

SCHEDULE 1

Table 2 - Occupational Exposure Limits (OELs) for chemical substances

Description of the OEL Review

Revision of Alberta Occupational Exposure Limits

Section 16 of the Alberta Occupational Health and Safety (OHS) Code requires employers to ensure that worker exposure to substances does not exceed Occupational Exposure Limits (OEL) listed in Table 2, Schedule 1. An OEL is the airborne concentration of a substance for which it is believed that nearly all workers may be repeatedly exposed on a day-to-day basis without suffering adverse health effects. The OEL refers to the concentration of the substance to which the worker is exposed, not the concentration of the substance in workplace air. OELs are based on review of data from experimental animal and human studies and from industrial experience from studies of workers. Exposure limits have been developed by a number of organizations. Most of the OELs currently listed in the OHS Code are based on Threshold Limit Values (TLVs) developed by the American Conference of Governmental Industrial Hygienists (ACGIH).

Each year, ACGIH reviews a number of TLVs and makes revisions based on current science and knowledge on the health effects from exposure to the chemicals. In Alberta, the OHS legislation does not automatically adopt the most current version of the TLVs; rather a process of review and consultation is followed to ensure that the exposure limits are appropriate for Alberta workplaces. OELs are typically reviewed on about a five year cycle; the current OELs in the 2009 OHS Code were based on the 2006 TLVs.

The primary goal of the OEL review is to recommend exposure limits that protect the health of workers at Alberta work sites. To ensure that the OEL review process is comprehensive and that stakeholder issues are addressed, a working group is established to conduct the technical review and provide recommendations to the Department. The working group includes representatives from industry, labour and the government. Recommendations from the working group are forwarded to the process for revisions to the OHS Code.

There are approximately 800 substances with OELs listed in Schedule 1, Table 2 of the OHS Code. The technical review process does not include a detailed evaluation of the OELs for all of these substances. For the purposes of the review for this revision of the OHS Code, the 2012 ACGIH TLVs were used as a baseline. The OEL Review Working Group then identified a short list of substances that required detailed technical review. Substances subject to review included those for which the TLV was different than the current OEL, was new (there is no OEL), those substances for which ACGIH does not have a TLV or specific substances for which stakeholders had requested a detailed review.

Evaluation criteria included the following:

- Available scientific documentation and rationale,
- Availability of established and standardized sampling and analytical methods for monitoring airborne exposure in the workplace
- Occupational exposure limits established in other Canadian jurisdictions
- Existing and potential compliance issues (e.g. availability of controls),
- Applicability to Alberta specific conditions, and
- Other relevant factors, as appropriate.

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Proposed Changes:

The following changes are proposed with respect to the Alberta OELs:

1. Unless otherwise specified, the proposed OEL is the respective 2012 ACGIH TLV for the substance. Recommended changes that deviate from the 2012 ACGIH TLVs are listed in the attached table.
2. Existing OELs for particulate not otherwise regulated, polymethylene polyphenyl isocyanate, sulphur and 1,1,1-trifluoro-2,2-dichloroethane (HCFC-123) will be retained (no ACGIH TLV for these substances).
3. TLVs listed in the Notice of Intended Changes in the 2012 TLV documentation will not be adopted.
4. Because of potential issues with measurement, TLVs with an IFV (inhalable fraction and vapour) notation will not be adopted. OELs for these substances will be maintained at their current level.
5. For pesticides that may not currently be registered for use in Canada, the current Alberta OEL listed in the 2009 OHS Code will be retained.
6. In Table 2, Schedule 1, the column heading “substance interaction” will be revised to “notation”
7. A new notation will be added to the OELs for crystalline silica and coal dust listed in Table 2, Schedule 1, to consist of “Do not adjust for daily work shifts longer than 8 hours”.
8. A new notation will be added, consisting of “sensitizer” for substances designated by ACGIH as sensitizers in their TLV documentation.

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All Proposed Changes

Legend

ACGIH	American Conference of Governmental Industrial Hygienists
OEL	Occupational Exposure Limit
TLV	Threshold Limit Value
INH	Inhalable
IFV	Inhalable Fraction and Vapour
TF	Thoracic Fraction
R	Respirable
V	Vapour and aerosol

	Alberta OEL ¹						ACGIH TLV (2012)						Proposed Alberta OEL					
	8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
Acetic anhydride	--	--	--	--	5	21	1	4	3	13	--	--	1	4	3	13	--	--
Acrylamide	--	0.03	--	--	--	--	--	0.03 ^{IFV}	--	--	--	--	0.03	--	--	--	--	--
Alachlor	--	--	--	--	--	--	--	1 ^{IFV}	--	--	--	--	--	--	--	--	--	--
Aldrin	--	0.25	--	--	--	--	--	0.05 ^{IFV}	--	--	--	--	--	0.25	--	--	--	--
Aliphatic hydrocarbon gases (Alkanes C1-C4)	Refer to individual substances (methane, propanes, butanes), methane not adopted.						Refer to individual substances (methane, propanes, butanes).						Refer to individual substances (methane, propanes, butanes), methane not adopted.					
Allyl bromide	--	--	--	--	--	--	0.1	0.5	0.2	1.0	--	--	0.1	0.5	0.2	1.0	--	--
Alumina (Aluminum oxide) ²	--	10	--	--	--	--	--	1 ^R	--	--	--	--	1 ^R	--	--	--	--	--
Aluminum ² Metal Dust	--	10	--	--	--	--	--	1 ^R	--	--	--	--	1 ^R	--	--	--	--	--
Pyro Powders	--	5	--	--	--	--	--	1 ^R	--	--	--	--	1 ^R	--	--	--	--	--
Soluble Salts	--	2	--	--	--	--	--	1 ^R	--	--	--	--	1 ^R	--	--	--	--	--

Updated March, 27, 2014

Notes:

1. If not otherwise specified, limit for aerosols (particulate) is total.
2. Combined into TLV for aluminum metal and insoluble compounds
3. Add sensitizer notation
4. Add a note to refer to the OELs for lead and arsenic
5. Maintain a skin and sensitizer notation in table entry
6. Use the TWA for Talc.
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	Alberta OEL ¹						ACGIH TLV (2012)						Proposed Alberta OEL					
	8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
Alkyls	--	2	--	--	--	--	--	1 ^R	--	--	--	--	1 ^R	--	--	--	--	
Tert-Amyl methyl ether (TAME)	--	--	--	--	--	--	20	84	--	--	--	--	20	84	--	--	--	
Arsine	0.05	0.2	--	--	--	--	0.005	0.016	--	--	--	--	0.005	0.016	--	--	--	
Asphalt (Bitumen) fume, as benzene-soluble aerosol	--	5	--	--	--	--	--	0.5 ^{INH}	--	--	--	--	--	0.5 ^{INH}	--	--	--	
Azinphos-methyl	--	0.2	--	--	--	--	--	0.2 ^{IFV}	--	--	--	--	--	0.2	--	--	--	
Benomyl ³	0.84	10	--	--	--	--	--	1 ^{INH}	--	--	--	--	0.84	10	--	--	--	
Beryllium and compounds (Zinc beryllium silicate)	--	0.002	--	0.01	--	--	--	0.00005 ^{INH}	--	--	--	--	--	0.00005 ^{INH}	--	--	--	
Borates, tetra, sodium salts	--	1	--	3	--	--	--	2 ^{INH}	--	6 ^{INH}	--	--	--	2 ^{INH}	--	6 ^{INH}	--	
Butenes, all isomers	--	--	--	--	--	--	250	574	--	--	--	--	250	574	--	--	--	
Butylated hydroxytoluene (BHT)	--	10	--	--	--	--	--	2 ^{IFV}	--	--	--	--	--	10	--	--	--	
Calcium carbonate, Limestone, Marble	--	10	--	--	--	--	--	--	--	--	--	--	--	10	--	--	--	
Calcium sulphate	--	10	--	--	--	--	--	10 ^{INH}	--	--	--	--	--	10	--	--	--	
Caprolactam	--	5	--	--	--	--	--	5 ^{IFV}	--	--	--	--	--	5	--	--	--	
Captan	--	5	--	--	--	--	--	5 ^{INH}	--	--	--	--	--	5	--	--	--	
Carbaryl	--	5	--	--	--	--	--	0.5 ^{IFV}	--	--	--	--	--	0.5	--	--	--	
Carbofuran	--	0.1	--	--	--	--	--	0.1 ^{IFV}	--	--	--	--	--	0.1	--	--	--	
Carbon black	--	3.5	--	--	--	--	--	3 ^{INH}	--	--	--	--	--	3 ^{INH}	--	--	--	
Carbonyl sulfide	--	--	--	--	--	--	5	12	--	--	--	--	--	--	--	--	--	

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4. Add a note to refer to the OELs for lead and arsenic
5. Maintain a skin and sensitizer notation in table entry
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	8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
Chlorpyrifos	--	0.1	--	--	--	--	--	0.1 ^{IFV}	--	--	--	--	--	0.1	--	--	--	--
Citral (CAS 5392-40-5)	--	--	--	--	--	--	5 ^{IFV}	31	--	--	--	--	--	--	--	--	--	--
Coal Dust	Add "do not adjust for work shifts longer than 8-hours" notation to substance interactions column																	
Cotton dust, raw, untreated	--	0.2	--	--	--	--	--	0.1 ^{TF}	--	--	--	--	--	0.2	--	--	--	--
Coumaphos	--	0.5	--	--	--	--	--	0.05 ^{IFV}	--	--	--	--	5	0.05	--	--	--	--
Cresol, all isomers	5	22	--	--	--	--	--	20 ^{IFV}	--	--	--	--	--	22	--	--	--	--
Demeton (Systox)	--	0.05	--	--	--	--	--	0.05 ^{IFV}	--	--	--	--	--	0.05	--	--	--	--
Demeton-s-methyl	--	0.05	--	--	--	--	--	0.05 ^{IFV}	--	--	--	--	--	0.05	--	--	--	--
Diacetyl	--	--	--	--	--	--	0.01	0.04	0.02	0.07	--	--	0.01	0.04	0.02	0.07	--	--
Diazinon	--	0.01	--	--	--	--	--	0.01 ^{IFV}	--	--	--	--	--	0.01	--	--	--	--
Dibrom (Naled)	--	0.1	--	--	--	--	--	0.1 ^{IFV}	--	--	--	--	--	0.1	--	--	--	--
Dibutyl phosphate	1	8.6	2	17	--	--	--	5 ^{IFV}	--	--	--	--	1	8.6	2	17	--	--
2,2-Dichloropropionic acid	--	5	--	--	--	--	--	5 ^{INH}	--	--	--	--	--	5	--	--	--	--
Dichlorvos	--	0.1	--	--	--	--	--	0.1 ^{IFV}	--	--	--	--	--	0.1	--	--	--	--
Dicrotophos	--	0.05	--	--	--	--	--	0.05 ^{IFV}	--	--	--	--	--	0.05	--	--	--	--
Dieldrin	--	0.25	--	--	--	--	--	0.1 ^{IFV}	--	--	--	--	--	0.25	--	--	--	--
Diesel fuel, as total hydrocarbons	--	100	--	--	--	--	--	100 ^{IFV}	--	--	--	--	--	100	--	--	--	--
Diethanolamine	--	2	--	--	--	--	--	1 ^{IFV}	--	--	--	--	--	2	--	--	--	--
Diglycidyl ether	0.1	0.5	--	--	--	--	0.01	0.05	--	--	--	--	0.01	0.05	--	--	--	--
Dihydroxybenzene (Hydroquinone)	--	2	--	--	--	--	--	1	--	--	--	--	--	1	--	--	--	--
Dimethyl carbamoyl chloride	--	--	--	--	--	--	0.005	0.022	--	--	--	--	0.005	0.022	--	--	--	--

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	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
Dimethyl disulfide	--	--	--	--	--	--	0.5	1.9	--	--	--	--	0.5	1.9	--	--	--	--
Dinitolmide (3,5-Dinitro-o-toluamide)	--	5	--	--	--	--	--	1	--	--	--	--	--	1	--	--	--	--
Dioxathion	--	0.1	--	--	--	--	--	0.1 ^{IFV}	--	--	--	--	--	0.1	--	--	--	--
Diquat	--	0.5	--	--	--	--	--	0.1 ^R 0.5 ^{INH}	--	--	--	--	--	0.5	--	--	--	--
Disulfoton	--	0.05	--	--	--	--	--	0.05 ^{IFV}	--	--	--	--	--	0.05	--	--	--	--
Emery ²	--	10	--	--	--	--	--	1	--	--	--	--	--	1	--	--	--	--
Endosulfan	--	0.1	--	--	--	--	--	0.1 ^{IFV}	--	--	--	--	--	0.1	--	--	--	--
EPN	--	0.1	--	--	--	--	--	0.1 ^{INH}	--	--	--	--	--	0.1	--	--	--	--
Ethion	--	0.05	--	--	--	--	--	0.05 ^{IFV}	--	--	--	--	--	0.05	--	--	--	--
Ethyl amyl ketone, 5-Methyl-3-heptanone	25	131	--	--	--	--	10	52.4	--	--	--	--	10	52.4	--	--	--	--
Ethyl benzene	100	434	125	543	--	--	20	86.8	---	--	--	--	20	86.8	---	--	--	--
Ethyleneimine	0.5	0.9	--	--	--	--	0.05	0.09	0.1	0.2	--	--	0.05	0.09	0.1	0.2	--	--
Ethyl formate	100	303	--	--	--	--	--	--	100	303	--	--	--	--	100	303	--	--
2-Ethylhexanoic acid	--	5	--	--	--	--	--	5 ^{IFV}	--	--	--	--	--	5	--	--	--	--
Fenamiphos	--	0.05	--	--	--	--	--	0.05 ^{IFV}	--	--	--	--	--	0.05	--	--	--	--
Fensulfothion	--	0.01	--	--	--	--	--	0.01 ^{IFV}	---	--	--	--	--	0.01	--	--	--	--
Fenthion	--	0.05	--	--	--	--	--	0.05 ^{IFV}	--	--	--	--	--	0.05	--	--	--	--
Ferbam	--	10	--	--	--	--	--	5	--	--	--	--	--	10	--	--	--	--
Flour dust	--	0.5	--	--	--	--	--	0.5 ^{INH}	--	--	--	--	--	1.5 ^{INH}	--	--	--	--
Fonofos	--	0.01	--	--	--	--	--	0.1 ^{IFV}	--	--	--	--	--	0.01	--	--	--	--

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	Alberta OEL ¹						ACGIH TLV (2012)						Proposed Alberta OEL					
	8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
Formaldehyde	0.75	0.9	--	--	1	1.3	--	--	--	--	0.3	0.4	--	--	--	--	0.75	0.9
Glass fibres, continuous filament (Synthetic vitreous fibres)	--	5	--	--	--	--	--	5 ^{INH}	--	--	--	--	--	5	--	--	--	--
Glyoxal	--	0.1	--	--	--	--	--	0.1 ^{IFV}	--	--	--	--	--	0.1	--	--	--	--
Hexafluoropropylene	--	--	--	--	--	--	0.1	0.6	--	--	--	--	0.1	0.6	--	--	--	--
Hexahydrophthalic anhydride, all isomers	--	--	--	--	--	0.005	--	--	--	--	--	0.005 ^{IFV}	--	--	--	--	--	0.005
Hexone (methyl isobutyl ketone)	50	205	75	307	--	--	20	82	75	307	--	--	20	82	75	307	--	--
HCFC-123 (1,1,1-Trifluoro-2,2-dichloroethane)	50	310	--	--	--	--	--	--	--	--	--	--	50	310	--	--	--	--
Hydrogen sulfide	10	14	--	--	15	21	1	1.4	5	7	--	--	--	--	--	--	10	14
Hydroquinone	--	2	--	--	--	--	--	1	--	--	--	--	--	1	--	--	--	--
Indene	10	48	--	--	--	--	5	24	--	--	--	--	5	24	--	--	--	--
Iodine and iodides, iodine	--	--	--	--	0.1	1	--	0.01 ^{IFV}	0.1 ^V	--	--	--	--	--	--	--	0.1	1
Iodine and iodides, iodides	--	--	--	--	--	--	--	0.01 ^{IFV}	--	--	--	--	--	--	--	--	--	--
Lead arsenate ⁴	--	0.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium oxide	--	10	--	--	--	--	--	10 ^{INH}	--	--	--	--	--	10	--	--	--	--
Malathion	--	1	--	--	--	--	--	1 ^{IFV}	--	--	--	--	--	1	--	--	--	--
Maleic anhydride ³	0.1	0.4	--	--	--	--	--	0.01 ^{IFV}	--	--	--	--	0.1	0.4	--	--	--	--
Methane, Natural Gas	--	--	--	--	--	--	1000	656	--	--	--	--	--	--	--	--	--	--
Methyl demeton	--	0.5	--	--	--	--	--	0.05 ^{IFV}	--	--	--	--	--	0.5	--	--	--	--

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	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
Methyl isobutyl ketone	50	205	75	307	--	--	20	82	75	307	--	--	20	82	75	307	--	--
Methyl isopropyl ketone	200	705	--	--	--	--	20	70	--	--	--	--	20	70	--	--	--	--
1-Methyl naphthaline and 2-Methyl naphthalene	--	--	--	--	--	--	0.5	2.9	--	--	--	--	0.5	2.9	--	--	--	--
Methyl parathion	--	0.2	--	--	--	--	--	0.02 ^{IFV}	--	--	--	--	--	0.2	--	--	--	--
Methyl propyl ketone	200	705	250	881	--	--	--	--	150	529	--	--	200	705	250	881	--	--
α -Methyl styrene (CAS 98-83-9)	50	242	100	483	--	--	--	--	10	48	--	--	--	--	10	48	--	--
Methyl styrene, all isomers	50	242	100	483	--	--	No TLV for all isomers, new TLV for one of the isomers (α -Methyl styrene)—see above.						No TLV for all isomers, new TLV for one of the isomers (α -Methyl styrene)—see above.					
Mevinphos	--	0.01	--	--	--	--	--	0.01 ^{IFV}	--	--	--	--	--	0.01	--	--	--	--
Mineral oil, excluding metal working fluids, pure, highly and severely refined (Oil mist, mineral)	--	5	--	--	--	--	--	5 ^{INH}	--	--	--	--	--	5	--	--	--	--
Molybdenum, metal and insoluble compounds	--	10	--	--	--	--	--	10 ^{INH}	--	--	--	--	--	10	--	--	--	--
Monochloroacetic acid	0.5	1.9	--	--	--	--	0.5 ^{IFV}	1.9 ^{IFV}	--	--	--	--	0.5	1.9	--	--	--	--
Monocrotophos	--	0.05	--	--	--	--	--	0.05 ^{IFV}	--	--	--	--	--	0.05	--	--	--	--
Naphtha (Rubber solvent, VMP naphtha)	400	1590	--	--	--	--	TLV withdrawn, use reciprocal calculation method for refined hydrocarbon vapours (Appendix H).						400	1590	--	--	--	--
Natural rubber latex as total proteins⁵	--	0.001	--	--	--	--	--	0.0001 ^{INH}	--	--	--	--	--	--	--	--	--	--
Nickel and inorganic nickel																		

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Table 2 - Occupational Exposure Limits (OELs) for chemical substances

All Proposed Changes

	Alberta OEL ¹						ACGIH TLV (2012)						Proposed Alberta OEL					
	8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
compounds																		
Elemental	--	1.5	--	--	--	--	--	1.5 ^{INH}	--	--	--	--	--	1.5 ^{INH}	--	--	--	--
Insoluble compounds, as Ni	--	0.2	--	--	--	--	--	0.2 ^{INH}	--	--	--	--	--	0.2 ^{INH}	--	--	--	--
Soluble compounds, as Ni	--	0.1	--	--	--	--	--	0.1 ^{INH}	--	--	--	--	--	0.1 ^{INH}	--	--	--	--
Nickel subsulfide, as Ni	--	0.1	--	--	--	--	--	0.1 ^{INH}	--	--	--	--	--	0.1 ^{INH}	--	--	--	--
Nitrogen dioxide	3	5.5	5	9.4	--	--	0.2	0.4	--	--	--	--	1	1.9	--	--	--	--
5-Nitro-o-toluidine	--	--	--	--	--	--	--	1 ^{INH}	--	--	--	--	--	--	--	--	--	--
Nonane, all isomers	200	1050	--	--	--	--	ACGIH change of substance name to Nonane.						Change of substance name to Nonane.					
p,p'-Oxybis(benzenesulfonyl hydrazide)	--	--	--	--	--	--	--	0.1 ^{INH}	--	--	--	--	--	0.1 ^{INH}	--	--	--	--
Ozone	0.1	0.2	0.3	0.6	--	--	--	--	--	--	--	--	0.1	0.2	0.3	0.6	--	--
Heavy work	--	--	--	--	--	--	0.05	--	--	--	--	--	--	--	--	--	--	--
Moderate work	--	--	--	--	--	--	0.08	--	--	--	--	--	--	--	--	--	--	--
Light work	--	--	--	--	--	--	0.10	--	--	--	--	--	--	--	--	--	--	--
Heavy, moderate or light workloads (≤ 2 hours)	--	--	--	--	--	--	0.20	--	--	--	--	--	--	--	--	--	--	--
Parathion	--	0.05	--	--	--	--	--	0.05 ^{IFV}	--	--	--	--	--	0.05	--	--	--	--
Particulate not otherwise regulated							No TLV, but guideline of 10 mg/m ³ total and 3 mg/m ³ respirable.											
Total	--	10	--	--	--	--	--	--	--	--	--	--	--	10	--	--	--	--
Respirable	--	3	--	--	--	--	--	--	--	--	--	--	--	3	--	--	--	--
2,4-Pentanedione	--	--	--	--	--	--	25	102	--	--	--	--	25	102	--	--	--	--
Phorate	--	0.05	--	--	--	--	--	0.05 ^{IFV}	--	--	--	--	--	0.05	--	--	--	--
m-Phthalodinitrile	--	5	--	--	--	--	--	5 ^{IFV}	--	--	--	--	--	5	--	--	--	--

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Notes:

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3. Add sensitizer notation
4. Add a note to refer to the OELs for lead and arsenic
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SCHEDULE 1

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All Proposed Changes

	Alberta OEL ¹						ACGIH TLV (2012)						Proposed Alberta OEL					
	8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
o-Phthalodinitrile	--	--	--	--	--	--	--	1 ^{IFV}	--	--	--	--	--	--	--	--	--	--
Piperazine dihydrochloride	--	5	--	--	--	--	See below.						--	--	--	--	--	--
Piperazine and salts, as piperazine	--	5	--	--	--	--	0.03 ^{IFV}	0.06	--	--	--	--	0.03 ^{IFV}	0.06	--	--	--	--
Polymethylene polyphenyl isocyanate (PAPI)	0.005	0.07	--	--	--	--	--	--	--	--	--	--	0.005	0.07	--	--	--	--
Polyvinyl chloride (PVC)	--	--	--	--	--	--	--	1 ^R	--	--	--	--	--	1 ^R	--	--	--	--
Portland cement	--	10	--	--	--	--	--	1 ^R	--	--	--	--	--	1 ^R	--	--	--	--
n-Propanol (n-propyl alcohol)	200	492	400	984	--	--	100	246	--	--	--	--	100	246	--	--	--	--
Propyleneimine (2-methylaziridine)	2	4.7	--	--	--	--	0.2	0.5	0.4	0.9	--	--	0.2	0.5	0.4	0.9	--	--
Ronnel	--	5	--	--	--	--	--	5 ^{IFV}	--	--	--	--	--	5 ^{IFV}	--	--	--	--
Silica, crystalline	Add "do not adjust for work shifts longer than 8-hours" notation to substances interaction column.																	
Silicon carbide, nonfibrous	--	10	--	--	--	--	--	10 ^{INH}	--	--	--	--	--	10	--	--	--	--
Soapstone ⁶ , no asbestos and <1% crystalline silica																		
Total	--	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Respirable	--	3	--	--	--	--	--	2	--	--	--	--	--	2	--	--	--	--
Sulfotepp (TEDP)	--	0.1	--	--	--	--	--	0.1 ^{IFV}	--	--	--	--	--	0.1	--	--	--	--
Sulphur	--	10	--	--	--	--	--	--	--	--	--	--	--	10	--	--	--	--
Sulphur dioxide	2	5.2	5	13	--	--	--	--	0.25	0.66	--	--	2	5.2	5	13	--	--
Sulphuric acid	--	1	--	--	--	--	--	0.2 ^{TF}	--	--	--	--	--	0.2 ^{TF}	--	--	--	--
Sulprofos	--	1	--	--	--	--	--	0.1 ^{IFV}	--	--	--	--	--	1	--	--	--	--
Tantalum metal and oxide	--	5	--	--	--	--	TLV withdrawn in 2010.						--	--	--	--	--	--

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	8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
dusts as Ta																		
Temephos	--	1	--	--	--	--	--	1 ^{IFV}	--	--	--	--	--	1	--	--	--	--
TEPP (Tetraethyl pyrophosphate)	--	0.05	--	--	--	--	--	0.01 ^{IFV}	--	--	--	--	--	0.05	--	--	--	--
Terbufos	--	0.01	--	--	--	--	--	0.01 ^{IFV}	--	--	--	--	--	0.01	--	--	--	--
1,1,2,2-Tetrabromomethane (Acetylene tetrabromide)	0.1	1.4	--	--	--	--	0.1 ^{IFV}	1.4 ^{IFV}	--	--	--	--	0.1	1.4	--	--	--	--
1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4170	--	--	--	--	100	834	--	--	--	--	100	834	--	--	--	--
1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4170	--	--	--	--	50	417	--	--	--	--	50	417	--	--	--	--
Thallium and compounds as Tl	--	0.1	---	--	--	--	--	0.02 ^{INH}	--	--	--	--	--	0.02 ^{INH}	--	--	--	--
4,4'-Thiobis(6-tert-butyl-m-cresol)	--	10	--	--	--	--	--	1 ^{INH}	--	--	--	--	--	10	--	--	--	--
Thionyl chloride	--	--	--	--	1	4.9	--	--	--	--	0.2	1.0	--	--	--	--	0.2	1.0
Thiram ³	--	1	--	--	--	--	--	0.05 ^{IFV}	--	--	--	--	--	1	--	--	--	--
Toluene (Toluol)	50	188	--	--	--	--	20	75	--	--	--	--	20	75	--	--	--	--
Trichloroethylene	50	269	100	537	--	--	10	54	25	134	--	--	10	54	25	134	--	--
Trichlorophon	--	1	--	--	--	--	--	1 ^{INH}	--	--	--	--	--	1	--	--	--	--
Trimellitic anhydride	--	--	--	--	--	0.04	--	0.0005 ^{IFV}	--	0.002 ^{IFV}	--	--	--	--	--	--	--	0.04
Triphenyl amine	--	5	--	--	--	--	TLV withdrawn in 2010.						--	--	--	--	--	--
Vanadium pentoxide	--	0.05 ^R	--	--	--	--	--	0.05 ^{INH}	--	--	--	--	--	0.05 ^{INH}	--	--	--	--

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	8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling		8-hour		15-minute		Ceiling	
	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³	ppm	mg/m ³
Wood dusts																		
Western red cedar	--	0.5	--	--	--	--	--	0.5 ^{INH}	--	--	--	--	--	0.5	--	--	--	--
Hardwood (oak, beech, birch, mahogany, teak, walnut)	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--
All other species	--	5	--	--	--	--	--	1 ^{INH}	--	--	--	--	--	5	--	--	--	--
Xylidine (mixed isomers)	0.5	2.5	--	--	--	--	0.5 ^{IFV}	--	--	--	--	--	0.5	2.5	--	--	--	--

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SCHEDULE 1

Table 2 - Occupational Exposure Limits (OELs) for chemical substances

List of Proposed OELs that Deviate from TLVs and the Rationale

Substance	Current Alberta OEL	Proposed OEL	Rationale
Acrylamide	0.03 mg/m ³	0.03 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Alachlor	No OEL	No OEL	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Aldrin	0.25 mg/m ³	0.025 mg/m ³	ACGIH documentation does not appear to support lowering the level for this substance. According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
Aliphatic hydrocarbon gases (Alkanes C1-C4: e.g. methane, propane, iso-butane, butane)	Methane No OEL C2-C4 Alkanes 1000 ppm	Methane No OEL C2-C4 Alkanes 1000 ppm	Methane not included due to measurement issues at the OEL level.
Azinphos-methyl	0.2 mg/m ³	0.2 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Benomyl	10 mg/m ³	10 mg/m ³ with sensitizer notation	ACGIH documentation did not appear to provide a clear link between the scientific evidence and an inhalable based limit.
Butylated hydroxytoluene (BHT)	10 mg/m ³	10 mg/m ³	ACGIH documentation focuses on uptake of BHT in the body (via ingestion) versus workplace exposure as the substance is a food additive. Documentation did not appear to support lowering the limit.
Calcium sulphate	10 mg/m ³	10 mg/m ³	ACGIH documentation did not appear to provide a clear link between the scientific evidence and an inhalable based limit.
Caprolactam	5 mg/m ³	5 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Captan	5 mg/m ³	5 mg/m ³ with skin notation	ACGIH documentation did not appear to provide a clear link between the scientific evidence and an inhalable based limit.
Carbaryl	5 mg/m ³	5 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Carbofuran	0.1 mg/m ³	0.1 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Carbonyl sulfide	No OEL	No OEL	There does not appear to be a standardized sampling and analytical

SCHEDULE 1**Table 2 - Occupational Exposure Limits (OELs) for chemical substances****List of Proposed OELs that Deviate from TLVs and the Rationale**

Substance	Current Alberta OEL	Proposed OEL	Rationale
			method for measuring airborne exposure.
Chlorpyrifos	0.1 mg/m ³	0.1 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Citral	No OEL	No OEL	There does not appear to be a standardized sampling and analytical method for measuring airborne exposure.
Cotton dust, raw, untreated	0.2 mg/m ³	0.2 mg/m ³	As there is no cotton production in Alberta, working group recommendation to maintain status quo.
Coumaphos	0.5 mg/m ³	0.5 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Cresol, all isomers	5 ppm	5 ppm	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Demeton (Systox)	0.05 mg/m ³	0.05 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
Demeton-s-methyl	0.05 mg/m ³	0.05 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
Diazinon	0.01 mg/m ³	0.01 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Dibrom (Naled)	0.1 mg/m ³	0.1 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Dibutyl phosphate	8-hour 1 ppm 15-minute 2 ppm	8-hour 1 ppm 15-minute 2 ppm	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
2,2-Dichloropropionic acid	5 mg/m ³	5 mg/m ³	ACGIH documentation does not appear to support lowering the level for this substance.
Dichlorvos	0.1 mg/m ³	0.1 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Dicrotophos	0.05 mg/m ³	0.05 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group

SCHEDULE 1

Table 2 - Occupational Exposure Limits (OELs) for chemical substances

List of Proposed OELs that Deviate from TLVs and the Rationale

Substance	Current Alberta OEL	Proposed OEL	Rationale
			to maintain status quo.
Dieldrin	0.25 mg/m ³	0.25 mg/m ³	ACGIH documentation does not appear to support lowering the level for this substance. According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
Diesel fuel, as total hydrocarbons	100 mg/m ³	100 mg/m ³	There does not appear to be a standardized sampling and analytical method for measuring airborne exposure that accommodates the IFV notation.
Diethanolamine	2 mg/m ³	2 mg/m ³	Evidence for TLV based on animal studies; documentation does not appear to support the value for human exposures.
Dioxathion	0.1 mg/m ³	0.1 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
Diquat	0.5 mg/m ³	0.5 mg/m ³	ACGIH documentation does not appear to support lowering the level for this substance. Recommendation from working group to maintain status quo.
Disulfoton	0.05 mg/m ³	0.05 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Endosulfan	0.1 mg/m ³	0.1 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
EPN	0.1 mg/m ³	0.1 mg/m ³	Chemical no longer registered for use in the United States, use in Alberta is unknown. Recommendation from working group to maintain status quo.
Ethion	0.05 mg/m ³	0.05 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
2-Ethylhexanoic acid	5 mg/m ³	5 mg/m ³	There does not appear to be a standardized sampling and analytical method for measuring airborne exposure that accommodates the IFV notation.

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Substance	Current Alberta OEL	Proposed OEL	Rationale
Ethyl methacrylate	No OEL	8-hour 50 ppm 15-minute 100 ppm	Value based on limits for methyl methacrylate as health effects are similar. Consistent with value already adopted in British Columbia.
Fenamiphos	0.05 mg/m ³	0.05 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
Fensulfothion	0.01 mg/m ³	0.01 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
Fenthion	0.05 mg/m ³	0.05 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
Ferbam	10 mg/m ³	10 mg/m ³	ACGIH documentation does not appear to support lowering the level for this substance.
Flour dust	0.5 mg/m ³	1.5 mg/m ³ (Inhalable)	Based on monitoring within industry and laboratory detection limits; limit accommodates reduced sensitivity of measurement method. Based on ratio of inhalable:total of about 3:1, this change is equivalent to current OEL.
Fonofos	0.01 mg/m ³	0.01 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
Formaldehyde	8-hour 0.75 ppm Ceiling 1 ppm	Ceiling 0.75 ppm	Eye irritation appears to be the most reliable indicator for health effects, for most the threshold is between 0.6 and 0.8 ppm. This level should also be protective from other health effects (e.g. cancer).
Glass fibres, continuous filament (Synthetic vitreous fibres)	5 mg/m ³	5 mg/m ³	ACGIH documentation did not appear to provide a clear link between the scientific evidence and an inhalable based limit.
Glyoxal	0.1 mg/m ³	0.1 mg/m ³	There does not appear to be a standardized sampling and analytical method for measuring airborne exposure that accommodates the IFV notation.
Hexahydrophthalic anhydride	Ceiling 0.005 mg/m ³	Ceiling 0.005 mg/m ³	There does not appear to be a standardized sampling and analytical

SCHEDULE 1

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Substance	Current Alberta OEL	Proposed OEL	Rationale
			method for measuring airborne exposure that accommodates the IFV notation.
Hydrogen sulfide	8-hour 10 ppm Ceiling 15 ppm	Ceiling 10 ppm	There are technical issues around the measurement of airborne concentrations using current direct-reading measuring devices. Consistent with value already adopted in British Columbia.
Iodine and iodides	Ceiling 0.1 ppm	Ceiling 0.1 ppm	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Magnesium oxide	10 mg/m ³	10 mg/m ³	ACGIH documentation did not appear to provide a clear link between the scientific evidence and an inhalable based limit.
Malathion	1 mg/m ³	1 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Maleic anhydride	0.1 ppm	0.1 ppm and sensitizer notation	ACGIH documentation does not appear to support lowering the level for this substance and supports current OEL. There does not appear to be a standardized sampling and analytical method for measuring airborne exposure that accommodates the IFV notation.
Methyl demeton	0.5 mg/m ³	0.5 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
Methyl parathion	0.2 mg/m ³	0.2 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
Methyl propyl ketone	8-hour 200 ppm 15-minute 250 ppm	8-hour 200 ppm 15-minute 250 ppm	ACGIH documentation does not appear to support lowering the level for this substance.
Mevinphos	0.01 mg/m ³	0.01 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Mineral oil, excluding metal working fluids, pure, highly and severely refined (Oil mist, mineral)	5 mg/m ³	5 mg/m ³	There does not appear to be a standardized sampling and analytical method for measuring airborne exposure that allows for differentiation of the different types of mineral oil.

SCHEDULE 1

Table 2 - Occupational Exposure Limits (OELs) for chemical substances

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Substance	Current Alberta OEL	Proposed OEL	Rationale
Molybdenum, metal and insoluble compounds	10 mg/m ³	10 mg/m ³	ACGIH documentation did not appear to provide a clear link between the scientific evidence and an inhalable based limit.
Monochloroacetic acid	0.5 ppm	0.5 ppm	There does not appear to be a standardized sampling and analytical method for measuring airborne exposure that accommodates the IFV notation.
Monocrotophos	0.05 mg/m ³	0.05 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Naphtha (Rubber solvent and VMP naphtha)	8-hour 400 ppm	8-hour 400 ppm	ACGIH has recommended replacing the TLV with a calculation method; working group agreed that a set number is easier to apply and enforce.
Natural rubber latex as total proteins	0.001 mg/m ³	Withdraw OEL value but maintain a skin and sensitizer notation in table entry.	There does not appear to be a standardized sampling and analytical method for measuring airborne exposure, but there is a need for employers to be aware that the substance is a sensitizer.
Nitrogen dioxide	8-hour 3 ppm 15-minute 5 ppm	Ceiling 1 ppm	There are technical issues around the measurement of airborne concentrations. Consistent with value already adopted in British Columbia.
5-Nitro-o-toluidine	No OEL	No OEL	There does not appear to be a standardized sampling and analytical method for measuring airborne exposure.
Ozone	8-hour 0.1 ppm 15-minute 0.3 ppm	8-hour 0.1 ppm 15-minute 0.3 ppm	Average natural airborne levels in Alberta can approach 0.05 ppm. Interpretation of different work rates for TLV may be inconsistent.
Parathion	0.05 mg/m ³	0.05 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
Particulate not otherwise regulated	Total 10 mg/m ³ Respirable 3 mg/m ³	10 mg/m ³ (Total) 3 mg/m ³ (Respirable)	Limits based on recommendations provided by ACGIH in Appendix B of the 2012 Threshold Limit Values for Chemical Substances and Physical Agents.
Phorate	0.05 mg/m ³	0.05 mg/m ³	May not be registered for use in Canada; recommendation from working group to maintain status quo.
m-Phthalodinitrile	5 mg/m ³	5 mg/m ³	There does not appear to be a standardized sampling and analytical

SCHEDULE 1

Table 2 - Occupational Exposure Limits (OELs) for chemical substances

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Substance	Current Alberta OEL	Proposed OEL	Rationale
			method for measuring airborne exposure that accommodates the IFV notation.
o-Phthalodinitrile	No OEL	No OEL	There does not appear to be a standardized sampling and analytical method for measuring airborne exposure that accommodates the IFV notation.
Polymethylene polyphenyl isocyanate (PAPI)	0.005 ppm	No ACGIH TLV	Adopted in 2003, recommendation from working group to maintain OEL.
Silicon carbide, non-fibrous	10 mg/m ³	10 mg/m ³	ACGIH documentation did not appear to provide a clear link between the scientific evidence and an inhalable based limit.
Sulfotepp (TEDP)	0.1 mg/m ³	0.1 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
Sulphur	10 mg/m ³	10 mg/m ³	Alberta specific OEL that has been in place since 1988. Working group agreed to maintain OEL.
Sulphur dioxide	8-hour 2 ppm 15-minute 5 ppm	8-hour 2 ppm 15-minute 5 ppm	ACGIH documentation does not appear to support lowering the level for this substance. There are technical issues around the measurement of airborne concentrations.
Sulprofos	1 mg/m ³	1 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
Temephos	1 mg/m ³	1 mg/m ³	May be measurement issues with the IFV (inhalable fraction and vapour) size convention.
Terbufos	0.01 mg/m ³	0.01 mg/m ³	According to Alberta Environment, this pesticide is currently not registered for use in Canada. Recommendation from working group to maintain status quo.
1,1,2,2-Tetrabromomethane (Acetylene tetrabromide)	0.1 ppm	0.1 ppm	There does not appear to be a standardized sampling and analytical method for measuring airborne exposure that accommodates the IFV notation.
Tetraethyl pyrophosphate (TEPP)	0.05 mg/m ³	0.05 mg/m ³	May be measurement issues with the IFV (inhalable fraction and

SCHEDULE 1

Table 2 - Occupational Exposure Limits (OELs) for chemical substances

List of Proposed OELs that Deviate from TLVs and the Rationale

Substance	Current Alberta OEL	Proposed OEL	Rationale
			vapour) size convention.
Thiram	1 mg/m ³	1 mg/m ³ with sensitizer notation	ACGIH documentation does not appear to support lowering the level for this substance. There does not appear to be a standardized sampling and analytical method for measuring airborne exposure that accommodates the IFV notation.
4,4 Thiobis (6-tert-butyl-m-cresol)	10 mg/m ³	10 mg/m ³	ACGIH documentation does not appear to support lowering the level for this substance.
Trichlorophon	1 mg/m ³	1 mg/m ³	May not be registered for use in Canada; recommendation from working group to maintain status quo.
1,1,1-Trifluoro-2,2-dichloroethane (HCFC-123)	50 ppm	50 ppm	Adopted in 2003, recommendation from working group to maintain OEL.
Trimellitic anhydride	0.04 mg/m ³	0.04 mg/m ³	There does not appear to be a standardized sampling and analytical method for measuring airborne exposure that accommodates the IFV notation.
Wood dust	Western red cedar 0.5 mg/m ³ Other wood dust 5 mg/m ³ (total)	Western red cedar 0.5 mg/m ³ Hardwood (oak, beech, birch, mahogany, teak, walnut) 1 mg/m ³ (Total) Other wood species 5 mg/m ³ (Total)	Health effects for exposure to hard and soft wood dusts are different, there appears to be a good basis for a 1 mg/m ³ limit for hard woods, but 5 mg/m ³ appears to be protective for soft wood species. There are issues around the measurement of exposure with inhalable samplers; total samplers appear to measure closer to the inhalable convention.
Xylidine (mixed isomers)	0.5 ppm	0.5 ppm	There does not appear to be a standardized sampling and analytical method for measuring airborne exposure that accommodates the IFV notation.