



WORKERS' COMPENSATION BOARD OF BC

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**TO: HOLDERS OF THE *PREVENTION MANUAL***

This update of the *Prevention Manual* contains amendments implemented since update 2004 – 4.

This update includes:

- Item R5.48-1, *Chemical and Biological Substances – Exposure Limits and Designations*

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Margaret Eckenfelder  
Vice President  
Policy and Research Division

## ***PREVENTION MANUAL***

### **Transmittal Sheet for Update 2004 – 5**

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| <input type="checkbox"/> | R5.48-1<br>Chemical and Biological Substances<br>– Exposure Limits and Designations | R5.48-1<br>Chemical and Biological Substances –<br>Exposure Limits and Designations |
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**RE: Chemical and Biological Substances -  
Exposure Limits and Designations****ITEM: R5.48-1**

## **BACKGROUND**

### **1. Explanatory Notes**

Section 5.48 provides established limits for a worker's exposure to hazardous chemical substances. Generally, these exposure limits are established according to the Threshold Limit Values ("TLVs") adopted by the American Conference of Governmental Industrial Hygienists ("ACGIH"). However, the Board has authority to make exceptions and adopt occupational exposure limits for specific chemical substances that are not consistent with the TLVs established by the ACGIH. This policy sets out those exceptions.

### **2. The Regulation**

Section 5.48:

Except as otherwise determined by the Board, the employer must ensure that no worker is exposed to a substance that exceeds the ceiling limit, short-term exposure limit, or 8-hour TWA limit prescribed by ACGIH.

Section 5.57:

- (1) If a substance identified in ACGIH or IARC by any of the following notations, abbreviations, or endnotes is present in the workplace, the employer must replace it, if practicable, with a material which reduces the risk to workers:
  - (a) ACGIH A1 or A2, or IARC 1, 2A or 2B carcinogen,
  - (b) reproductive critical effects,
  - (c) sensitization critical effect or SEN notation, or
  - (d) L endnote.
  
- (2) If it is not practicable to substitute a material which reduces the risk to workers, in accordance with subsection (1), the employer must implement an exposure control plan to maintain workers' exposure as low as reasonably achievable below the exposure limit established under section 5.48.

**3. Preamble to Policy**

The following is a preamble to be applied to those exposure limits developed by the Board as an exception to the TLVs established by the ACGIH:

*An exposure level is a maximum allowed airborne concentration and is not intended to represent a fine line between safe and harmful conditions. In determining an exposure limit, it is not possible to take into account all factors that could influence the effect that exposure to the substance may have on an individual worker. Therefore, for all hazardous substances, regardless of any assigned exposure limit, the guiding principle is elimination of exposure or reduction to the lowest level that is reasonably achievable below the exposure limit.*

*Due to a wide variation in individual susceptibility, some workers may experience discomfort from some substances at concentrations at or below the exposure level. Others may be affected more seriously by aggravation of a pre-existing condition, or by development of an occupational disease. Furthermore, other workplace contaminants may affect an individual's response. The effects of combined chemical exposures are often unknown or poorly defined.*

**POLICY****1. Table of Occupational Exposure Limits for Excluded Substances**

As presented in the table below, the Board has determined exposure limits for the following specific substances, notwithstanding the TLVs established by the ACGIH.

Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit
ABATE (TEMEPHOS) TOTAL DUST	3383-96-8	mg/m <sup>3</sup>	10	20	
ACETONE	67-64-1	ppm	250	500	
ACETONE CYANOHYDRIN	75-86-5	ppm			1
ALLYL AMINE	107-11-9	ppm	2		
BENZYL CHLORIDE	100-44-7	ppm			1
BROMOCHLOROMETHANE	74-97-5	ppm	200	250	
n-BUTANE	106-97-8	ppm	600	750	
n-BUTYL ALCOHOL (n-BUTANOL)	71-36-3	ppm	15		30
n-BUTYL ACETATE	123-86-4	ppm	20		

Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit
n-BUTYL METHACRYLATE	97-88-1	ppm	50		
CALCIUM CARBONATE (incl. LIMESTONE, MARBLE), TOTAL DUST	1317-65-3	mg/m <sup>3</sup>	10	20	
CAPROLACTAM DUST	105-60-2	mg/m <sup>3</sup>	1	3	
CARBON DIOXIDE	124-38-9	ppm	5000	15,000	
CARBON DISULFIDE	75-15-0	ppm	4	12	
CARBON MONOXIDE	630-08-0	ppm	25	100	
CARBON TETRACHLORIDE	56-23-5	ppm	2		
CHLOROACETIC ACID	79-11-8	ppm	0.3		
CHLOROBROMOMETHANE (see BROMOCHLOROMETHANE)					
1-CHLORO-1,1-DIFLUOROETHANE	75-68-3	ppm	1000		
CHLORODIFLUOROMETHANE	75-45-6	ppm	500	1250	
CHLOROFORM	67-66-3	ppm	2		
CHLOROTRIFLUOROMETHANE	75-72-9	ppm	1000		
CHROMIUM, WATER SOLUBLE, Cr VI COMPOUNDS	7440-47-3	mg/m <sup>3</sup>	0.025		0.1
CRESOL, ALL ISOMERS	1319-77-3, 95-48-7, 108-39-4, 106-44-5	mg/m <sup>3</sup>	10		
CUMENE	98-82-8	ppm	25	75	
DICHLOROMETHANE	75-09-2	ppm	25		
DICYCLOHEXYLMETHANE-4,4'-DIISOCYANATE	5124-30-1	ppm	0.005		0.01
2,4-DICHLOROPHENOXYACETIC ACID AND ITS ESTERS	94-75-7	mg/m <sup>3</sup>	10	20	
DIISOCYANATES, N.O.S.		ppm	0.005		0.01
DIMETHOXYMETHANE	109-87-5	ppm	1000	1250	
DIMETHYL ETHER	115-10-6	ppm	1000		
DIMETHYL SULFATE	77-78-1	ppm			0.1
n-DIOCTYL PHTHALATE	117-84-0	mg/m <sup>3</sup>	5		
ENFLURANE	13838-16-9	ppm	2		
EPICHLOROHYDRIN	106-89-8	ppm	0.1		
ETHYL ACETATE	141-78-6	ppm	150		
ETHYL METHACRYLATE	97-63-2	ppm	50		
ETHYLENE DIBROMIDE	106-93-4	ppm	0.5		
ETHYLENE DICHLORIDE (1,2-DICHLOROETHANE)	107-06-2	ppm	1	2	
ETHYLENE GLYCOL, PARTICULATE	107-21-1	mg/m <sup>3</sup>	10	20	
ETHYLENE GLYCOL, VAPOUR	107-21-1	ppm			50
ETHYLENE OXIDE	75-21-8	ppm	0.1	1	
FLUORINE	7782-41-4	ppm	0.1		

Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit
FLUOROXENE	406-90-6	ppm	2		
FORMALDEHYDE	50-00-0	ppm	0.3		1
FURFURYL ALCOHOL	98-00-0	ppm	5	10	
GLYCERIN MIST, RESPIRABLE	56-81-5	mg/m <sup>3</sup>	3		
GYPSUM, TOTAL DUST	13397-24-5	mg/m <sup>3</sup>	10	20	
HALOTHANE	151-67-7	ppm	2		
HEXAMETHYLENE DIISOCYANATE	822-06-0	ppm	0.005		0.01
n-HEXANE	110-54-3	ppm	20		
HEXANE, ALL ISOMERS except n-HEXANE		ppm	200		
HYDROGEN FLUORIDE, as F	7664-39-3	ppm			2
HYDROGEN SULFIDE	7783-06-4	ppm			10
HYDROQUINONE	123-31-9	mg/m <sup>3</sup>			2
IRON OXIDE, FUME	1309-37-1	mg/m <sup>3</sup>	5	10	
IRON PENTACARBONYL	13463-40-6	ppm	0.01		
IRON SALTS, SOLUBLE, as Fe		mg/m <sup>3</sup>	1	2	
ISOPHORONE DIISOCYANATE	4098-71-9	ppm	0.005		0.01
ISOPROPYL GLYCIDYL ETHER (IGE)	4016-14-2	ppm			50
LIQUIFIED PETROLEUM GAS	68476-85-7	ppm	1000	1250	
LITHIUM HYDROXIDE	1310-65-2	mg/m <sup>3</sup>			1
MAGNESIUM OXIDE, RESPIRABLE DUST AND FUME, as Mg	1309-48-4	mg/m <sup>3</sup>	3	10	
MERCURY, ARYL COMPOUNDS	7439-97-6	mg/m <sup>3</sup>	0.05		0.1
MESITYL OXIDE	141-79-7	ppm	10	25	
METHOXYFLURANE	76-38-0	ppm	2		
1-METHOXY-2-PROPANOL	107-98-2	ppm	50	75	
2-METHOXY-1-PROPANOL	1589-47-5	ppm	20	40	
1-METHOXYPROPYL-2-ACETATE	108-65-6	ppm	50	75	
2-METHOXYPROPYL-1-ACETATE	70657-70-4	ppm	20	40	
METHYLENE BISPHENYL ISOCYANATE	101-68-8	ppm	0.005		0.01
METHYLENE bis (4-CYCLOHEXYL-ISOCYANATE)	5124-30-1	ppm	0.005		0.01
4,4'-METHYLENEDIANILINE	101-77-9	ppm	0.01		
METHYL ETHYL KETONE (MEK)	78-93-3	ppm	50	100	
METHYL PROPYL KETONE (2-PENTANONE)	107-87-9	ppm	150	250	
alpha-METHYL STYRENE	98-83-9	ppm	50	75	100
1,5-NAPHTHYLENE DIISOCYANATE	3173-72-6	ppm	0.005		0.01
NICKEL, ELEMENTAL, SOLUBLE INORGANIC COMPOUNDS (NOS)	7440-02-0	mg/m <sup>3</sup>	0.05		
NICKEL, INSOLUBLE	7440-02-0	mg/m <sup>3</sup>	0.05		

Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit
INORGANIC COMPOUNDS (NOS)					
NICKEL CARBONYL	13463-39-3	ppm	0.001		
NITROGEN DIOXIDE	10102-44-0	ppm			1
2-NITROPROPANE	79-46-9	ppm	5		
NITROUS OXIDE	10024-97-2	ppm	25		
OIL MIST, MINERAL, MILDLY REFINED		mg/m <sup>3</sup>	0.2		
OIL MIST, MINERAL, SEVERELY REFINED		mg/m <sup>3</sup>	1		
PHENYL ISOCYANATE	103-71-9	ppm	0.005		0.01
PHENYL MERCAPTAN	108-98-5	ppm			0.1
PIPERAZINE AND ITS SALTS, as PIPERAZINE	142-64-3	mg/m <sup>3</sup>	0.3	1	
PIPERIDINE	110-89-4	ppm	1		
PLASTER OF PARIS, TOTAL DUST	26499-65-0	mg/m <sup>3</sup>	10	20	
POLYVINYL CHLORIDE, TOTAL DUST	9002-86-2	mg/m <sup>3</sup>	5		
RHODIUM, METAL AND INSOLUBLE COMPOUNDS, as Rh	7440-16-6	mg/m <sup>3</sup>	0.1	0.3	
RHODIUM, SOLUBLE COMPOUNDS, as Rh	7440-16-6	mg/m <sup>3</sup>	0.001	0.003	
SELENIUM AND COMPOUNDS, as Se	7782-49-2	mg/m <sup>3</sup>	0.1		
SILICA, AMORPHOUS:					
DIATOMACEOUS EARTH, UNCALCINED, TOTAL DUST	61790-53-2	mg/m <sup>3</sup>	4		
DIATOMACEOUS EARTH, UNCALCINED, RESPIRABLE DUST	61790-53-2	mg/m <sup>3</sup>	1.5		
PRECIPITATED SILICA and SILICA GEL, TOTAL DUST	112926-00-8	mg/m <sup>3</sup>	4		
PRECIPITATED SILICA and SILICA GEL, RESPIRABLE DUST	112926-00-8	mg/m <sup>3</sup>	1.5		
SILICA FUME, TOTAL DUST	69012-64-2	mg/m <sup>3</sup>	4		
SILICA FUME, RESPIRABLE DUST	69012-64-2	mg/m <sup>3</sup>	1.5		
SILICON TETRAHYDRIDE (SILANE)	7803-62-5	ppm	0.5	1	
SILVER AND COMPOUNDS, as Ag	7440-22-4	mg/m <sup>3</sup>	0.01	0.03	
STODDARD SOLVENT (MINERAL SPIRITS)	8052-41-3	mg/m <sup>3</sup>	290	580	
STYRENE	100-42-5	ppm	50	75	
1,1,2,2-TETRACHLORO-1,2-DIFLUOROETHANE	76-12-0	ppm	200		
TETRAETHYL LEAD, as Pb	78-00-2	mg/m <sup>3</sup>	0.075		

Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit
TETRAMETHYL LEAD, as Pb	75-74-1	mg/m <sup>3</sup>	0.075		
2,4-TOLUENE DIISOCYANATE (TDI)	584-84-9	ppm	0.005		0.01
2,6-TOLUENE DIISOCYANATE	91-08-7	ppm	0.005		0.01
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	ppm	500	1250	
TRIMETHYL HEXAMETHYLENE DIISOCYANATE	28679-16-5	ppm	0.005		0.01
TRI-n-BUTYL TIN COMPOUNDS	688-73-3	mg/m <sup>3</sup>	0.05		
URANIUM COMPOUNDS, NATURAL, SOLUBLE, as U	7440-61-1	mg/m <sup>3</sup>	0.05		
VANADIUM PENTOXIDE, RESPIRABLE DUST and FUME, as V <sub>2</sub> O <sub>5</sub>	1314-62-1	mg/m <sup>3</sup>			0.05
VANADIUM PENTOXIDE, TOTAL DUST, as V <sub>2</sub> O <sub>5</sub>	1314-62-1	mg/m <sup>3</sup>	0.2		
VEGETABLE OIL MIST, RESPIRABLE FRACTION, EXCEPT CASTOR, CASHEW NUT, OR SIMILAR IRRITATING OILS	8008-89-7	mg/m <sup>3</sup>	3		
VINYLDENE CHLORIDE	75-35-4	ppm	1		
VINYL TOLUENE, ALL ISOMERS	25013-15-4	ppm	25	75	
WOOD DUST:					
ALLERGENIC		mg/m <sup>3</sup>	1		
NON-ALLERGENIC, HARDWOOD		mg/m <sup>3</sup>	1		
NON-ALLERGENIC, SOFTWOOD		mg/m <sup>3</sup>	2.5		
ZINC STEARATE, TOTAL DUST	557-05-1	mg/m <sup>3</sup>	10	20	

## 2. Dusts

The Board categorizes particulates that are insoluble or poorly soluble in water and do not cause toxic effects other than by inflammation or the mechanism of "lung overload", as "nuisance dusts".

A "nuisance dust" will have an exposure limit or TLV of 10 mg/m<sup>3</sup> for total particulate. It is recognized that the respirable fraction of "nuisance dusts" may also be measured. The equivalent exposure limit for respirable particulate is 3 mg/m<sup>3</sup>. Respirable particulate refers to the fraction of inhaled dust that is capable of passing through the upper respiratory tract to the gas exchange region of the lung. Total particulate refers to a wide range of particle sizes capable of being deposited in the various regions of the respiratory tract.



WORKERS' COMPENSATION BOARD OF BC

## PREVENTION MANUAL

### **PRACTICE**

For any relevant PRACTICE information regarding exposure limits or appropriate sampling methods for dusts, readers should consult the Guidelines available on the WCB website.

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<b>EFFECTIVE DATE:</b>	August 1, 2004
<b>AUTHORITY:</b>	s. 5.48, <i>Occupational Health and Safety Regulation</i>
<b>CROSS REFERENCES:</b>	
<b>HISTORY:</b>	This item was originally developed to implement the amendments made to the <i>Occupational Health and Safety Regulation</i> , effective October 29, 2003 pertaining to occupational exposure limits. A review of the policy was conducted to ensure that all substances for which an exception was warranted were listed, and there was no duplication with the information provided by the ACGIH.
<b>APPLICATION:</b>	The amended policy comes into effect on August 1, 2004 and applies to all regulatory violations discovered on or after that date. Regulatory violations discovered before August 1, 2004 will continue to be dealt with under the previous policy.