

2004-07-20-05

**THE WORKERS' COMPENSATION BOARD OF BRITISH COLUMBIA
RESOLUTION OF THE BOARD OF DIRECTORS**

RE: Occupational Exposure Limits

WHEREAS:

Pursuant to section 82 of the *Workers Compensation Act*, RSBC 1996, Chapter 492 and amendments thereto ("*Act*"), the Board of Directors must set and revise as necessary the policies of the Board of Directors, including policies respecting compensation, assessment, rehabilitation, and occupational health and safety;

AND WHEREAS:

Policy item R5.48-1 in the *Prevention Manual, "Chemical and Biological Substances – Exposure Limits and Designations"*, provides exceptions to the American Conference of Governmental Industrial Hygienists' ("ACGIH") Threshold Limit Values ("TLVs") where it was determined that the TLVs are not appropriate for adoption in British Columbia;

AND WHEREAS:

A review of policy item R5.48-1 was conducted to ensure that all substances for which an exception was warranted were listed, and that there was no duplication of the information provided by the ACGIH;

AND WHEREAS:

Four categories of proposed amendments were identified for review;

AND WHEREAS:

The Policy and Research Division has consulted with stakeholders on these amendments;

THE BOARD OF DIRECTORS RESOLVES THAT:

1. Amendments to policy item R5.48-1 of the *Prevention Manual*, attached as Appendix A, are approved.
2. This resolution is effective August 1, 2004.

DATED at Richmond, British Columbia, July 20, 2004.

By the Workers' Compensation Board

**DOUGLAS J. ENNS, CHAIR
BOARD OF DIRECTOR**

**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 ~~Threshold Limit Values~~ **TLVs** established by the ~~American Conference of Governmental Industrial Hygienists-ACGIH~~. **This policy sets out those exceptions.**

2. The Regulation

Section 5.48:

Except as otherwise determined by the ~~board~~ **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.

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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 ~~Threshold Limit Values~~ **TLVs** established by the ~~American Conference of Governmental Industrial Hygienists~~ **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 ~~Threshold Limit Values~~ **TLVs** established by the ~~American Conference of Governmental Industrial Hygienists~~ **ACGIH**.

Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit	Notation, Abbreviation, Endnote	Critical Health Effect
ABATE (TEMEPHOS), RESPIRABLE DUST	3383-96-8	mg/m³	3				
ABATE (TEMEPHOS) TOTAL DUST	3383-96-8	mg/m ³	10	20			
ACETAMIDE	60-35-5					2B	
ACETONE	67-64-1	ppm	250	500			
ACETONE CYANOHYDRIN	75-86-5	ppm			1	Skin	
ALLYL AMINE	107-11-9	ppm	2				

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Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit	Notation, Abbreviation, Endnote	Critical Health Effect
ALUMINUM HYDROXIDE, RESPIRABLE DUST	21645-51-2	mg/m³	3				
ALUMINUM OXIDE, RESPIRABLE DUST, as Al₂O₃	1344-28-1	mg/m³	3				
ALUMINUM, RESPIRABLE DUST, as Al	7429-90-5	mg/m³	3				
AMMONIUM SULFAMATE, RESPIRABLE DUST	7773-06-0	mg/m³	3				
BARIUM SULFATE, RESPIRABLE DUST	7727-43-7	mg/m³	3				
BENOMYL, RESPIRABLE DUST	17804-35-2	mg/m³	3				Reproductive
BENZIDINE-BASED DYES						2A	
BENZYL CHLORIDE	100-44-7	ppm			1		
BISMUTH TELLURIDE, RESPIRABLE DUST, as Bi₂Te₃	1304-82-1	mg/m³	3				
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				
n-BUTYL METHACRYLATE	97-88-1	ppm	50				
CALCIUM CARBONATE (incl. LIMESTONE, MARBLE), TOTAL DUST	1317-65-3	mg/m ³	10	20			
CALCIUM CARBONATE (incl. LIMESTONE, MARBLE), RESPIRABLE DUST	1317-65-3	mg/m³	3				
CALCIUM SILICATE, RESPIRABLE DUST	1344-95-2	mg/m³	3				
CALCIUM SULFATE, RESPIRABLE DUST	7778-18-9	mg/m³	3				
CAPROLACTAM DUST	105-60-2	mg/m³	1	3			
CARBON DIOXIDE	124-38-9	ppm	5000	15,000			
CARBON DISULFIDE	75-15-0	ppm	4	12		Skin	
CARBON MONOXIDE	630-08-0	ppm	25	100			
CARBON TETRACHLORIDE	56-23-5	ppm	2			Skin, A2, 2B	
CELLULOSE, RESPIRABLE DUST	9004-34-6	mg/m³	3				
CHLOROACETIC ACID	79-11-8	ppm	0.3				
p-CHLOROANILINE	106-47-8					2B	
CHLOROBROMOMETHANE (see BROMOCHLOROMETHANE)	74-97-5	ppm	200	250			
1-CHLORO-1,1-DIFLUOROETHANE	75-68-3	ppm	1000				
CHLORODIFLUOROMETHANE	75-45-6	ppm	500	1250			
CHLOROFORM	67-66-3	ppm	2			2B	Reproductive
4-CHLORO-o-TOLUIDINE	95-69-2					2A	

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Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit	Notation, Abbreviation, Endnote	Critical Health Effect
2-CHLORO-6-(TRICHLOROMETHYL)PYRIDINE, RESPIRABLE DUST (NITRAPYRIN)	1929-82-4	mg/m ³	3				
CHLOROTRIFLUOROMETHANE	75-72-9	ppm	1000				
CLOPIDOL, RESPIRABLE DUST	2971-90-6	mg/m ³	3				
CHROMIUM, WATER SOLUBLE, Cr VI COMPOUNDS	7440-47-3	mg/m ³	0.025		0.1	A1, 4	
CRESOL, ALL ISOMERS	1319-77-3, 95-48-7, 108-39-4, 106-44-5	mg/m ³	10			Skin	
CUMENE	98-82-8	ppm	25	75			
2,4-DIAMINOANISOLE	615-05-4					2B	
2,4-DIAMINOTOLUENE	95-80-7					2B	
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8					2B	
2,6-DI-tert-BUTYL-p-CRESOL	128-37-0	mg/m ³	10	20			
DICHLOROMETHANE	75-09-2	ppm	25			2B	
2,2-DICHLORODIETHYL SULFIDE (MUSTARD GAS)	505-60-2					4	
2,2-DICHLORO-N-METHYLDIETHYLAMINE (NITROGEN MUSTARD)	51-75-2					2A	
DICYCLOPENTADIENYL IRON (FERROCENE), RESPIRABLE DUST	102-54-5	mg/m ³	3				
DICYCLOHEXYLMETHANE-4,4'-DIISOCYANATE	5124-30-1	ppm	0.005		0.01		
2,4-DICHLOROPHENOXYACETIC ACID AND ITS ESTERS	94-75-7	mg/m ³	10	20			
DIETHYL SULFATE	64-67-5					2A	
DIISOCYANATES, N.O.S.		ppm	0.005		0.01		
3,3-DIMETHOXYBENZIDINE	119-90-4					2B	
DIMETHOXYMETHANE	109-87-5	ppm	1000	1250			
3,3-DIMETHYLBENZIDINE	119-93-7					2B	
DIMETHYL ETHER	115-10-6	ppm	1000				
1,2-DIMETHYLHYDRAZINE	540-73-8					2A	
DIMETHYL SULFATE	77-78-1	ppm			0.1	Skin, 2A	
n-DIOCTYL PHTHALATE	117-84-0	mg/m ³	5				
DIPHENYL ETHER, MIXED WITH DIPHENYL	101-84-8	ppm	4	2			
DIPROPYLENE GLYCOL METHYL ETHER	34590-94-8	ppm	100	150			
DYFONATE	944-22-9	mg/m ³	0.1				

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Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit	Notation, Abbreviation, Endnote	Critical Health Effect
EMERY, RESPIRABLE DUST	42415-34-8	mg/m³	3				
ENFLURANE	13838-16-9	ppm	2				
EPICHLOROHYDRIN	106-89-8	ppm	0.1			Skin, 2A	
ETHYL ACETATE	141-78-6	ppm	150				
ETHYL METHACRYLATE	97-63-2	ppm	50				
ETHYLENE DIBROMIDE	106-93-4	ppm	0.5			Skin, 2A	
ETHYLENE DICHLORIDE (1,2-DICHLOROETHANE)	107-06-2	ppm	1	2		2B	
ETHYLENE GLYCOL, PARTICULATE	107-21-1	mg/m ³	10	20			
ETHYLENE GLYCOL, VAPOUR	107-21-1	ppm			50		
ETHYLENE OXIDE	75-21-8	ppm	0.1	1		A2, 1	Reproductive
FLUORINE	7782-41-4	ppm	0.1				
FLUOROXENE	406-90-6	ppm	2				
FORMALDEHYDE	50-00-0	ppm	0.3		1	SEN, A2, 2A	
FURFURYL ALCOHOL	98-00-0	ppm	5	10		Skin	
GLYCERIN MIST, RESPIRABLE	56-81-5	mg/m ³	3				
GYPSUM, TOTAL DUST	13397-24-5	mg/m ³	10	20			
GYPSUM, RESPIRABLE DUST	13397-24-5	mg/m³	3				
HALOTHANE	151-67-7	ppm	2				Reproductive
HEXAMETHYL PHOSPHORAMIDE	680-31-9					Skin, 2B	
HEXAMETHYLENE DIISOCYANATE	822-06-0	ppm	0.005		0.01		
n-HEXANE	110-54-3	ppm	20			Skin	
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 ³			2		
IRON OXIDE, FUME	1309-37-1	mg/m³	5	10			
IRON PENTACARBONYL	13463-40-6	ppm	0.01				
IRON SALTS, SOLUBLE as Fe		mg/m³	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 ³			1		
MAGNESITE (MAGNESIUM CARBONATE), RESPIRABLE DUST	546-93-0	mg/m³	3				
MAGNESIUM OXIDE, RESPIRABLE DUST AND FUME, as Mg	1309-48-4	mg/m ³	3	10			

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Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit	Notation, Abbreviation, Endnote	Critical Health Effect
MERCURY, ARYL COMPOUNDS	7439-97-6	mg/m ³	0.05		0.1	Skin	
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			Skin, 2B	
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 ³	0.05			A1, 4	
NICKEL, INSOLUBLE INORGANIC COMPOUNDS (NOS)	7440-02-0	mg/m ³	0.05				
NICKEL CARBONYL	13463-39-3	ppm	0.001				
NITROGEN DIOXIDE	10102-44-0	ppm			1		
2-NITROPROPANE	79-46-9	ppm	5			2B	
NITROPYRENE, MONO-, DI-, TRI-, TETRA-, ISOMERS	5522-43-0 57835-92-4					2B	
n-NITROSODIETHANOLAMINE	4416-54-7					2B	
n-NITROSODIETHYLAMINE	55-18-5					2A	
n-NITROSOMETHYLETHYLAMINE	10595-95-6					2B	
n-NITROSOMORPHOLINE	59-89-2					2B	
n-NITROSOPIPERIDINE	400-75-4					2B	
n-NITROSOPYRROLIDINE	930-55-2					2B	
NITROUS OXIDE	10024-97-2	ppm	25				Reproductive
OIL MIST, MINERAL, MILDLY REFINED		mg/m ³	0.2			4	
OIL MIST, MINERAL, SEVERELY REFINED		mg/m ³	1				
PENTAERYTHRITOL, RESPIRABLE DUST	445-77-5	mg/m³	3				
PERLITE, RESPIRABLE DUST	93763-70-3	mg/m³	3				
PHENYL ISOCYANATE	103-71-9	ppm	0.005		0.01		
PHENYL MERCAPTAN	108-98-5	ppm			0.1		

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Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit	Notation, Abbreviation, Endnote	Critical Health Effect
PICLORAM, RESPIRABLE DUST	4918-02-4	mg/m³	3				
PIPERAZINE AND ITS SALTS, as PIPERAZINE	142-64-3	mg/m ³	0.3	1			
PIPERIDINE	110-89-4	ppm	1				
PLASTER OF PARIS, RESPIRABLE DUST	26499-65-0	mg/m³	3				
PLASTER OF PARIS, TOTAL DUST	26499-65-0	mg/m ³	10	20			
POLYVINYL CHLORIDE, TOTAL DUST	9002-86-2	mg/m ³	5				
PORTLAND CEMENT, RESPIRABLE DUST	65997-15-4	mg/m³	3				
RHODIUM, METAL AND INSOLUBLE COMPOUNDS, as Rh	7440-16-6	mg/m ³	0.1	0.3			
RHODIUM, SOLUBLE COMPOUNDS, as Rh	7440-16-6	mg/m ³	0.001	0.003			
ROUGE, RESPIRABLE DUST		mg/m³	3				
SELENIUM AND COMPOUNDS, as Se	7782-49-2	mg/m ³	0.1				
SESONE, RESPIRABLE DUST	436-79-7	mg/m³	3				
SILICA, AMORPHOUS:							
DIATOMACEOUS EARTH, UNCALCINED, TOTAL DUST	61790-53-2	mg/m ³	4				
DIATOMACEOUS EARTH, UNCALCINED, RESPIRABLE DUST	61790-53-2	mg/m ³	1.5				
PRECIPITATED SILICA and SILICA GEL, TOTAL DUST	112926-00-8	mg/m ³	4				
PRECIPITATED SILICA and SILICA GEL, RESPIRABLE DUST	112926-00-8	mg/m ³	1.5				
SILICA FUME, TOTAL DUST	69012-64-2	mg/m ³	4				
SILICA FUME, RESPIRABLE DUST	69012-64-2	mg/m ³	1.5				
SILICON, RESPIRABLE DUST	7440-21-3	mg/m³	3				
SILICON TETRAHYDRIDE (SILANE)	7803-62-5	ppm	0.5	1			
SILVER AND COMPOUNDS, as Ag	7440-22-4	mg/m ³	0.01	0.03			
STARCH, RESPIRABLE DUST	9005-25-8	mg/m³	3				
STODDARD SOLVENT (MINERAL SPIRITS)	8052-41-3	mg/m ³	290	580			
STYRENE	100-42-5	ppm	50	75		2B	
SUCROSE, RESPIRABLE DUST	57-50-4	mg/m³	3				
TEREPHTHALIC ACID, RESPIRABLE DUST	100-21-0	mg/m³	3				
1,1,2,2-TETRACHLORO-1,2-DIFLUOROETHANE	76-12-0	ppm	200				

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Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit	Notation, Abbreviation, Endnote	Critical Health Effect
TETRAETHYL LEAD, as Pb	78-00-2	mg/m ³	0.075			Skin	
TETRAMETHYL LEAD, as Pb	75-74-1	mg/m ³	0.075			Skin	
4,4'-THIOBIS(6-tert-BUTYL-m-CRESOL), RESPIRABLE DUST	96-69-5	mg/m³	3				
TITANIUM DIOXIDE, RESPIRABLE DUST	13463-67-7	mg/m³	3				
2,4-TOLUENE DIISOCYANATE (TDI)	584-84-9	ppm	0.005		0.01	2B	Sensitization
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-BUTYLTIN COMPOUNDS	688-73-3	mg/m ³	0.05				
URANIUM COMPOUNDS, NATURAL, SOLUBLE, as U	7440-61-1	mg/m ³	0.05			A4	
VANADIUM PENTOXIDE, RESPIRABLE DUST and FUME, as V ₂ O ₅	1314-62-1	mg/m ³			0.05		
VANADIUM PENTOXIDE, TOTAL DUST, as V ₂ O ₅	1314-62-1	mg/m ³	0.2				
VEGETABLE OIL MIST, RESPIRABLE FRACTION, EXCEPT CASTOR, CASHEW NUT, OR SIMILAR IRRITATING OILS	8008-89-7	mg/m ³	3				
VINYLDENE CHLORIDE	75-35-4	ppm	1				
VINYL TOLUENE, ALL ISOMERS	25013-15-4	ppm	25	75			
WOOD DUST:							
ALLERGENIC		mg/m ³	1			4	
NON-ALLERGENIC, HARDWOOD		mg/m ³	1			A1, 4	
NON-ALLERGENIC, SOFTWOOD		mg/m ³	2.5			4	
ZINC STEARATE, TOTAL DUST	557-05-1	mg/m ³	10	20			
ZINC STEARATE, RESPIRABLE DUST	557-05-1	mg/m³	3				

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/m³ 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/m³. 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.

PRACTICE

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

EFFECTIVE DATE:	October 29, 2003 August 1, 2004
AUTHORITY:	s. 5.48, <i>Occupational Health and Safety Regulation</i>
CROSS REFERENCES:	
HISTORY:	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.
APPLICATION:	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.