. 2006; US NLM no date (no date-2006)	Not Reported	Summary Data only	No	No	No	No	None	Cyanogen 1-2, ACGIH 2016
Cyanogen bromide [506-68-3]	0.3 ppm {0.75 mg/m3} TLV-C	2015	Eye and URT irritation	Clayton and Clayton 1994; Dow Chemical Company 1992; Prentiss 1937; US Army	Not Reported	Summary Data only	No	No	No	No	None	Cyanogen bromide 1-3, ACGIH 2015

				1999; US EPA 1995 (1937-1999)								
Cyanogen chloride (506-77-4]	0.3 ppm {1.3 mg/m^3} TLV-C	2014	Eye and URT irritation; pulmonary edema	Clayton and Clayton 1994; Prentiss 1937; US Army 2007; US EPA 1995 (1937-2007)	Not Reported	Summary Data only	No	No	No	No	None	Cyanogen chloride 1-3, ACGIH 2014
2,4-D [94-75-7]	10 mg/m^3	2017	Thyroid effects; kidney tubular damage	Blondell 2004; Bradberry et al. 2000; Bradberry et al. 2004; Burns et al. 2001; Charles et al. 1996a; Charles et al. 1996b; Gorzinski et al. 1987; Griffin et al. 1997; Kogevinas et al. 1997; Munro et al. 1992; Saghir et al. 2006; Sauerhoff et al. 1997; Timchalk 2001; US EPA 2005; Van Ravenswaay et al. 2003 (1987-	Ames assays - negative; Chromosomal aberrations - negative; Dominant-lethal assay - negative; SCE - positive	Summary Data only	No	No	No	No	None	2,4-D 1-10, ACGIH 2017

				2006)								
Diacetyl [431-03-8]	0.01 ppm {0.04 mg/m^3}	2012	Lung damage (bronchiolitis obliterans-like illness)	Akpinar-Elci et al. 2002; Akpinar-Elci et al. 2005; Ashley et al. 2008; Cox-Ganser et al. 2011; Egilman et al. 2011; Gloede et al. 2011; Kanwal et al. 2006; Lockey et al. 2009; Maier et al. 2010; MMWR 2002; Morris and Hubbs 2009; NIOSH 2004; NIOSH 2011; Parmet et al. 2002; Stoner et al. 1973; White et al. 2010 (1973-2011)	Ames test - TA98 negative, TA100 and TA104 positive	Summary Data only	No	No	No	No	No ne	Diacetyl 1-9, ACGIH 2012
Dibutyl phosphate [107-66-4]	0.6 ppm {5.0 mg/m^3}	2009	Bladder irritation; eye irritation; URT irritation	Abou-Donia 1981; Auletta et al. 1998; IPCS 1994; JMHW 1995; Suzuki et al. 1984	Ames test - negative; Chromosomal aberrations -negative	Summary Data only	No	No	No	No	No ne	Dibutyl phosphate 1-4, ACGIH 2009

				(1981-1998)								
Dieldrin [60-57-1]	0.1 mg/m^3 RPM	2010	Liver damage; reproductive effects; CNS impairment	Ashwood-Smith 1981; IARC 1974; IARC 1987; Jager 1970; Ortega et al. 1957; Treon and Cleveland 1955; US NCI 1978a; US NCI 1978b (1955-1987)	Ames tests -negative; Chromosomal aberrations - negative; SCE - negative; micronucleus assay - negative	Summary Data only	No	No	No	No	None	Dieldrin 1-7, ACGIH 2010
Diesel Fuel [68334-30-5; 68476-30-2; 68476-31-3; 68476-34-6] as total hydrocarbons	100 mg/m^3 RPM	2008	CNS impairment; Liver damage	ATSDR 1995; Barrientos et al. 1977; Biles et al. 1988; Callahan et al. 1983a; Callahan et al. 1983b; Charbonneau et al. 1989; Chu et al. 1989; Cowan and Jenkins 1981; Crisp et al. 1979; Dalbey et al. 1987; Dalbey and Lock 1982; Dalbey et al. 1982a; Dalbey	Ames tests - negative; Dominant-lethal assay - negative; micronucleus assay - negative	Summary Data only	No	No	No	No	None	Diesel Fuel 1-11, ACGIH 2008

				et al. 1982b; Easley et al. 1982; Freeman et al. 1993; Gaworski et al. 1985; Gerhart et al. 1988; Jungen et al. 1995; Kainz and White 1982; Kainz and White 1984; Khanna et al. 2004; Kim et al. 2006; Lee et al. 1988; Lock et al. 1984; NTP 1986; Skyberg et al. 1990; Swenberg et al. 1989; Witschi et al 1987 (1982-2006)								
Diethanolamine [111-42-2]	0.2 ppm {1.0 mg/m^3} RPM	2009	Liver and kidney damage	Beyer et al. 1983; Eastman-Kodak, undated; Hartung et al. 1970; US NTP 1992; US NTP 1997	Ames tests - positive; Chromosomal aberration - negative; SCE - negative; Mouse lymphoma cell assay - negative	Summary Data only	No	No	No	No	None	Diethanolamine 1-6, ACGIH 2009

				(undated -1997)								
Diethylamine [109-89-7]	5.0 ppm {15.0 mg/m^3} RPM	2013	URT irritation, eye, and skin irritation	Lundquist et al. 1992; NTP 2011; Smyth et al. 1951 (1951-2011)	Ames tests - negative; Unscheduled DNA synthesis - negative	Summary Data only	No	No	No	No	None	Diethylamine 1-5, ACGIH 2013
Diethylene glycol monobutyl ether [112-34-5]	10.0 ppm {67.5 mg/m^3} RPM	2013	Hematologic, liver and kidney effects	European Chemicals Bureau 1999; Johnson et al. 2005 (1999-2005)	Ames tests - negative; Unscheduled DNA synthesis - negative; micronucleated polychromatic erythrocyteassay - negative	Summary Data only	No	No	No	No	None	Diethylene glycol monobutyl ether 1-6, ACGIH 2013
N,N-Diethylhydroxylamine [3710-84-7]	2 ppm {7.3 mg/m^3}	2013	URT irritation	Atofina 2001; Elf Atochem North America 2005a; Elf Atochem North America 2005b; Elf Atochem North America 2005c; Heicklen et al. 1981; Legator et al. 1979; Munzner and Filby 1979; Pennsalt Chemicals 1957; Pennwalt Corporation 1975; Pennwal	Ames tests - negative; Unscheduled DNA synthesis - positive; micronucleated erythrocyte assay - negative; Dominant-lethal assay - equivocal	Summary Data only	No	No	No	No	None	N,N-Diethylhydroxylamine 1-4, ACGIH 2013

				t Corporation1977a; Pennwalt Corporation 1977b; Pennwalt Corporation 1980; Pennwalt Corporation 1989 (1957-2005)								
Dimethylcarbamoyl chloride [79-44-7]	0.005 ppm {0.2 mg/m^3}	2018	Nasal cancer; URT irritation	Ashby et al. 1982; Brooks and Dean 1981; Burns et al. 1989; Caspary et al. 1988; Dean 1981; Dellarco et al. 1986; Dunkel et al. 1981; Fouremann et al. 1994; Frentzel-Beyme et al. 1976; Green 1982; Katz et al. 1981; Kirkhart 1981; Loprieno 1981; MacDonald 1981; Martire et al.	Ames tests - positive; micronucleated erythrocyte assay - positivel	Summary Data only	No	No	No	No	None	Dimethylcarbamoyl chloride 1-5, ACGIH 2018

				1981; Mehta and Von Borstel 1981; Mukai 1976; Perry 1986; Pienta 1980; Salamone et al. 1981; Sellakumar et al. 1989; Simmon 1979; Snyder et al. 1986; Steinhoff et al. 1986; Sugiki et al. 1992; Thomson 1981; Tweats 1981; Van Duuren et al. 1972; Van Duuren et al. 1974; Van Duuren et al. 1987; Venitt and Crofton-Sleigh 1981; Von Hey et al. 1974 (1972-1994)								
Dimethylacetamide [127-19-5]	10 ppm {36 mg/m^3}	2018	Liver damage; reproductive effects;	JISHA 2013; Johnson 1961; Klimisch	Ames tests - negative; Unscheduled DNA synthesis -	Summary Data	No	No	No	No	None	Dimethylacetamide 1-8, ACGIH 2018

			embryo and fetal damage; teratogenic effects; renal effects	and Hellwig 2000; Malley et al. 1995; Marino et al. 1994; Okuda et al. 2006; OECD 2001; Stula and Krauss 1977; Weiss et al. 1962a; Weiss et al. 1962b (1961-2013)	negative; SCE - positive	only						
Dimethylamine [124-40-3]	5 ppm {9.2 mg/m^3}	2014	URT and LRT and gastrointestinal irritation	Buckley et al. 1985; CIIT 1990; Coon et al. 1970; Friemann and Overhoff 1956; Kantoh et al. 1985; Koch et al. 1980; Kremneva and Sanina 1961; Mellerio and Weale 1966; Mezentzeva 1956; Steinhagen et al. 1982 (1956-1990)	Ames tests - weakly mutagenic; Unscheduled DNA synthesis - negative; SCE - negative; Chromosomal aberrations - negative	Summary Data only	No	No	No	No	None	Dimethylamine 1-4, ACGIH 2014
Dimethylformamide	5 ppm	2018	Liver damage;	Cai et al. 1992;	Ames assays -	Summ	No	No	No	No	None	Dimethylformamide

[68-12-2]	{15 mg/m^3}		eye irritation; URT irritation	Chang et al. 2005; Cirla et al. 1984; Fiorito et al. 1997; Kennedy and Sherman 1986; Lynch et al. 2003; Malley et al. 1994; Potter 1973; Redlich et al. 1988; Redlich et al. 1990; Senoh et al. 2004; Tomasini et al. 1983; US NTP 1992; WHO 1991; Wrbitzky et al. 1996 (1983-2003)	negative; Chromosomal aberrations - negative; SCE - negative; Dominant-lethal assay - negative	y Data only						1-10, ACGIH 2018
Endosulfan [115-29-7]	0.006 ppm {0.1 mg/m^3} RPM	2009	LRT irritation; liver and kidney damage	Aguilar and Misra 2004; Ansari et al. 1984; Das and Garg 1981; Dikshith and Datta 1978; Dikshith et al. 1978; FMC 1980; Gilbert 1992; Gupta et	Ames assays - equivocal; Chromosomal aberrations - equivocal; SCE - eqivocal; micronucleus assay - equivocal	Summary Data only	No	No	No	No	None	Endosulfan 1-8, ACGIH 2009

				al. 1981; Hoechst 1984a; Hoechst 1984b; Hoechst 1985; Hoechst 1989a; Hoechst 1989b; Paul et al. 1995; Raizada et al. 1991; Sinha et al. 2001; Smith 1991 (1978-2004)								
Ethanol [64-17-5]	1000 ppm {1880 mg/m^3} TLV-STEL	2009	URT irritation	Bevan 2001; IARC 1998; Lester and Greenberg 1951; Muller and Greff 1984; Nelson et al. 1985a; Nelson et al. 1985b; Seeber et al. 1997; Soffritti 2002 (1951-2002)	Gernerally found to be non-genotoxic; SCE - positive	Summary Data only	No	No	No	No	None	Ethanol 1-4, ACGIH 2009
Ethyl formate [109-94-4]	100 ppm {303 mg/m^3} TVL-STEL	2012	URT irritation	Flury and Neumann 1938; Flury and Zernik 1931; Opdyke 1978; Rady et	Ames assays - negative	Summary Data only	No	No	No	No	None	Ethyl formate 1-4, ACGIH 2012

				al. 1981; Roe and Salaman 1955; Smyth et al. 1954; Stoner et al. 1973; van Thriel et al. 2006 (1931-2006)								
Ethyl isocyanate [109-90-0]	0.02 ppm {0.06 mg/m^3}	2014	URT and eye irritation	Eastman Kodak 1964; Fowler and Dodd 1985; Kimmerle and Eben 1964; Mellon Institute 1970 (1964-1985)	Not Reported	Summary Data only	No	No	No	No	None	Ethyl isocyanate 1-3, ACGIH 2014
Ethyl tert-butyl ether [637-92-3]	25 ppm {105 mg/m^3}	2013	URT and LRT irritation; CNS impairment	JPEC Not dated; Medinsky et al. 1999; Nihlen et al. 1998a; Nihlen et al. 1998b; White et al. 1995 (Not dated-1999)	Ames assays - negative; Chromosomal aberrations - negative; micronucleus assay - negative	Summary Data only	No	No	No	No	None	Ethyl tert-butyl ether 1-5, ACGIH 2013
Ethylamine [75-04-7]	5 ppm {9 mg/m^3}	2013	URT irritation	Brieger and Hodes 1951; Fasset 1963; Lynch et al. 1988 (1951-1988)	Ames assays - negative; SCE - positive; Unscheduled DNA synthesis - negative	Summary Data only	No	No	No	No	None	Ethylamine 1-3, ACGIH 2013
Ethylbenzene [100-41-4]	20 ppm {87	2011	URT irritation; kidney	Bardodej and Bardodej	Ames assays - negative;	Summary	No	No	No	No	None	Ethylbenzene 1-8, ACGIH

	mg/m^3}		damage (neuropathy); cochlear impairment	ova 1970; Dutkiewicz and Tyras 1967; Gagnaire and Langlais 2005; Opdyke 1975; Smyth et al. 1962; NTP 1999; Wolf et al. 1956; Yant et al. 1930 (1930-1999)	SCE - weakly positive; Mouse lymphoma assay - positive; micronuclei assay - negative	Data only						2011
Ethylene glycol [107-21-1]	25 ppm Vapor Fraction	2017	URT irritation	Bond et al. 1985; Coon et al. 1970; Corley et al. 2005; Cruzan et al. 2004; DePass et al. 1986a; DePass et al. 1986b; Dunkelberg 1987; Frantz et al. 1989; Frantz et al. 1991; McDonald et al. 1972; Robinson et al. 1990; Tucker and Deye 1981; US NTP 1991; Wills et al. 1974	Ames assays - negative; SCE - negative; Chromosomal aberrations - negative; Mouse lymphoma assay - negative; Dominant-lethal assay - negative	Summary Data only	No	No	No	No	None	Ethylene glycol 1-11, ACGIH 2017

				(1970-1991)								
Ethyleneimine [151-56-4]	0.05 ppm {0.09 mg/m^3}	2009	URT irritation; liver and kidney damage	Carpenter et al. 1948; Innes et al. 1969; Reinhardt and Brittelli 1981; Walpole et al. 1954; Zaeva et al. 1966 (1948-1981)	Mutagenic in numerous bacrteial assays; Chromosomal aberrations - positive; SCE - positive	Summary Data only	No	No	No	No	None	Ethyleneimine 1-4, ACGIH 2009
Ethylidenenorbornene [16219-75-3]	2 ppm {10 mg/m^3}	2014	URT and eye irritation	Ballantyne et al. 1997; Kinkead et al. 1971 (1971-1997)	Ames assays - negative; SCE - negative	Summary Data only	No	No	No	No	None	Ethylidenenorbornene 1-3, ACGIH 2014
Ferbam [14484-64-1]	5 mg/m^3 RPM	2009	CNS impairment; body weight effects; spleen damage	Hodge et al. 1952; Hodge et al. 1956; Korablev 1969; Lee et al. 1978; Quinto et al. 1989; EPA 2005 (1952-2005)	Ames assays - positive; Chromosomal aberrations - positive	Summary Data only	No	No	No	No	None	Ferbam 1-4, ACGIH 2009
Fludioxonil [131341-86-1]	1 mg/m^3 Vapor Fraction	2018	Liver damage; kidney damage	FAO 2004; US EPA 2009 (2004-2009)	Ames assays - negative; Unscheduled DNA synthesis assay - negative; micronucleus assay - negative; Dominant-lethal assay - negative	Summary Data only	No	No	No	No	None	Fludioxonil 1-4, ACGIH 2018
Folpet [133-07-3]	1 mg/m	2017	Liver damage;	Barel et al. 1985;	Ames assays -	Summ	No	No	No	No	None	Folpet 1-7, ACGIH

	^{3} RPM		body weight effects	Cox et al. 1985; Crown et al. 1985; Crown et al. 1989; Daly and Knezevich 1986; Eisenlord and Wong 1982; Feussner 1984; Garrett et al. 1986; Hardy and Richter 1985; IARC 1983; Reno et al. 1981 (1981-1989)	positive; Mouse lymphoma assay - positive; Comet assay - positive; micronucleus assay - negative; Dominant-lethal assay - negative	y Data only						2017
Formaldehyde [50-00-0]	0.1 ppm {0.12 mg/m^{3}}	2017	URT and eye irritation; URT cancer	Alexandersson and Hedenstierna 1988; Andersen and Molhave 1983; Arrandale et al. 2012; Bardana and Andrach 1983; Beane Freeman et al. 2009; Berrins et al. 1964; Bono et al. 2010; Casanova et al. 1989; Casanov	Mutagenic assays - weak mutagen Dominant-lethal assay - equivocal	Summary Data only	No	No	Yes (2)	No	None	Formaldehyde 1-36, ACGIH 2017

				a et al. 1991; Chang et al. 1983; Conolly et al. 2004; Costa et al. 2011; de Jong et al. 2009; Dearman et al. 1999; Edling et al. 1988; Feron et al. 1988; Freeman and Grendon 1971; Glass 1961; Hendrick and Lane 1977; Hendrick et al. 1982; Hildesheim et al. 2001; Holness and Nethercott 1989; Horvath et al. 1988; Imbus 1985; Kerns et al. 1983; Kim et al. 2001; Kimbell et al. 2001; Lang et al. 2008; Matsunaga et al. 2008; Maurice et al. 1986;								

				Monticello et al. 1989; Monticello et al. 1996; Nordman et al. 1985; O'Quinn and Kennedy 1965; Overton et al. 2001; Peck and Palitz 1956; Perrenoud et al. 1994; Porter 1975; Roush et al. 1987; Rusch et al. 1983; Schachter et al. 1986; Sellakumar et al. 1985; Speit et al. 2011; Starr and Swenberg 2013; Starr and Swenberg 2016; Uehara 1978; US ATSDR 1997; US NAS 2014; Vandenplas et al. 2004; Vaughan et al. 1986a; Vaughan et al. 1986b; Vaughan							

				et al. 2000; Viegas et al. 2010; West et al. 1993 (1961-2014)								
Furfural [98-01-1]	0.2 ppm {0.8 mg/m^3}	2017	URT irritation; eye irritation	Arts et al. 2004; Clark Burton and Kawamoto 1995; Joseph 2006; Morimoto et al. 2007; US NTP 1990; US NTP 1999 (1990-2007)	Ames tests - equivocal; Mouse lymphoma assay - positive	Summary Data only	No	No	No	No	None	Furfural 1-7, ACGIH 2017
Furfuryl alcohol [98-00-0]	0.2 ppm {0.8 mg/m^3}	2017	URT irritation; eye irritation	Ahman et al. 1991; Apol 1973; Sujatha 2008; US NTP 1990; US NTP 1999; Woods and Seevers 1979 (1973-2008)	Ames tests - negative; Chromosomal aberrations - negative; SCE - positive	Summary Data only	No	No	No	No	None	Furfuryl alcohol 1-7, ACGIH 2017
Hard Metals containing Cobalt [7440-48-4] and Tungsten carbide [12070-12-1] , as Co	0.005 mg/m^3 as Co	2016	Pneumonitis	Davison et al. 1983; De Boeck et al. 2003; Lasfargues et al. 1994; Lison et al. 1996; Moulin et al. 1998; Sprince et al.	Single-cell gel and alkaline elution assays were found to induce DNA single strand breaks in human peripheral blood lymphocyt	Summary Data only	No	No	No	No	None	Hard Metals containing Cobalt 1-8, ACGIH 2016

				1984; Wild et al. 2000 (1983-2000)	es.							
Hexafluoropropylene [116-15-4]	0.1 ppm {0.6 mg/m^3}	2010	Kidney damage	Anders et al. 1988; Carpenter et al. 1985; Clayton 1977; Dilley et al. 1974; DuPont Company 1960; Green and Odum 1985; Japan Bioassay Research Center 2006; Koob and Dekant 1990; Lock 1988; Paulet and Debrousses 1965; Smirnova 1971; Stadler and Rickard 1988 (1960-2006)	Ames tests - negative; Chromosomal aberrations - positive	Summary Data only	No	No	No	No	None	Hexafluoropropylene 1-5, ACGIH 2010
Hexylene glycol [107-41-5]	25 ppm Vapor Fraction	2017	URT irritation and eye irritation	Epstein 1978; Fabreguettes 1999; Fischer et al. 1968; Gardner 1996; Hine et al. 1955;	Ames tests - negative; Chromosomal aberrations - negative	Summary Data only	No	No	No	No	None	Hexylene glycol 1-5, ACGIH 2017

				Procter 1966; Silverman et al. 1946; Union Carbide Corp 1976; Wills et al. 1974 (1946-1999)								
Hydrogen sulfide [7783-06-4]	1 ppm {1.4 mg/m^3}	2010	URT irritation; CNS impairment	ATSDR 1999; Barthemy 1939; Beauchamp et al. 1989; Bhambhani Y and Singh 1991; Bhambhani et al. 1994; Bhambhani et al. 1996a; Bhambhani et al. 1996b; Bhambhani et al. 1997; Blackstone et al. 2005; Brenneman et al. 2000; Dorman et al. 2004; Elkins 1950; Fiedler et al. 2008; Fuller and Suruda 2000; Grant 1986; Kimura et al.	Ames tests in TA97, TA98, TA100 - negative; TA1535 test - slightly positive	Summary Data only	No	No	No	No	No ne	Hydrogen sulfide 1-8, ACGIH 2010

				2005; Masure 1950; Milby 1962; Milby and Baselt 1999; Nesswetha 1969; NCM 2001; US EPA 2003; van Aalst et al. 2000 (1939-2008)								
Hydroquinone [123-31-9]	1 mg/m^3	2008	Eye irritation; eye damage	Alder and Kliesch 1990; Anderson and Oglesby 1958; Barale et al. 1990; Basketter and Scholes 1992; Chatterjee and Sharma 1972; Ciranni et al. 1988; Crebelli et al. 1987; Gad-El-Karim et al. 1986; Galloway et al. 1987; Gocke et al. 1981; Goodwin et al. 1981; Liden 1988; Liden	Ames test - negative; Chromosomal aberrations - positive; SCE - positive; micronuclei - positive;	Summary Data only	No	No	No	No	None	Hydroquinone 1-9, ACGIH 2014

				and Boman 1988; Morieart y et al. 1978; NIOSH 1978; NTP 1989; Oglesby et al. 1947; Olumide 1985; Pacchier otti et al. 1991; Shibata et al. 1991; Sterner et al. 1947; Tunek et al. 1982; Van der Walle et al. 1982 (1947-1992)								
Indene [95-13-6]	5 ppm {24 mg/m^3}	200 8	Liver damage	Cameron and Donlger 1939; Terril 1987 (1939-1987)	Ames test (4 strains) - negative	Sum mar y Dat a only	No	No	No	No	No ne	Indene 1-3, ACGIH 2008
Iodine [7553-56-2] and Iodides	0.01 ppm {0.1 mg/m^3}	200 8	Hypothyr oidism; URT irriration	Amdur 1978; Flury and Zernik 1931; IOM 2000; Morgan et al. 1968 (1931-2000)	Lymphoma assay - negative	Sum mar y Dat a only	No	No	Yes (1)	No	No ne	Iodine and Iodides 1-5, ACGIH 2008
Lead chromate [7758-97-6] as Cr (VI)	0.000 2 mg/m^3 RPM	201 8	Lung cancer; sinonasal cancer; respirator y tract	Holmes et al. 2006; Wise et al. 1994; Wise et	Ames positive 6 strains; Chromoso mal aberration	Sum mar y Dat a only	No	No	No	No	No ne	Lead chromate 1-5, ACGIH 2018

			irritation; asthma	al. 2002; Wise et al. 2004a; Wise et al. 2004b; Wise et al. 2006a; Wise et al. 2006b; Wise et al. 2010; Xie et al. 2005; Xie et al. 2007 (1994-2010)	s positive; Comet assay positive							
Lithium hydride [7580-67-8]	0.05 mg/m^3 RPM TLV-C	2015	Eye irritation; respiratory tract irritation	Spiegl et al. 1956 (1956)	Not Reported	Summary Data only	No	No	No	No	None	Lithium hydride 1-4, ACGIH 2015
Maleic anhydride [108-31-6]	0.0025 ppm {0.01 mg/m^3} RPM and Vapor	2011	Respiratory sensitization	Barker et al. 1998; Baur et al. 1995; Covance 1999; Dearman et al. 2000; Dearman et al. 2002; Dickens and Jones 1961; Dickens and Jones 1963; Durham et al. 1987; Durham et al. 1992; Graneek et al. 1987; Grigor'eva 1966;	Four strains of Ames - negative; Chromosomal aberrations -negative	Summary Data only	No	No	No	No	None	Maleic anhydride 1-6, ACGIH 2014

				IIT Research Institute 1983; Kanerva and Alanko 2000; Klein 1965; Lee et al. 1991; Motolese et al. 1993; Seidenari et al. 1990; Short et al. 1988; Topping et al. 1986 (1961-2002)								
Manganese [7439-96-5], elemental and inorganic compounds as Mn	0.02 mg/m^3 RPM	2013	CNS impairment	ATSDR 2000; Bast-Pettersen et al. 2004; Bouchard et al. 2007a; Bouchard et al. 2007b; Crump and Rousseau 1999; Ellingsen et al. 2003; IPCS 1981; Levy et al. 2003; Lucchini et al. 1999; Mergler et al. 1994; Park et al. 2006; Roels et al. 1987;	Not mutagenic in Ames tests; SCE - positive	Summary Data only	No	No	Yes (2)	No	None	Manganese 1-18, ACGIH 2013

				Roels et al. 1992; Tjalve et al. 1995; Tjalve and Henriksson 1999; Young et al. 2005 (1981-2007)								
Methanol [67-56-1]	200 ppm {262 mg/m^3}	2009	Headache; dizziness; nausea; eye damage (degeneration of ganglion cells in the retina)	Browning 1965; Gosselin et al. 1984; Henson 1960; McNally 1937; Rowe et al. 1982; US NIOSH 1997 (1937-1997)	Mutagenic in RK+ test; non-mutagenic in all other microbial and mamalian tests.	Summary Data only	No	No	No	No	None	Methanol 1-5, ACGIH 2009
Methomyl [16752-77-5]	0.2 mg/m^3 RPM and Vapor	2014	Acetylcholinesterase inhibition; male reproductive damage; hematologic effects	Baron 1991; Brock 1989; Cable and Doherty 1999; Foster 1966; Hayes 1982; Kaplan and Sherman 1977; Serota et al. 1981; Shalaby et al. 2010; Tsatsakis et al. 2001 (1966-2010)	All strains of Ames - Negative;Chromosomal aberration - positive; micronuclei - positive; Mutatox test-positive; SCE - positive	Summary Data only	No	No	No	No	None	Methomyl 1-7, ACGIH 2014
1-Methoxy-2-propanol	50 ppm {184 mg/m	2013	Eye and URT irritation	Brieger et al. 2008; Carney	CHO - negative; 5 strains Ames -	Summary Dat	No	No	No	No	None	1-Methoxy-2-propanol

[107-98-2]	^{3}}			et al. 1999; Emmen et al. 2003; Lamb et al. 1997; Landry et al. 1983; Lemazurier et al. 2005; Rowe et al. 1959; Spencer et al. 2002; Stewart et al. 1970 (1959-2008)	negative; SCE - slight positive; micronuclei - negative	a only						1-9, ACGIH 2013
Methyl acetate [79-20-9]	200 ppm {606 mg/m^{3}}	2013	Headache; dizziness; nausea; eye damage (degeneration of ganglion cells in the retina)	Browning 1965; Gosselin et al. 1984; Henson 1960; Hofmann 1999; McNally 1937; Schmid 1956; US NIOSH 1976 (1937-1999)	5 strains of Ames - Negative; No mitotic recombinationor point mutations; red blood cell micronuclei - negative	Summary Data only	No	No	No	No	None	Methyl acetate 1-5, ACGIH 2013
Methyl formate [107-31-3]	50 ppm {123 mg/m^{3}}	2015	CNS impairment; URT irritation; eye damage	BASF AG 2001; Duquenois and Revel 1935; Gettler 1940; Nihlen and Droz 2000; Schrenk et al. 1936; Sethre et al. 2000a; Sethre et	5 strains of Ames - Negative	Summary Data only	No	No	No	No	None	Methyl formate 1-4, ACGIH 2015

				al. 2000b (1935-2001)								
Methyl isoamyl ketone [100-12-3]	20 ppm {96 mg/m^3}	2013	CNS impairment; URT irritation	DeCeauriz et al. 1984; Silverman et al. 1946 (1946-1984)	Ames testing - Negative	Summary Data only	No	No	No	No	None	Methyl isoamyl ketone 1-4, ACGIH 2013
Methyl isobutyl ketone [108-10-1]	20 ppm {82 mg/m^3}	2010	Dizziness; headache; URT irritation	Armeli et al. 1968; lregren et al. 1993; Linari et al. 1964; Silverman et al. 1946; US NTP 2006; Wigaeus-Hjelm et al. 1990 (1946-2006)	Ames testing - Negative; Mouse lymphoma assay equivocal	Summary Data only	No	No	No	No	None	Methyl isobutyl ketone 1-8, ACGIH 2010
Methyl isocyanate [624-83-9]	0.02 ppm {0.047 mg/m^3}	2014	URT and eye irritation	Avashia det al. 1996; Fowler and Dodd 1985; Jeevaratnam and Sriramachari 1994; Kimmerle and Eben 1964; Mellon Institute 1963; Mellon Institute 1970; Union Carbide 1981; Varma 1991 (1963-1996)	5 strains of Ames - Negative; SCE - positive; Mouse lymphoma assay - positive	Summary Data only	No	No	No	No	None	Methyl isocyanate 1-6, ACGIH 2014
Methyl	20	201	Embryo/f	Bernard	Induced	Sum	No	No	No	No	No	Methyl

isopropyl ketone [563-80-4]	ppm {70 mg/m^3}	1	etal damage; neonatal toxicity	2001 (2001)	mitotic chromosomal malsegregation and point mutations using a diploid yeast strain.	mary Data only					ne	isopropyl ketone 1-3, ACGIH 2011
Methyl parathion [298-00-0]	0.02 mg/m^3 RPM and Vapor	2009	Cholinesterase inhibition	EPA 1998; Gaines 1960; Gaines 1969; Morgan et al. 1977; Rider et al. 1969; Rider et al. 1970; Rider et al. 1971; Rodnitzky et al. 1978 (1960-1998)	Ames tests equivocal; SCE - positive; Chromosomal aberrations - positive; Mouse-dominant lethal assay - negative	Summary Data only	No	No	No	No	None	Methyl parathion 1-13, ACGIH 2009
Methylacrylonitrile [126-98-7]	1 ppm {2.7 mg/m^3}	2011	CNS impairment; eye ans skin irritation	Hartung 1982; McOmie 1949; Pozzani et al. 1968; Smyth et al. 1962; US NTP 2001 (1949-2001)	Ames tests - negative; peripheral blood micronuclei - negative	Summary Data only	No	No	No	No	None	Methylacrylonitrile 1-4, ACGIH 2011
Methylamine [74-89-5]	5 ppm {6.4 mg/m^3}	2013	URT irritation, skin, and eye irritation	Beard and Noe 1981; Goffman and McGuire 1980; Kinney et al. 1990 (1980-1990)	Ames tests - negative; Mouse lymphoma cell assay - positive	Summary Data only	No	No	No	No	None	Methylamine 1-4, ACGIH 2013
α-Methylsty	10 ppm	**2010**	URT irritation;	NTP 2007;	Ames tests - negative;	Summ	No	No	Yes (3)	No	None	α-Methylsty

rene [98-83-9]	{48 mg/m^3}		kidney damage; female reproductive system damage	Wolf et al. 1956 (1956-2007)	SCE - positive; Chromosomal aberrations - negative; micronucleated erythrocytes assay - negative	y Data only						rene 1-7, ACGIH 2010
Mineral oil, excluding metal working fluids	Pure - 5 mg/m^3 RPM; Not refined - No TLV	2010	URT irritation	Burr et al. 1994; Dalbev 2001; Mackerer et al. 2003; Moline et al. 2000; Savitz 2003; Segrade et al. 1990; Teschke et al. 2005; Varughese et al. 2005 (1990-2005)	Correlation between mutagenicity, PAH content, and carcinogenicity is weak.	Summary Data only	No	No	Yes (3)	No	None	Mineral oil 1-10, ACGIH 2010
Naththalene [91-20-3]	10 ppm {52 mg/m^3}	2014	URT irritation; cataracts; hemolytic anemia	Baldwin et al. 2004; Brusick 2008; Buckpitt et al. 2002; Buckpitt et al. 2012; Cruzan et al. 2009; Frasch et al. 2007; Ghetti and Mariani 1956; Lee et al. 2005; Recio et	Ames tests - negative; SCE - positive; Chromosomal aberrations - positive; micronucleus assay - equivocal	Summary Data only	No	No	No	No	None	Naththalene 1-9, ACGIH 2014

				al. 2012; Schreiner 2003; Smith et al. 1979; US NTP 1992; US NTP 2000; Walker et al. 1996; West et al. 2001 (1956-2008)								
Natural rubber latex [9006-04-6] as inhalable allergenic proteins	0.0001 mg/m^3	2008	Respiratory sensitization	Baur 2002; Chaiear et al. 2001; Cohen et al. 1998; German MAK Commission 2001; Miguel et al. 1996; Poley and Slater 2000; Sussman and Beezhold 1995; US FDA 1991; US NIOSH 1997; Woolhiser et al. 2000; Yip et al. 1994 (1991-2001)	Not Reported	Summary Data only	No	No	No	No	None	Natural rubber latex 1-7, ACGIH 2014
Nickel carbonyl [13463-39-3] as Ni	0.05 ppm {0.12 mg/m^3} TLV-C	2014	Lung irritation	Doll 1958; Lau et al. 1972; Morgan 1958; Sunderman et al.	Not Reported	Summary Data only	No	No	No	No	None	Nickel carbonyl 1-5, ACGIH 2014

				1957 (1957-1972)								
Nitrogen dioxide [10102-44-0]	0.2 ppm {0.38 mg/m^3}	2012	LRT irritation	Avissar et al. 2000; Barck et al. 2002; Blomberg et al. 1997; Blomberg et al. 1999; Frampton et al. 1991; Hazucha et al. 1983; Jenkins et al. 1999; Kleinman et al. 1983; Mohsenin 1988; Posin et al. 1978; Roger et al. 1990 (1978-2002)	Ames tests - equivocal; Chromosomal aberrations - negative; micronucleus assay - negative	Summary Data only	No	No	Yes (1)	No	None	Nitrogen dioxide 1-6, ACGIH 2012
Nonane [111-84-2]	200 ppm {1048 mg/m^3}	2012	CNS impairment	Carpenter et al. 1978; Kanikkannan et al. 2001; Nilsen et al. 1988 (1978-2001)	Ames tests - negative	Summary Data only	No	No	No	No	None	Nonane 1-4, ACGIH 2012
Oxalic acid, anhydrous [144-62-7] and dihydrate [6153-56-6]	1 mg/m^3	2015	Eye irritation; skin irritation; URT irritation	Gosselin et al. 1984; Laerum and Aarseth 1985; von Burg 1994; Webster 1930 (1930-1994)	Ames tests - negative; Chromosomal aberrations - negative	Summary Data only	No	No	No	No	None	Oxalic acid, anhydrous 1-5, ACGIH 2015
Paraquat	0.05	201	Lung	Castro-	Paraquat	Sum	No	No	No	No	No	Paraquat

[4685-14-7] as the cation	mg/m^3 RPM	8	damage; URT irritation	Gutierrez et al. 1997; D'Souza et al. 2005; D'Souza et al. 2006; Gage 1968; Hoppin et al. 2002; Kimbrough and Gaines 1970; Marrs and Adjei 2003; McElligott 1972; Soloukides et al. 2007 (1968-2006)	has minimal to no genotoxicity in most in vitro and in vivo assays; Chromosomal aberration - positive; micronuclei - positive; SCE - positive	Summary Data only					ne	1-7, ACGIH 2018
Pentachlorophenol [87-86-5]	0.05 ppm {0.5 mg/m^3}	2014	URT and eye irritation; CNS and cardiac impairment	Chhabra et al. 1999; Deichmann and Keplinger 1981; Gasiewicz 1991; Innes et al. 1969; IARC 1999; NTP 1989; NTP 1999; US NTIS 1968 (1968-1999)	Ames tests - negative	Summary Data only	No	No	No	No	None	Pentachlorophenol 1-9, ACGIH 2014
2,4-Pentanedione [123-54-6]	25 ppm {102 mg/m^3}	2011	Neurotoxicity; CNS impairment	Ballantyne 2001; Dodd et al. 1986; Frantz et al. 1998; Tyl et al. 1989	Ames tests - negative; SCE - positive; Chromosomal aberrations -	Summary Data only	No	No	No	No	None	2,4-Pentanedione 1-4, ACGIH 2011

				(1986-2001)	negative; micronucleus assay - equivocal							
Pentaerythritol [115-77-5]	10 mg/m^3 RPM	2013	Gastrointestinal irritation	Hayashi et al. 1992; Keplinger and Kay 1964 (1964-1992)	Not Reported	Summary Data only	No	No	No	No	None	Pentaerythritol 1-2, ACGIH 2013
Pentane, all isomers [78-78-4; 109-66-0; 463-82-1]	1000 ppm {2950 mg/m^3}	2014	Narcosis, respiratory tract irritation	McKee et al. 1998; Patty and Yant 1929; Swann et al. 1974 (1929-1998)	Ames tests - negative; Chromosomal aberrations - negative; Dominant-lethal assay in mice - negative; micronucleus assay - negative	Summary Data only	No	No	No	No	None	Pentane, all isomers 1-6, ACGIH 2018
Phosphine [7803-51-2]	0.05 ppm {0.07 mg/m^3}	2018	Respiratory tract irritation; pulmonary edema	Misra et al. 1988; Newton et al. 1999; Poundfoot 2009 (1988-2009)	Chromosomal aberrations - negative; SCE - negative; micronucleus assay - negative	Summary Data only	No	No	No	No	None	Phosphine 1-6, ACGIH 2018
Phthalic anhydride [85-44-9]	0.0003 ppm {0.002 mg/m^3} RPM and Vapor	2017	Respiratory sensitivity, asthma	Baader 1955; Barker et al. 1998; de Groene et al. 2011; Dearman et al. 2000; Dearman et al. 2002; Gach et al. 2005; Gad 1988; Goutet et al. 2012;	Mouse lymnphoma assay - positive; Chromosomal aberrations - negative; SCE - negative	Summary Data only	No	No	No	No	None	Phthalic anhydride 1-12, ACGIH 2017

				Gutierrez-Fernandez et al. 2007; Kim 2009; Kluwe et al. 1982; Menschick 1955; Mori et al. 2012; Nielsen et al. 1988; Sarlo et al. 1994; van Och et al. 2002; van Tongeren et al. 1995; Wernfors et al. 1986 (1955-2012)								
m-Phthalodinitrile [626-17-5]	5 mg/m^3 RPM and Vapor	2009	Liver damage;autonomic nervous system impairment	Anonymous 1993; Anonymous 1994; Laveglia and Turck 2000; Ulrich and Owen 1972 (1972-2000)	Ames tests - negative; Chromosomal aberrations - negative	Summary Data only	No	No	No	No	None	m-Phthalodinitrile 1-3, ACGIH 2009
o-Phthalodinitrile [91-15-6]	1 mg/m^3 RPM and Vapor	2012	CNS convulsion; body weight effects	BG Chemie 1995a; BG Chemie 1995b; MHLWJ 1996; MHLWJ 2001; Yoshikawa and	Ames tests - negative; Chromosomal aberrations - negative; HGPRT assay - negative	Summary Data only	No	No	No	No	None	o-Phthalodinitrile 1-4, ACGIH 2012

				Kawai 1966; Zeller et al. 1969 (1966-2001)								
Piperazine and salts [110-85-0], as piperazine	0.03 ppm {0.1 mg/m^3} RPM and Vapor	2012	Respiratory sensitivity, asthma	Carpenter and Smyth 1946; Hagmar and Welinder 1986; Hagmar et al. 1984; Hagmar et al. 1986; Hagmar et al. 1987; Holness and Nethercott 1997; Leung and Auletta 1997; Pepys et al. 1972; Quirce et al. 2006; Ridgway 1987a; Ridgway 1987b; Trochimowicz et al. 1994; van Kampen et al. 2000 (1946-2006)	Ames tests - negative; micronucleus assay - negative	Summary Data only	No	No	No	No	None	Piperazine and salts 1-7, ACGIH 2014
Propoxur [114-26-1]	0.06 ppm {0.5 mg/m^3} RPM and Vapor	2016	Cholinesterase inhibition	Kimmerle and Iyatomi 1976; Machemer et al. 1982; Montazemi 1969; Motabar	Ames tests - negative; Chromosomal aberrations - positive; micronucleus assay - equivocal	Summary Data only	No	No	No	No	None	Propoxur 1-8, ACGIH 2016

				1971; Pauluhn 1997; Suberg et al. 1997; Vandekar et al. 1968; Wright et al. 1969 (1968-1997)								
Propyl acetate isomers [108-21-4; 109-60-4]	100 ppm {417 mg/m^3}	2018	URT irritation; Eye irritation; CNS impairment	Abraham et al. 1996; David et al. 2001; EU Commission 2000; Flury and Wirth 2013; Silverman et al. 1946; Smyth et al. 1969 (1946-2013)	Slight increase in incidence of mitotic aneuploidy in yeast; Generally the propyl acetates are not genotoxic in yeasts and fail to induce aneuploidy	Summary Data only	No	No	No	No	None	Propyl acetate isomers 1-6, ACGIH 2018
Propyleneimine [75-55-8]	0.2 ppm {0.5 mg/m^3}	2009	URT irritation; kidney damage	Carpenter et al. 1948; Halman et al. 1986 (1948-1986)	Ames tests - positive	Summary Data only	No	No	No	No	None	Propyleneimine 1-3, ACGIH 2009
Silica, crystalline -α-quartz [1317-95-9; 14808-60-7] and cristbalite [14464-46-1]	0.025 mg/m^3 RPM	2010	Pulmonary fibrosis, lung cancer	Checkoway et al. 1993; Checkoway et al. 1996; Checkoway et al. 1997; Chen et al. 2005; Gardner 1938; Graham et al. 2004;	Not Reported	Summary Data only	No	No	No	No	None	Silica, crystalline 1-18, ACGIH 2010

				Harrison et al. 2005; Hemenway et al. 1990; Hughes et al. 1998; King et al. 1953; Park et al. 2002; Steenland and Sendersson 2001; Zaidi et al. 1956 (1938-2005)								
Silicon tetrahydride [7803-62-5]	5 ppm {6.57 mg/m^3}	2015	URT irritation	Omae et al. 1992 (1992)	Ames tests - positive	Summary Data only	No	No	No	No	None	Silicon tetrahydride 1-2, ACGIH 2015
Simazine [122-34-9]	0.5 mg/m^3 RPM	2016	Hematologic effects	IARC 1999; US EPA 1989 (1989-1999)	Ames tests - negative; micronucleus assay - negative; Dominant-lethal assay - negative; SCE - negative	Summary Data only	No	No	No	No	None	Simazine 1-4, ACGIH 2016
Stearates [57-11-4; 557-04-0; 557-05-1; 822-16-2]	3 mg/m^3 RPM	2017	LRT irritation	Boyland et al. 1964; Busch 1982; CTFA 1970; Deichmann et al. 1958; Harding 1958; Swern et al. 1970; Van Duuren et al. 1972 (1958-1982)	Ames tests - negative	Summary Data only	No	No	No	No	None	Stearates 1-6, ACGIH 2017

Sulfur dioxide [7446-09-5]	0.25 ppm {0.65 mg/m^3} TLV-STEL	2009	Pulmonary function; LRT irritation	Balmes et al. 1987; Bedi et al. 1982; Bethel et al. 1985; Laskin et al. 1976; Lawther et al. 1975; Linn et al. 1983; Newhouse et al. 1978; Peacock and Spence 1967; Roger et al. 1985; Skalpe 1964; Smith et al. 1977; Stacy and House 1981 (1964-1987)	Comet assay - positive; SCE - negative; Chromosomal aberrations - negative	Summary Data only	No	No	No	No	None	Sulfur dioxide 1-6, ACGIH 2009
Sulprofos [35400-43-2]	0.008 ppm {0.1 mg/m^3} RPM and Vapor	2009	Cholinesterase inhibition	Jones 1994 (1994)	Ames tests - negative; micronucleus assay - negative; SCE - negative	Summary Data only	No	No	No	No	None	Sulprofos 1-6, ACGIH 2009
Talc [14807-96-6]	2 mg/m^3 RPM	2010	Pulmonary fibrosis, pulmonary function	Fine et al. 1976; Gamble et al. 1982; Honda et al. 2002; Wegman et al. 1982; Wild et al. 1995; Wild et al 2002 (1976-2002)	Unscheduled DNA synthesis - negative; SCE - negative	Summary Data only	No	No	Yes (2)	No	None	Talc 1-11, ACGIH 2010
1,1,1,2-	100	200	Liver and	Bandma	Not	Sum	No	No	No	No	No	1,1,1,2-

Tetrachloro-2,2-difluoroethane [76-11-9]	ppm {834 mg/m^3}	8	kidney damage; CNS impairment	n et al. 1990; Clayton et al. 1966; Torkelson et al. 1971 (1966-1990)	Reported	mary Data only					ne	Tetrachloro-2,2-difluoroethane 1-3, ACGIH 2008
1,1,2,2-Tetrachloro-1,2-difluoroethane [76-12-0]	50 ppm {417 mg/m^3}	2008	Liver and kidney damage; CNS impairment	Clark and Tinston 1973; Clayton 1967; Gage 1970; Sax 1975 (1967-1975)	Ames tests - weakly positive; Dominant-lethal assay - negative	Summary Data only	No	No	No	No	None	1,1,2,2-Tetrachloro-1,2-difluoroethane 1-3, ACGIH 2008
Thallium [7440-28-0] and compounds as Tl	0.02 mg/m^3 RPM	**2010**	GI damage; peripheral neuropathy	AMACD 1957; Brockhaus et al. 1981; Butcher 1964; Marcus 1985; Richeson 1958; Schaller et al. 1980 (1957-1985)	Limited data did not permit a definitive assessment of genotoxicity.	Summary Data only	No	No	No	No	None	Thallium and compounds 1-7, ACGIH 2010
4,4'-Thiobis(6-tert-butyl-m-cresol) [96-69-5]	1 mg/m^3 RPM	2011	URT Irritation	ACC 2003; Birnbaum et al. 1983; Birnbaum and Heaney 1987; P&G 2001; US NTP 1994 (1983-2003)	Ames tests - negative; Chromosomal aberrations - negative; SCE - positive	Summary Data only	No	No	No	No	None	4,4'-Thiobis(6-tert-butyl-m-cresol) 1-6, ACGIH 2011
Thioglycolic acid [68-11-1] and salts	1 ppm {3.8 mg/m^3}	2018	Eye and Respiratory Irritation	Dow 1973; Elf 1989; Fassett 1963; Grant	Ames tests - negative; Chromosomal aberrations -	Summary Data only	No	No	No	No	None	Thioglycolic acid 1-5, ACGIH 2018

				1986; Lewis 1996; SCCS 2013 (1973-2013)	negative; micronucleated polychromatic erythrocytes - negative							
Thionyl chloride [7719-09-7]	0.2 ppm {1 mg/m^3} TLV-C	2010	URT Irritation	Ducatman et al. 1988; Merck Index 1996; Ruth 1986 (1986-1996)	Not Reported	Summary Data only	No	No	No	No	None	Thionyl chloride 1-2, ACGIH 2010
Thiram [137-26-8]	0.005 ppm {0.05 mg/m^3} RPM and Vapor	2008	Body weight and Hematologic Effecienci es	Kehoe 1988; Kehoe 1989a; Kehoe 1989b; Kehoe 1991a; Kehoe 1991b; Knapek et al. 1989; Lee et al. 1978; Lowy et al. 1980; Maita et al. 1991; Short et al. 1976 (1976-1991)	Ames tests - equivocal; Chromosomal aberrations - equivocal; SCE - equivocal; micronucleated erythrocytes - positive, Dominant-lethal assay - positive; Comet assay - positive	Summary Data only	No	No	No	No	None	Thiram 1-7, ACGIH 2014
Toluene isocyanate 2,4- or 2,6- (or as a mixture) [584-84-9; 91-08-7]	0.001 ppm {0.007 mg/m^3} RPM and Vapor	2016	Asthma; Pulmonary function; Eye Irritation	Adams 1970; Buyantseva et al. 2011; Dieter 1990; Gulati et al. 1989; Littorin et al. 2007; Loeser 1983; Mackay 1992; Mikoczy	Ames tests - equivocal; Chromosomal aberrations - negative; SCE - equivocal; micronucleated erythrocytes - negative; Mouse lymphoma	Summary Data only	No	No	No	No	None	Toluene isocyanate 1-16, ACGIH 2016

				et al. 2004; Paris et al. 2012; Porter et al. 1975; Schnorr et al. 1996; Sorahan and Nichols 2002; US NTP 1986; Vandenplas et al. 2011; Wegman et al. 1974; Weill et al. 1981 (1970-2012)	cell assay - positive; Unscheduled DNA synthesis - negative							
Tributyl phosphate [126-73-8]	0.5 ppm {5 mg/m^3} RPM and Vapor	2013	Bladder, Eye and URT Irritation	Arnold et al. 1997; Auletta et al. 1998a; Auletta et al. 1998b; Cohen 1998; Solbu 2007 (1997-2007)	Ames tests - negative; HGPRT assay - negative; Chromosomal aberrations - negative; micronucleated erythrocytes - negative	Summary Data only	No	No	No	No	None	Tributyl phosphate 1-7, ACGIH 2013
Trichloroacetic acid [76-03-9]	0.5 ppm {3.34 mg/m^3}	2014	Eye and URT Irritation	Bowden et al. 1998; DeAngelo et al. 2008; Dreisbach 1977; Faerber 1962; Grant 1974a; Grant 1974b; Harton and Rawl 1976; Woodar	Ames tests - negative; No DNA damage when tested on CHO cells; DNA unwinding assay - positive	Summary Data only	No	No	No	No	None	Trichloroacetic acid 1-10, ACGIH 2014

				d 1941 (1941-2008)								
1,2,3-Trichloropropane [96-18-4]	0.005 ppm {0.03 mg/m^3}	2015	Cancer	IPCS 2003; Johannsen et al. 1988; Ruth 1986; Silverman et al. 1946; US NTP 1991 (1946-2003)	Ames tests - positive; SCE - positive; Chromosomal aberrations - positive; Mouse lymphoma assay - positive	Summary Data only	No	No	No	No	None	1,2,3-Trichloropropane 1-6, ACGIH 2015
Triethylamine [121-44-8]	0.5 ppm {2.07 mg/m^3}	2015	Visual Impairment; URT Irritation	Akesson et al. 1985; Akesson et al. 1986; Amor 1950; Benya and Harbison 1994; Davison et al. 1965; Jarvinen 1998; Kustov et al. 1960; Potts et al. 1986; Smyth et al. 1951; Warren and Selchan 1988 (1950-1998)	Ames tests - negative	Summary Data only	No	No	No	No	None	Triethylamine 1-5, ACGIH 2015
Trimellitic anhydride [552-30-7]	0.00006 ppm {0.0005 mg/m^3} RPM and Vapor	2008	Respiratory Sensitivity	Barker et al. 1998; Dearman and Kimber 1991; Dearman et al. 1992; Farraj et al. 2006;	Ames tests - negative; Chromosomal aberrations - negative	Summary Data only	No	No	No	No	None	Trimellitic anhydride 1-11, ACGIH 2014

				Gramme r et al. 1993; Gramme r et al. 1999; Gramme r et al. 2000; Leach et al. 1987; Leach et al. 1989; Pauluhn et al. 2002; Zeiss et al. 1989; Zeiss et al. 1992; Zhang et al. 2002 (1987-2006)								
Trimethyla mine [75-50-3]	5 ppm {12 mg/m ^{3}}	201 3	URT, Eye and Skin Irritation	APCI 1978; Amoore and Hautala 1983; Frieman n and Overhoff 1956; Gagnaire et al. 1989; Kinney et al. 1990; Kunnem ann 1928; Leonard os et al. 1969; Rotenbe rg and Mashbits 1969; Ruth 1986 (1928-1990)	Ames tests - negative	Sum mar y Dat a only	No	No	No	No	No ne	Trimethyla mine 1-4, ACGIH 2013
Triorthocr esyl phosphate [78-30-8]	0.02 mg/m ^{3} RPM and	201 6	Neurotoxi city; Cholinest erase	Abou-Donia et al. 1986; Cavanau	Ames tests - negative; Unschedul ed DNA	Sum mar y Dat	No	No	No	No	No ne	Triorthocr esyl phosphate 1-9,

	Vapor		inhibitor	gh 1954; Glees and White 1961; Hunter et al. 1944; Prentice and Majeed 1983; Silver 1959; Tabershaw et al. 1957; US NTP 1994; Wang et al. 2009 (1944-2009)	synthesis - negative	a only						ACGIH 2016
Tungsten [7440-33-7] and compounds, in the absence of Cobalt, as W	3 mg/m^3 RPM	2017	Lung Damage	Hanzu et al. 2010; McDonald et al. 2005; Rajendran et al. 2012	Micronucleus test - positive; Single cell gel assay - positive; alkaline elution assay - positive; Comet assay - equivocal	Summary Data only	No	No	No	No	None	Tungsten and compounds 1-5, ACGIH 2017
Vanadium pentoxide [1314-62-1] as V	0.05 mg/m^3 RPM	**2009**	URT and LRT Irritation	Cortijo et al. 1997; Irsigler et al. 1999; Kiviluoto et al. 1979; Kiviluoto 1980; Knecht et al. 1985; Knecht et al; 1992; Lees 1980; Lewis 1959; Musk	Ames tests - negative; induces aneuploidy - positive; single strand DNA breaks - positive	Summary Data only	No	No	No	No	None	Vanadium Pentoxide 1-9, ACGIH 2009

				and Tees 1982; Pistelli 1991; Sjoberg 1950; Sjoberg 1951; NTP 2002; Vintinner et al. 1955; Werner et al. 1996; Williams 1952; Woodin et al. 2000; Zenz and Berg 1967 (1950-2002)								
Vinyl acetate [108-05-4]	10 ppm {35 mg/m^3}	2018	URT and Eye Irritation	Barisch et al. 1979; Bogdanffy et al. 1994; Brams et al. 1987; Deese and Joyner 1969; EU 2008; Gruvberger et al. 1998; Jantunen et al. 1986; JETOC 2004; Jung et al. 1992; Kirby 2008; Lahdetie 1988; Lijinsky and Reuber 1983; Maki-	Ames tests - negative; SCE - positive; Chromosomal aberrations - positive; micronuclei assay - positive	Summary Data only	No	No	No	No	None	Vinyl Acetate 1-7, ACGIH 2018

				Paakanen and Norppa 1987; Mustonen 1986; Norppa et al. 1985; Simon et al. 1985; Smyth and Carpenter 1992; ATSDR 1992 (1979-2008)								
Warfarin [81-81-2]	0.01 mg/m^3 RPM	2016	Bleeding; Teratogenic	BMS 2011; Choonara et al. 1988; EC 2009; Fristedt and Sterner 1965; Green 1955; Hayes and Gaines 1950; HCN 2004; Heisey et al. 1956; O'Reilly et al. 1963; Sittert and Tuinman 1994 (1950-2011)	Not Reported	Summary Data only	No	No	No	No	None	Warfarin 1-6, ACGIH 2016

Natural products like wood dust and cotton dust were not part of the table.

Bolded chemicals are those that have only recently adopted a TLV from the ACGIH. All others were reviewed and re-adopted.

RPM = respirable/inhalable particulate matter

C= Ceiling

* Threshold Limit Values and Adoption Dates from ACGIH 2018 7th Edition TLVs and BIEs

URT = upper respiratory tract

LRT = lower respiratory tract

SCE = Sister Chromatid Exchange

Table 2. Carcinogenicity Indices for Top 145 Chemicals Reviewed and Adopted by ACGIH between 2008 -2018

Chemical Name [CASRN] !	Threshold Limit Value !	Carcinogenicity Indices			
		Smith et al. 2018 [Rank 1-48] †	IARC *	NTP‡	ACGIH Cancer Rating !
Acetaldehyde [75-07-0]	25 ppm {45 mg/m^3} TLV-C	n.o.s.	2B	R	A2
Acetamide [60-35-5]	1 ppm {2.42 mg/m^3}	n.o.s.	2B	n.o.s.	A3
Acetic anhydride [108-24-7]	1 ppm {4.2 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A4
Acetone [67-64-1]	250 ppm {594	n.o.s.	n.o.s.	n.o.s.	A4

	mg/m^3}				
Acetophenone [98-86-2]	10 ppm {50 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Acrylonitrile [107-13-1]	2 ppm {4.3 mg/m^3}	n.o.s.	2B	R	A3
Aldicarb (116-06-3]	0.0006 ppm {0.005 mg/m^3}	48	3	n.o.s.	A4
Allyl bromide [106-95-6]	0.1 ppm {0.5 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A4
Allyl chloride [107-05-1]	1 ppm {3 mg/m^3}	44	3	n.o.s.	A3
Allyl methacrylate [96-05-9]	1 ppm {5.16 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Aluminum metal [7429-90-5] and insoluble compounds	1 ppm RPM	n.o.s.	1	n.o.s.	A4
Atrazine [1912-24-9] (and related symmetrical triazines)	5 ppm RPM	n.o.s.	3	n.o.s.	n.o.s.
Barium sulfate [7727-43-7]	3 ppm RPM	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Bendiocarb [22781-23-3]	0.011 ppm {0.1 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A4
Benomyl [17804-35-2]	1 mg/m^3 RPM	n.o.s.	n.o.s.	n.o.s.	A3
Beryllium [7440-41-7] and compounds, as Be Soluble compounds Soluble and insoluble compounds	0.00005 mg/m^3 RPM	n.o.s.	1	K	A1
Boron tribromide [10294-33-4]	0.7 ppm {7.19 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Boron trichloride [10294-34-5]	0.7 ppm {2.4 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Boron trifluoride [7637-07-2]	0.1 ppm	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Boron trifluoride ethers [109-63-7; 353-42-4], as BF_3	0.1 ppm	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Bromoform [75-25-2]	0.5 ppm {5.2 mg/m^3}	23	3	n.o.s.	A3
1-Bromopropane [106-94-5]	0.1 ppm {0.5 mg/m^3}	7	2B	R	A3
Butane, isomers [75-28-5; 106-97-8]	1000 ppm {2370 mg/m^3} TLV-STEL	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Butenes, all isomers [106-98-9; 107-01-7; 590-18-1; 624-64-6; 25167-67-3] Isobutene [115-11-7]	50 ppm {238 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A4
Butyl acetates, all isomers [105-46-4; 110-19-0; 123-86-4; 540-88-5]	251 ppm {574 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
tert-Butyl hydroperoxide [75-91-2]	0.1 ppm {0.4mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Cadusafos [95465-99-9]	0.00009 ppm {0.001 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A4
Calcium silicate, naturally occurring as	1 mg/m^3 RPM	n.o.s.	3	n.o.s.	A4

Wollastonite [13983-17-0]					
Captafol [2425-06-1]	0.007 ppm {0.1 mg/m^3}	n.o.s.	2A	n.o.s.	A3
Carbaryl [63-25-2]	0.06 ppm {0.5 mg/m^3}	n.o.s.	3	n.o.s.	A4
Carbon black [1333-86-4]	3 mg/m^3 RPM	n.o.s.	2B	n.o.s.	A3
Carbonyl sulfide [463-58-1]	5 ppm {12 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Carfentrazone-ethyl [128639-02-1]	1 mg/m^3 RPM	n.o.s.	n.o.s.	n.o.s.	A4
Chlorine [7782-50-5]	0.1 ppm {0.29 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Chlorine dioxide [10049-04-4]	0.1 ppm {0.28 mg/m^3} TLV-C	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Chlorobromomethane [74-97-5]	200 ppm {1060 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
1-Chloro-1-nitropropane [600-25-9]	2 ppm {10 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Chloroprene [126-99-8]	1 ppm {3.6 mg/m^3}	1	2B	R	A2
Chromium, [7440-47-3] and inorganic compounds Metallic chromium, as Cr(O); Trivalent chromium compounds, as Cr(III); Hexavalent chromium compounds, as Cr(VI) water and insoluble compounds	0.5 mg/m^3 as Cr(0); 0.003 mg/m^3 as Cr(III);0.0002 mg/m^3 as Cr(VI); Chromyl chloride 0.0001 ppm	Cr(0) n.o.s.; Cr(III) n.o.s. ; Cr(VI) 1	Cr(0) 3.; Cr(III) 3 ; Cr(VI) 1	Cr(0) n.o.s.; Cr(III) n.o.s. ; Cr(VI) K	Cr(0) n.o.s.; Cr(III) A4 ; Cr(VI) A1 ; Chromyl chloride A1
Citral [5392-40-5]	5 ppm {32 mg/m^3}	46	n.o.s.	n.o.s.	A4
Clopidol [2971-90-6]	3 mg/m^3 RPM	n.o.s.	n.o.s.	n.o.s.	A4
Cresol, all isomers [95-48-7; 106-44-5;108-39-4; 1319-77-3]	20 mg/m^3 RPM	Invalid	n.o.s.	n.o.s.	A4
Cyanoacrylates, Ethyl [7085-85-0] and Methyl (137-05-3]	0.2 ppm {1 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Cyanogen [460-19-5]	5 ppm {10.6 mg/m3} TLV-C	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Cyanogen bromide [506-68-3]	0.3 ppm {0.75 mg/m3} TLV-C	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Cyanogen chloride (506-77-4]	0.3 ppm {1.3 mg/m^3} TLV-C	n.o.s.	n.o.s.	n.o.s.	n.o.s.
2,4-D [94-75-7]	10 mg/m^3	n.o.s.	2B	n.o.s.	A4
Diacetyl [431-03-8]	0.01 ppm {0.04 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Dibutyl phosphate [107-66-4]	0.6 ppm {5.0 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Dieldrin [60-57-1]	0.1 mg/m^3 RPM	46	2A	n.o.s.	A3

Diesel Fuel [68334-30-5; 68476-30-2; 68476-31-3; 68476-34-6] as total hydrocarbons	100 mg/m^3 RPM	n.o.s.	2B	R	A3
Diethanolamine [111-42-2]	0.2 ppm {1.0 mg/m^3} RPM	17	2B	n.o.s.	A3
Diethylamine [109-89-7]	5.0 ppm {15.0 mg/m^3} RPM	48	n.o.s.	n.o.s.	A4
Diethylene glycol monobutyl ether [112-34-5]	10.0 ppm {67.5 mg/m^3} RPM	n.o.s.	n.o.s.	n.o.s.	n.o.s.
N,N-Diethylhydroxylamine [3710-84-7]	2 ppm {7.3 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Dimethyl carbamoyl chloride [79-44-7]	0.005 ppm {0.2 mg/m^3}	n.o.s.	2A	R	A2
Dimethylacetamide [127-19-5]	10 ppm {36 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A3
Dimethylamine [124-40-3]	5 ppm {9.2 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A4
Dimethylformamide [68-12-2]	5 ppm {15 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A3
Endosulfan [115-29-7]	0.006 ppm {0.1 mg/m^3} RPM	Invalid	n.o.s.	n.o.s.	A4
Ethanol [64-17-5]	1000 ppm {1880 mg/m^3} TLV-STEL	n.o.s.	1	K	A3
Ethyl formate [109-94-4]	100 ppm {303 mg/m^3} TVL-STEL	n.o.s.	n.o.s.	n.o.s.	A4
Ethyl isocyanate [109-90-0]	0.02 ppm {0.06 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Ethyl tert-butyl ether [637-92-3]	25 ppm {105 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A4
Ethylamine [75-04-7]	5 ppm {9 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Ethylbenzene [100-41-4]	20 ppm {87 mg/m^3}	18	2B	n.o.s.	A3
Ethylene glycol[107-21-1]	25 ppm Vapor Fraction	n.o.s.	n.o.s.	n.o.s.	A4
Ethyleneimine [151-56-4]	0.05 ppm {0.09 mg/m^3}	n.o.s.	2B	n.o.s.	A3
Ethylidene norbornene [16219-75-3]	2 ppm {10 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Ferbam [14484-64-1]	5 mg/m^3 RPM	n.o.s.	3	n.o.s.	A4
Fludioxonil [131341-86-1]	1 mg/m^3 Vapor Fraction	n.o.s.	n.o.s.	n.o.s.	A3
Folpet [133-07-3]	1 mg/m^3 RPM	n.o.s.	n.o.s.	n.o.s.	A3
Formaldehyde [50-00-0]	0.1 ppm {0.12	n.o.s.	1	K	A1

	mg/m^3}				
Furfural [98-01-1]	0.2 ppm {0.8 mg/m^3}	20	3	n.o.s.	A3
Furfuryl alcohol [98-00-0]	0.2 ppm {0.8 mg/m^3}	34	2B	n.o.s.	A3
Hard Metals containing Cobalt [7440-48-4] and Tungsten carbide [12070-12-1] , as Co	0.005 mg/m^3 as Co	1	2B	R	A2
Hexafluoropropylene [116-15-4]	0.1 ppm {0.6 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Hexylene glycol [107-41-5]	25 ppm Vapor Fraction	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Hydrogen sulfide [7783-06-4]	1 ppm {1.4 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Hydroquinone [123-31-9]	1 mg/m^3	31	3	n.o.s.	A3
Indene [95-13-6]	5 ppm {24 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Iodine [7553-56-2] and Iodides	0.01 ppm {0.1 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A4
Lead chromate [7758-97-6] as Cr (VI)	0.0002 mg/m^3 RPM		n.o.s.	K	A1
Lithium hydride [7580-67-8]	0.05 mg/m^3 RPM TLV-C	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Maleic anhydride [108-31-6]	0.0025 ppm {0.01 mg/m^3} RPM and Vapor	n.o.s.	n.o.s.	n.o.s.	A4
Manganese [7439-96-5], elemental and inorganic compounds as Mn	0.02 mg/m^3 RPM	n.o.s.	n.o.s.	n.o.s.	A4
Methanol [67-56-1]	200 ppm {262 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Methomyl [16752-77-5]	0.2 mg/m^3 RPM and Vapor	n.o.s.	n.o.s.	n.o.s.	A4
1-Methoxy-2-propanol [107-98-2]	50 ppm {184 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A4
Methyl acetate [79-20-9]	200 ppm {606 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Methyl formate [107-31-3]	50 ppm {123 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Methyl isoamyl ketone [100-12-3]	20 ppm {96 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Methyl isobutyl ketone [108-10-1]	20 ppm {82 mg/m^3}	30	2B	n.o.s.	A3
Methyl isocyanate [624-83-9]	0.02 ppm {0.047 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Methyl isopropyl ketone [563-80-4]	20 ppm {70 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Methyl parathion [298-00-0]	0.02 mg/m^3 RPM	48	3	n.o.s.	A4

	and Vapor				
Methylacrylonitrile [126-98-7]	1 ppm {2.7 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A4
Methylamine [74-89-5]	5 ppm {6.4 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
α-Methylstyrene [98-83-9]	10 ppm {48 mg/m^3}	n.o.s.	2B	n.o.s.	A3
Mineral oil, excluding metal working fluids	Pure - 5 mg/m^3 RPM; Not refined - No TLV	n.o.s.	3 - Pure; 1 - Not refined	n.o.s. - Pure; K - Not refined	A4 - Pure; A2 - Not refined
Naththalene [91-20-3]	10 ppm {52 mg/m^3}	12	2B	n.o.s.	A3
Natural rubber latex [9006-04-6] as inhalable allergenic proteins	0.0001 mg/m^3	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Nickel carbonyl [13463-39-3] as Ni	0.05 ppm {0.12 mg/m^3} TLV-C	n.o.s.	1	K	A3
Nitrogen dioxide [10102-44-0]	0.2 ppm {0.38 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A4
Nonane [111-84-2]	200 ppm {1048 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Oxalic acid, anhydrous [144-62-7] and dihydrate [6153-56-6]	1 mg/m^3	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Paraquat [4685-14-7] as the cation	0.05 mg/m^3 RPM	n.o.s.	n.o.s.	n.o.s.	A4
Pentachlorophenol [87-86-5]	0.05 ppm {0.5 mg/m^3}	n.o.s.	1	R	A3
2,4-Pentanedione [123-54-6]	25 ppm {102 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Pentaerythritol [115-77-5]	10 mg/m^3 RPM	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Pentane, all isomers [78-78-4; 109-66-0; 463-82-1]	1000 ppm {2950 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Phosphine [7803-51-2]	0.05 ppm {0.07 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A4
Phthalic anhydride [85-44-9]	0.0003 ppm {0.002 mg/m^3} RPM and Vapor	48	n.o.s.	n.o.s.	A4
m-Phthalodinitrile [626-17-5]	5 mg/m^3 RPM and Vapor	n.o.s.	n.o.s.	n.o.s.	n.o.s.
o-Phthalodinitrile [91-15-6]	1 mg/m^3 RPM and Vapor	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Piperazine and salts [110-85-0], as piperazine	0.03 ppm {0.1 mg/m^3} RPM and Vapor	n.o.s.	n.o.s.	n.o.s.	A4
Propoxur [114-26-1]	0.06 ppm {0.5 mg/m^3} RPM and Vapor	n.o.s.	n.o.s.	n.o.s.	A3
Propyl acetate isomers [108-21-4; 109-	100 ppm {417	n.o.s.	n.o.s.	n.o.s.	n.o.s.

60-4]	mg/m^3}				
Propyleneimine [75-55-8]	0.2 ppm {0.5 mg/m^3}	n.o.s.	2B	n.o.s.	A3
Silica, crystalline -α-quartz [1317-95-9; 14808-60-7] and cristbalite [14464-46-1]	0.025 mg/m^3 RPM	n.o.s.	1	K	A2
Silicon tetrahydride [7803-62-5]	5 ppm {6.57 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Simazine [122-34-9]	0.5 mg/m^3 RPM	n.o.s.	3	n.o.s.	A3
Stearates [57-11-4; 557-04-0; 557-05-1; 822-16-2]	3 mg/m^3 RPM	n.o.s.	n.o.s.	n.o.s.	A4
Sulfur dioxide [7446-09-5]	0.25 ppm {0.65 mg/m^3} TLV-STEL	n.o.s.	3	n.o.s.	A4
Sulprofos [35400-43-2]	0.008 ppm {0.1 mg/m^3} RPM and Vapor	n.o.s.	n.o.s.	n.o.s.	A4
Talc [14807-96-6]	2 mg/m^3 RPM	23	n.o.s.	n.o.s.	A4
1,1,1,2-Tetrachloro-2,2-difluoroethane [76-11-9]	100 ppm {834 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
1,1,2,2-Tetrachloro-1,2-difluoroethane [76-12-0]	50 ppm {417 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Thallium [7440-28-0] and compounds as Tl	0.02 mg/m^3 RPM	n.o.s.	n.o.s.	n.o.s.	n.o.s.
4,4'-Thiobis(6-tert-butyl-m-cresol) [96-69-5]	1 mg/m^3 RPM	n.o.s.	n.o.s.	n.o.s.	A4
Thioglycolic acid [68-11-1] and salts	1 ppm {3.8 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Thionyl chloride [7719-09-7]	0.2 ppm {1 mg/m^3} TLV-C	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Thiram [137-26-8]	0.005 ppm {0.05 mg/m^3} RPM and Vapor	n.o.s.	n.o.s.	n.o.s.	A4
Toluene isocyanate 2,4- or 2,6- (or as a mixture) [584-84-9; 91-08-7]	0.001 ppm {0.007 mg/m^3} RPM and Vapor	n.o.s.	2B	R	A3
Tributyl phosphate [126-73-8]	0.5 ppm {5 mg/m^3} RPM and Vapor	n.o.s.	n.o.s.	n.o.s.	A3
Trichloroacetic acid [76-03-9]	0.005 ppm {0.03 mg/m^3}	n.o.s.	2B	n.o.s.	A3
1,2,3-Trichloropropane [96-18-4]	0.5 ppm {2.07 mg/m^3}	1	2A	n.o.s.	A2
Triethylamine [121-44-8]	0.5 ppm {3.34 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	A4
Trimellitic anhydride [552-30-7]	0.00006 ppm {0.0005 mg/m^3} RPM and Vapor	n.o.s.	n.o.s.	n.o.s.	n.o.s.

Trimethylamine [75-50-3]	5 ppm {12 mg/m^3}	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Triorthocresyl phosphate [78-30-8]	0.02 mg/m^3 RPM and Vapor	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Tungsten [7440-33-7] and compounds, in the absence of Cobalt, as W	3 mg/m^3 RPM	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Vanadium pentoxide [1314-62-1] as V	0.05 mg/m^3 RPM	10	2B	n.o.s.	A3
Vinyl acetate [108-05-4]	10 ppm {35 mg/m^3}	n.o.s.	2B	n.o.s.	A3
Warfarin [81-81-2]	0.01 mg/m^3 RPM	n.o.s.	n.o.s.	n.o.s.	n.o.s.
Natural products like wood dust and cotton dust were not part of the table.					
Bolded chemicals are those that have only recently adopted a TLV from the ACGIH. All others were reviewed and re-adopted.					
RPM = respirable/inhalable particulate matter					
C= Ceiling					
n.o.s. = not otherwise specified as carcinogenic					
† Smith CJ, Perfetti TA, Ko GM, et al. Ames mutagenicity, structural alerts of carcinogenicity, Hansch molecular parameters (ClogP, CMR, MgVol), tumor site concordance/multiplicity, and tumorigenicity rank in 2-year NTP studies. Res Appl 2018; 2: 1–14.					
* https://monographs.iarc.fr/agents-classified-by-the-iarc/					
‡ https://ntp.niehs.nih.gov/pubhealth/roc/index-1.html					
! Data from 2018 ACGIH 7th Edition TLVs and BIEs					

Table 3. TLV, Cost and Exposure Information on the Top 145 Chemicals Produced or Imported During 2017**

Chemical Name*	TLV *	Thousands of Pounds Produced or Imported (Annual US 2015) †	Sales (Annual US Dollars) [Average Cost/Metric Ton x Average Metric Tonnage]	Average Cost per Pound (lb or kg) or Metric Ton (mt) (US Dollars) 2006-2017 #	Average Metric Tons	Estimated Annual Chemical Exposure of US M+F for All Jobs (%) Δ
Chemicals Organic/Inorganic [CASRN]						

Acetaldehyde [75-07-0]	25 ppm {45 mg/m^3} TLV-C	250,000,000 - 500,000,000 lb	$172,352,800	0.46/lb	170000	23.1
Acetamide [60-35-5]	1 ppm {2.42 mg/m^3}	-	0	-	0	
Acetic anhydride [108-24-7]	1 ppm {4.2 mg/m^3}	1,000,000,000 - 5,000,000,000 lb	$1,498,720,000	0.50/lb	1360000	
Acetone [67-64-1]	250 ppm {594 mg/m^3}	1,000,000,000 - 5,000,000,000 lb	$1,498,720,000	0.50/lb	1360000	0.2
Acetophenone [98-86-2]	10 ppm {50 mg/m^3}	10,000,000 - 50,000,000 lb	$14,987,200	0.50/lb	13600	
Acrylonitrile [107-13-1]	2 ppm {4.3 mg/m^3}	1,000,000,000 - 5,000,000,000 lb	$2,098,208,000	0.70/lb	1360000	
Aldicarb (116-06-3]	0.0006 ppm {0.005 mg/m^3}	-	0	-	0	
Allyl bromide [106-95-6]	0.1 ppm {0.5 mg/m^3}	Withheld	0	-	0	
Allyl chloride [107-05-1]	1 ppm {3 mg/m^3}	250,000,000 - 500,000,000 lb	$234,000,000	1300/ mt	180000	3.0
Allyl methacrylate [96-05-9]	1 ppm {5.16 mg/m^3}	1,000,000 - 10,000,000 lb	-	-	2500	
Aluminum metal [7429-90-5] and insoluble compounds	1 ppm RPM	10,000,000,000 - 20,000,000,000 lb	-	-	6800000	8.1
Atrazine [1912-24-9] (and related symmetrical triazines)	5 ppm RPM	-	0	-	0	0.4
Barium sulfate [7727-43-7]	3 ppm RPM	10,000,000 - 50,000,000 lb	$6,800,000	500/mt	13600	
Bendiocarb [22781-23-3]	0.011 ppm {0.1 mg/m^3}	-	0	-	0	5.5
Benomyl [17804-35-2]	1 mg/m^3 RPM	-	0	-	0	0.4
Beryllium [7440-41-	0.00005	Withheld	0	-	0	13.6

7] and compounds, as Be Soluble compounds Soluble and insoluble compounds	mg/m^3 RPM					
Boron tribromide [10294-33-4]	0.7 ppm {7.19 mg/m^3}	-	0	-	0	
Boron trichloride [10294-34-5]	0.7 ppm {2.4 mg/m^3}	500,000 - 1,000,000 lb	0	-	0	
Boron trifluoride [7637-07-2]	0.1 ppm	Withheld	0	-	0	
Boron trifluoride ethers [109-63-7; 353-42-4], as BF_3	0.1 ppm	Withheld	0	-	0	
Bromoform [75-25-2]	0.5 ppm {5.2 mg/m^3}	-	0	-	0	
1-Bromopropane [106-94-5]	0.1 ppm {0.5 mg/m^3}	500,000 - 1,000,000 lb	$2,108,000	6.20/kg	340	
Butane, isomers [75-28-5; 106-97-8]	1000 ppm {2370 mg/m^3} TLV-STEL	30,000,000,000 - 40,000,000,000 lb; 60,000,000,000 - 70,000,000,000 lb	$14,546,400,000	0.3/lb	22000000	7.7
Butenes, all isomers [106-98-9; 107-01-7; 590-18-1; 624-64-6; 25167-67-3] Isobutene [115-11-7]	50 ppm {238 mg/m^3}	1,000,000,000 - 5,000,000,000 lb; < 25,000 lb; 100,000,000 - 250,000,000 lb; 250,000,000 - 500,000,000 lb; 1,000,000,000 - 5,000,000,000 lb; 1,000,000,000 - 5,000,000,000 lb	$1,190,160,000	0.3/lb	1800000	

Butyl acetates, all isomers [105-46-4; 110-19-0; 123-86-4; 540-88-5]	251 ppm {574 mg/m^3}	-; 50,000,000 - 100,000,000 lb; 250,000,000 - 500,000,000 lb; 10,000,000 - 50,000,000 lb	$262,276,000	0.7/lb	170000	0.9
tert-Butyl hydroperoxide [75-91-2]	0.1 ppm {0.4mg/m^3}	10,000,000 - 50,000,000 lb	$36,720,000	2700/ mt	13600	
Cadusafos [95465-99-9]	0.00009 ppm {0.001 mg/m^3}	-	0	-	0	
Calcium silicate, naturally occurring as Wollastonite [13983-17-0]	1 mg/m^3 RPM	100,000 - 500,000 lb	$27,200	200/mt	136	2.9
Captafol [2425-06-1]	0.007 ppm {0.1 mg/m^3}	-	0	-	0	0.4
Carbaryl [63-25-2]	0.06 ppm {0.5 mg/m^3}	-	0	-	0	5.5
Carbon black [1333-86-4]	3 mg/m^3 RPM	1,000,000,000 - 5,000,000,000 lb	$1,498,720,000	0.5/lb	1360000	2.6
Carbonyl sulfide [463-58-1]	5 ppm {12 mg/m^3}	1,000,000 - 10,000,000 lb	-	-	2500	
Carfentrazone-ethyl [128639-02-1]	1 mg/m^3 RPM	-	0	-	0	0.4
Chlorine [7782-50-5]	0.1 ppm {0.29 mg/m^3}	20,000,000,000 - 30,000,000,000 lb	$2,835,000,000	250/mt	11340000	
Chlorine dioxide [10049-04-4]	0.1 ppm {0.28 mg/m^3} TLV-C	1,000,000,000 - 5,000,000,000 lb	$2,040,000,000	1500/ mt	1360000	
Chlorobromomethane [74-97-5]	200 ppm {1060 mg/m^3}	Withheld	0	-	0	3.0
1-Chloro-1-nitropropane [600-25-9]	2 ppm {10 mg/m^3}	-	0	-	0	3.0
Chloroprene [126-99-8]	1 ppm {3.6 mg/m^3}	50,000,000 - 100,000,000 lb	$56,202,000	0.75/lb	34000	2.6
Chromium, [7440-	0.5 mg/m^3	1,000,000,000	-	-	1360000	Cr(0)

47-3] and inorganic compounds Metallic chromium, as Cr(O); Trivalent chromium compounds, as Cr(III); Hexavalent chromium compounds, as Cr(VI) water and insoluble compounds	as Cr(0); 0.003 mg/m^3 as Cr(III);0.0002 mg/m^3 as Cr(VI); Chromyl chloride 0.0001 ppm	- 5,000,000,000 lb				13.6; Cr(III) 6.0 ; Cr(VI) 2.8
Citral [5392-40-5]	5 ppm {32 mg/m^3}	100,000 - 500,000 lb	-	-	140	23.1
Clopidol [2971-90-6]	3 mg/m^3 RPM	-	0	-	0	
Cresol, all isomers [95-48-7; 106-44-5;108-39-4; 1319-77-3]	20 mg/m^3 RPM	10,000,000 - 50,000,000 lb; 50,000,000 - 100,000,000 lb; 50,000,000 - 100,000,000 lb; Withheld	$81,600,000	1000/ mt	81600	2.3
Cyanoacrylates, Ethyl [7085-85-0] and Methyl (137-05-3]	0.2 ppm {1 mg/m^3}	1,000,000 - 10,000,000 lb, '-	$2,500,000	1000/ mt	2500	0.6
Cyanogen [460-19-5]	5 ppm {10.6 mg/m3} TLV-C	-	0	-	0	0.6
Cyanogen bromide [506-68-3]	0.3 ppm {0.75 mg/m3} TLV-C	-	0	-	0	0.6
Cyanogen chloride (506-77-4]	0.3 ppm {1.3 mg/m^3} TLV-C	-	0	-	0	0.6
2,4-D [94-75-7]	10 mg/m^3	Withheld	0	-	0	0.4
Diacetyl [431-03-8]	0.01 ppm {0.04 mg/m^3}	-	0	-	0	
Dibutyl phosphate [107-66-4]	0.6 ppm {5.0 mg/m^3}	1,000,000 - 10,000,000 lb	-	-	2500	
Dieldrin [60-57-1]	0.1 mg/m^3 RPM	-	0	-	0	5.5
Diesel Fuel [68334-	100 mg/m^3	30,000,000,00	$71,100,000,0	450/mt	15800000	2.5

30-5; 68476-30-2; 68476-31-3; 68476-34-6] as total hydrocarbons	RPM	0 - 40,000,000,000 lb; 50,000,000,000 - 60,000,000,000 lb; 1,000,000,000 - 5,000,000,000 lb; 120,000,000,000 - 130,000,000,000 lb 120,000,000,000 - 130,000,000,000 lb	00		0	
Diethanolamine [111-42-2]	0.2 ppm {1.0 mg/m^3} RPM	5,000,000,000 - 10,000,000,000 lb	$340,000,000	100/mt	3400000	
Diethylamine [109-89-7]	5.0 ppm {15.0 mg/m^3} RPM	10,000,000 - 50,000,000 lb	$25,160,000	1850/ mt	13600	
Diethylene glycol monobutyl ether [112-34-5]	10.0 ppm {67.5 mg/m^3} RPM	100,000,000 - 250,000,000 lb	$98,400,000	1230/ mt	80000	0.6
N,N-Diethylhydroxylamine [3710-84-7]	2 ppm {7.3 mg/m^3}	1,000,000 - 10,000,000 lb	$5,000,000	2000/ mt	2500	
Dimethyl carbamoyl chloride [79-44-7]	0.005 ppm {0.2 mg/m^3}	-	0	-	0	
Dimethylacetamide [127-19-5]	10 ppm {36 mg/m^3}	10,000,000 - 50,000,000 lb	$20,400,000	1500/ mt	13600	
Dimethylamine [124-40-3]	5 ppm {9.2 mg/m^3}	250,000,000 - 500,000,000 lb	$110,500,000	650/mt	170000	
Dimethylformamide [68-12-2]	5 ppm {15 mg/m^3}	10,000,000 - 50,000,000 lb	$10,880,000	800/mt	13600	33.0
Endosulfan [115-29-7]	0.006 ppm {0.1 mg/m^3} RPM	-	0	-	0	5.5

Ethanol [64-17-5]	1000 ppm {1880 mg/m^3} TLV-STEL	120,000,000,000 - 130,000,000,000 lb	$56,000,000,000	1000/ mt	56000000	1.5
Ethyl formate [109-94-4]	100 ppm {303 mg/m^3} TVL-STEL	< 25,000 lb	-	-	11	
Ethyl isocyanate [109-90-0]	0.02 ppm {0.06 mg/m^3}	-	-	-	0	
Ethyl tert-butyl ether [637-92-3]	25 ppm {105 mg/m^3}	1,000,000,000 - 5,000,000,000 lb	$2,040,000,000	1500/ mt	1360000	
Ethylamine [75-04-7]	5 ppm {9 mg/m^3}	Withheld	0	-	0	
Ethylbenzene [100-41-4]	20 ppm {87 mg/m^3}	10,000,000,000 - 20,000,000,000 lb	$8,992,320,000	0.6/lb	6800000	33.0
Ethylene glycol[107-21-1]	25 ppm Vapor Fraction	5,000,000,000 - 10,000,000,000 lb	$5,245,520,000	0.7/lb	3400000	2.1
Ethyleneimine [151-56-4]	0.05 ppm {0.09 mg/m^3}	-	0	-	0	
Ethylidene norbornene [16219-75-3]	2 ppm {10 mg/m^3}	50,000,000 - 100,000,000 lb	$119,000,000	3.50/kg	34000	
Ferbam [14484-64-1]	5 mg/m^3 RPM	-	0	-	0	0.4
Fludioxonil [131341-86-1]	1 mg/m^3 Vapor Fraction	-	0	-	0	0.4
Folpet [133-07-3]	1 mg/m^3 RPM	-	0	-	0	0.4
Formaldehyde [50-00-0]	0.1 ppm {0.12 mg/m^3}	1,000,000,000 - 5,000,000,000 lb	$629,462,400	0.21/lb	1360000	18.9
Furfural [98-01-1]	0.2 ppm {0.8 mg/m^3}	1,000,000 - 10,000,000 lb	$4,375,000	1750/ mt	2500	
Furfuryl alcohol [98-00-0]	0.2 ppm {0.8	10,000,000 - 50,000,000 lb	$24,480,000	1800/ mt	13600	

	mg/m^3}					
Hard Metals containing Cobalt [7440-48-4] and Tungsten carbide [12070-12-1] , as Co	0.005 mg/m^3 as Co	10,000,000 - 50,000,000 lb; 10,000,000 - 50,000,000 lb	-	-	27200	13.6
Hexafluoropropylene [116-15-4]	0.1 ppm {0.6 mg/m^3}	10,000,000 - 50,000,000 lb	-	-	13600	
Hexylene glycol [107-41-5]	25 ppm Vapor Fraction	10,000,000 - 50,000,000 lb	-	-	13600	
Hydrogen sulfide [7783-06-4]	1 ppm {1.4 mg/m^3}	1,000,000,000 - 5,000,000,000 lb	-	-	1360000	3.2
Hydroquinone [123-31-9]	1 mg/m^3	10,000,000 - 50,000,000 lb	$77,520,000	5700/ mt	13600	
Indene [95-13-6]	5 ppm {24 mg/m^3}	-	-	-	0	
Iodine [7553-56-2] and Iodides	0.01 ppm {0.1 mg/m^3}	1,000,000 - 10,000,000 lb	$6,000,000	24/kg	2500	
Lead chromate [7758-97-6] as Cr (VI)	0.0002 mg/m^3 RPM	Withheld	0	-	0	0.8
Lithium hydride [7580-67-8]	0.05 mg/m^3 RPM TLV-C	-	0	-	0	
Maleic anhydride [108-31-6]	0.0025 ppm {0.01 mg/m^3} RPM and Vapor	500,000,000 - 750,000,000 lb	$327,073,600	0.53/lb	280000	
Manganese [7439-96-5], elemental and inorganic compounds as Mn	0.02 mg/m^3 RPM	250,000,000 - 500,000,000 lb	-	-	170000	0.1
Methanol [67-56-1]	200 ppm {262 mg/m^3}	10,000,000,000 - 20,000,000,000 lb	$1,700,000,000	250/mt	6800000	5.0
Methomyl [16752-77-5]	0.2 mg/m^3 RPM and Vapor	-	0	-	0	5.5
1-Methoxy-2-propanol [107-98-2]	50 ppm {184 mg/m^3}	100,000,000 - 250,000,000 lb	$80,000,000	1000/ mt	80000	

Methyl acetate [79-20-9]	200 ppm {606 mg/m^3}	1,000,000,000 - 5,000,000,000 lb	$1,360,000,000	1000/ mt	1360000	0.9
Methyl formate [107-31-3]	50 ppm {123 mg/m^3}	10,000,000 - 50,000,000 lb	$13,600,000	1000/ mt	13600	0.9
Methyl isoamyl ketone [100-12-3]	20 ppm {96 mg/m^3}	-	0	-	0	3.0
Methyl isobutyl ketone [108-10-1]	20 ppm {82 mg/m^3}	100,000,000 - 250,000,000 lb	$158,688,000	0.9/lb	80000	3.0
Methyl isocyanate [624-83-9]	0.02 ppm {0.047 mg/m^3}	-	0	-	0	0.6
Methyl isopropyl ketone [563-80-4]	20 ppm {70 mg/m^3}	Withheld	0	-	0	3.0
Methyl parathion [298-00-0]	0.02 mg/m^3 RPM and Vapor	-	0	-	0	0.4
Methylacrylonitrile [126-98-7]	1 ppm {2.7 mg/m^3}	-	0	-	0	
Methylamine [74-89-5]	5 ppm {6.4 mg/m^3}	10,000,000 - 50,000,000 lb	$16,320,000	1200/ mt	13600	
α-Methylstyrene [98-83-9]	10 ppm {48 mg/m^3}	10,000,000 - 50,000,000 lb	$14,987,200	0.5/lb	13600	
Mineral oil, excluding metal working fluids	Pure - 5 mg/m^3 RPM; Not refined - No TLV	-	0	-	0	2.3
Naththalene [91-20-3]	10 ppm {52 mg/m^3}	100,000,000 - 250,000,000 lb	$64,000,000	800/mt	80000	
Natural rubber latex [9006-04-6] as inhalable allergenic proteins	0.0001 mg/m^3	-	0	-	0	0.5
Nickel carbonyl [13463-39-3] as Ni	0.05 ppm {0.12 mg/m^3} TLV-C	-	0	-	0	3.8
Nitrogen dioxide [10102-44-0]	0.2 ppm {0.38 mg/m^3}	-	0	-	0	
Nonane [111-84-2]	200 ppm {1048 mg/m^3}	500,000 - 1,000,000 lb	$408,000	1200/ mt	340	26.0
Oxalic acid,	1 mg/m^3	1,000,000 -	$1,540,000	700/mt	2200	

anhydrous [144-62-7] and dihydrate [6153-56-6]		10,000,000 lb; 100,000 - 500,000 lb				
Paraquat [4685-14-7] as the cation	0.05 mg/m^3 RPM	-	0	-	0	0.4
Pentachlorophenol [87-86-5]	0.05 ppm {0.5 mg/m^3}	10,000,000 - 50,000,000 lb	-	-	13600	2.3
2,4-Pentanedione [123-54-6]	25 ppm {102 mg/m^3}	1,000,000 - 10,000,000 lb	$13,750,000	5500/ mt	2500	3.0
Pentaerythritol [115-77-5]	10 mg/m^3 RPM	100,000,000 - 250,000,000 lb	$80,000,000	1000/ mt	80000	
Pentane, all isomers [78-78-4; 109-66-0; 463-82-1]	1000 ppm {2950 mg/m^3}	1,000,000,000 - 5,000,000,000 lb; 1,000,000,000 - 5,000,000,000 lb; -	$2,992,000,000	1100/ mt	2720000	26.0
Phosphine [7803-51-2]	0.05 ppm {0.07 mg/m^3}	100,000 - 500,000 lb	-	-	136	
Phthalic anhydride [85-44-9]	0.0003 ppm {0.002 mg/m^3} RPM and Vapor	500,000,000 - 750,000,000 lb	$280,000,000	1000/ mt	280000	
m-Phthalodinitrile [626-17-5]	5 mg/m^3 RPM and Vapor	1,000,000 - 10,000,000 lb	$13,750,000	5500/ mt	2500	
o-Phthalodinitrile [91-15-6]	1 mg/m^3 RPM and Vapor	Withheld	0	-	0	
Piperazine and salts [110-85-0], as piperazine	0.03 ppm {0.1 mg/m^3} RPM and Vapor	10,000,000 - 50,000,000 lb	-	-	13600	
Propoxur [114-26-1]	0.06 ppm {0.5 mg/m^3} RPM and Vapor	-	0	-	0	5.5
Propyl acetate isomers [108-21-4;	100 ppm {417	10,000,000 - 50,000,000 lb;	$291,600,000	1350/ mt	216000	0.9

109-60-4]	mg/m^3}	100,000,000 - 250,000,000 lb				
Propyleneimine [75-55-8]	0.2 ppm {0.5 mg/m^3}	100,000 - 500,000 lb	-	-	136	
Silica, crystalline - α-quartz [1317-95-9; 14808-60-7] and cristbalite [14464-46-1]	0.025 mg/m^3 RPM	-; 100,000,000 - 250,000,000 lb; 10,000,000 - 50,000,000 lb	$102,600,000	900/mt	114000	10.6
Silicon tetrahydride [7803-62-5]	5 ppm {6.57 mg/m^3}	10,000,000 - 50,000,000 lb	-	-	13600	
Simazine [122-34-9]	0.5 mg/m^3 RPM	-	0	-	0	0.4
Stearates [57-11-4; 557-04-0; 557-05-1; 822-16-2]	3 mg/m^3 RPM	500,000,000 - 750,000,000; 1,000,000 - 10,000,000 lb; 1,000,000 - 10,000,000 lb	$420,000,000	1500/ mt	280000	0.9
Sulfur dioxide [7446-09-5]	0.25 ppm {0.65 mg/m^3} TLV-STEL	50,000,000 - 100,000,000 lb	-	-	35000	6.0
Sulprofos [35400-43-2]	0.008 ppm {0.1 mg/m^3} RPM and Vapor	-	0	-	0	5.5
Talc [14807-96-6]	2 mg/m^3 RPM	50,000,000 - 100,000,000 lb	$7,000,000	200/mt	35000	3.3
1,1,1,2-Tetrachloro-2,2-difluoroethane [76-11-9]	100 ppm {834 mg/m^3}	-	0	-	0	1.1
1,1,2,2-Tetrachloro-1,2-difluoroethane [76-12-0]	50 ppm {417 mg/m^3}	-	0	-	0	1.1
Thallium [7440-28-0] and compounds as Tl	0.02 mg/m^3 RPM	-	0	-	0	13.6
4,4'-Thiobis(6-tert-butyl-m-cresol) [96-69-5]	1 mg/m^3 RPM	500,000 - 1,000,000 lb	-	-	340	
Thioglycolic acid [68-11-1] and salts	1 ppm {3.8 mg/m^3}	Withheld	0	-	0	
Thionyl chloride [7719-09-7]	0.2 ppm {1	1,000,000 -	$5,250,000	2100/	2500	

	mg/m^3} TLV-C	10,000,000 lb		mt		
Thiram [137-26-8]	0.005 ppm {0.05 mg/m^3} RPM and Vapor	1,000,000 - 10,000,000 lb	$5,000,000	2000/ mt	2500	0.4
Toluene isocyanate 2,4- or 2,6- (or as a mixture) [584-84-9; 91-08-7]	0.001 ppm {0.007 mg/m^3} RPM and Vapor	100,000,000 - 250,000,000 lb; Withheld	$320,000,000	4000/ mt	80000	
Tributyl phosphate [126-73-8]	0.5 ppm {5 mg/m^3} RPM and Vapor	1,000,000 - 10,000,000 lb	$2,250,000	900/mt	2500	
Trichloroacetic acid [76-03-9]	0.005 ppm {0.03 mg/m^3}	-	0	-	0	
1,2,3-Trichloropropane [96-18-4]	0.5 ppm {2.07 mg/m^3}	Withheld	0	-	0	3.0
Triethylamine [121-44-8]	0.5 ppm {3.34 mg/m^3}	10,000,000 - 50,000,000 lb	$6,800,000	500/mt	13600	
Trimellitic anhydride [552-30-7]	0.00006 ppm {0.0005 mg/m^3} RPM and Vapor	50,000,000 - 100,000,000 lb	$59,500,000	1700/ mt	35000	
Trimethylamine [75-50-3]	5 ppm {12 mg/m^3}	100,000,000 - 250,000,000 lb	$80,000,000	1000/ mt	80000	
Triorthocresyl phosphate [78-30-8]	0.02 mg/m^3 RPM and Vapor	-	0	-	0	
Tungsten [7440-33-7] and compounds, in the absence of Cobalt, as W	3 mg/m^3 RPM	10,000,000 - 50,000,000 lb	-	-	35000	13.6
Vanadium pentoxide [1314-62-1] as V	0.05 mg/m^3 RPM	10,000,000 - 50,000,000 lb	$344,750,000	9850/ mt	35000	
Vinyl acetate [108-05-4]	10 ppm {35 mg/m^3}	1,000,000,000 - 5,000,000,000 lb	$1,224,000,000	900/mt	1360000	
Warfarin [81-81-2]	0.01 mg/m^3	-	0	-	0	

	RPM					
Second-hand tobacco smoke						64.1
Total			**189,909,385,400**			
* Data from 2018 7th Edition ACGIH Bokk of TLVs and BEIs						
** Metals and gases were not included. Some of the price and tonnage data were not available for certain chemicals.						
# Data from https://www.intratec.us/indexes-and-pricing-data/chemicals-pricing-data-store and http://www.icis.com/about/free-trials/.						
All other prices were obtained from a search of the internet						
† 2017 Data from http://www.epa.gov/chemical-data-reporting and http://epa.gov/cdr/						
Δ Exposure Data from http://www.irsst.qc.ca/media/documents/PubIRSST/R-895.pdf						

There were 149,500,000 jobs in the US in September 2018 according to the CES survey of employers. https://www.deptofnumbers.com/employment/us/