

**2010/07/20-01**

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

**RE: The Occupational Health and Safety Regulation**  
**2008-2009 Occupational Exposure Limits**

**WHEREAS:**

Pursuant to Section 225 of the *Workers' Compensation Act* ("Act"), the Workers' Compensation Board ("Board") may make regulations it considers necessary or advisable in relation to occupational health and safety and occupational environment;

**AND WHEREAS:**

Pursuant to Section 5.48 of the Occupational Health and Safety Regulation ("Regulation"), except as otherwise determined by the Board, an 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 the American Conference of Governmental Industrial Hygienists ("ACGIH") publication entitled "Threshold Limit Values and Biological Exposure Indices" ("Publication") dated 2002, as amended from time to time;

**AND WHEREAS:**

The Board of Directors ("BOD") has created, pursuant to Section 5.48 of the Regulation, a Table of Occupational Exposure Limits ("OELs") for Excluded Substances which substitute for ACGIH Threshold Limit Values ("TLVs");

**AND WHEREAS:**

The ACGIH Publication is amended from time to time, thereby creating revised TLVs applicable to employers pursuant to Section 5.48 of the Regulation without notice to or consultation with stakeholders;

**AND WHEREAS:**

The BOD on March 17, 2010 approved a new OEL review and adoption procedure by Resolution 2010/03/17-06 whereby the ACGIH TLVs would not be automatically adopted each year until stakeholders are consulted and sampling issues are reviewed;

**AND WHEREAS:**

In 2008 and 2009, new or revised ACGIH TLVs were published by the ACGIH thereby becoming BC OELs pursuant to Section 5.48 of the Regulation, except for those substances which were on the Table of OELs for Excluded Substances that maintained their OELs;

**AND WHEREAS:**

Based on stakeholder feedback and a detailed review of sampling methodology related to the new or revised 2008 and 2009 ACGIH TLVs, implementation issues have been identified in regard to 20 of the new or revised substances, 2 of which were already on the Table of OELs for Excluded Substances;

**AND WHEREAS:**

In 2008, the TLVs for hydroquinone and polyvinyl chloride were revised by the ACGIH, and thereby became more protective for workers than the OELs on the Table of OELs for Excluded Substances;

**THE BOARD OF DIRECTORS RESOLVES THAT:**

1. Pursuant to Section 5.48 of the Regulation, the BOD determines that the new or revised 2008 and 2009 ACGIH TLVs listed below (now reflected in the 2010 ACGIH publication) will not continue as BC OELs but rather the substances will be placed on the Table of OELs for Excluded Substances in Prevention Policy R5.48-1 and the OELs applicable to the substances will be indicated in that Table:

- Butenes, all isomers
- Carbaryl
- Indene
- Iodine
- Iodides
- Natural rubber latex

- 1,1,1,2 – Tetrachloro-2,2-difluoroethane
  - Thiram
  - Trimellitic anhydride
  - Beryllium and compounds
  - Dibutyl phosphate
  - Diethanoloamine
  - Endosulfan
  - Ethyleneimine
  - Methyl parathion
  - Propyleneimine
  - Sulfur dioxide
  - Sulprofos
2. The following two substances are removed from the Table of OELs for Excluded Substances in Policy R5.48-1. The ACGIH TLV will apply:
- Hydroquinone
  - Polyvinyl chloride
- A copy of Policy R5.48-1 with the amendments is attached.
3. The amendments become effective on September 1, 2010.

**DATED at Richmond, British Columbia, July 20, 2010.**

**By the Workers' Compensation Board**

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**GEORGE MORFITT, FCA  
CHAIR, BOARD OF DIRECTORS**

**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
<b>BERYLLIUM AND COMPOUNDS, AS Be</b>	<b>7440-41-7</b>	<b>mg/m<sup>3</sup></b>	<b>0.002</b>	<b>0.01</b>	
BROMOCHLOROMETHANE	74-97-5	ppm	200	250	
n-BUTANE	106-97-8	ppm	600	750	

Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit
BUTENES, ALL ISOMERS, INCLUDING ISOBUTENE	106-98-9, 107-01-7, 590-18-1, 624-64-6, 25167-67-3, 115-11-7	ppm	No previous limit	No previous limit	No previous limit
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 <sup>3</sup>	10	20	
CAPROLACTAM DUST	105-60-2	mg/m <sup>3</sup>	1	3	
CARBARYL	63-25-2	mg/m <sup>3</sup>	5		
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
CITRAL, INHALABLE	5292-40-5	ppm	No Previous Limit	No Previous Limit	No Previous Limit
COTTON DUST, raw		mg/m <sup>3</sup>	0.2 (G)		
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	
DIBUTYL PHOSPHATE	107-66-4	ppm	1	2	
DICHLOROMETHANE	75-09-2	ppm	25		
DICYCLOHEXYLMETHANE-4,4'-DIISOCYANATE	5124-30-1	ppm	0.005		0.01
2,4-DICHLOROPHOENOXYACETIC ACID AND ITS ESTERS	94-75-7	mg/m <sup>3</sup>	10	20	
DIELDRIN	60-57-1	mg/m <sup>3</sup>	0.25		
DIETHANOLAMINE	111-42-2	mg/m <sup>3</sup>	2		
DIISOCYANATES, N.O.S.		ppm	0.005		0.01
DIMETHOXYMETHANE	109-87-5	ppm	1000	1250	
DIMETHYL ETHER	115-10-6	ppm	1000		

Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit
DIMETHYL SULFATE	77-78-1	ppm			0.1
n-DIOCTYL PHTHALATE	117-84-0	mg/m <sup>3</sup>	5		
<b>ENDOSULFAN</b>	<b>115-29-7</b>	<b>mg/m<sup>3</sup></b>	<b>0.1</b>		
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
<b>ETHYLENEIMINE</b>	<b>151-56-4</b>	<b>ppm</b>	<b>0.5</b>		
ETHYLENE OXIDE	75-21-8	ppm	0.1	1	
FLUORINE	7782-41-4	ppm	0.1		
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
<b>HYDROQUINONE</b>	<b>123-31-9</b>	<b>mg/m<sup>3</sup></b>			<b>2</b>
<b>INDENE</b>	<b>95-13-6</b>	<b>ppm</b>	<b>10</b>		
<b>IODIDES</b>		<b>ppm</b>	<b>No previous limit</b>	<b>No previous limit</b>	<b>No previous limit</b>
<b>IODINE</b>	<b>7553-56-2</b>	<b>ppm</b>			<b>0.1</b>
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

Substance/Chemical Name	CAS No.	Unit	8-hour TWA Limit	Short-term exposure Limit, STEL	Ceiling Limit
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 ISOBUTYL KETONE	108-10-1	ppm	50	75	
<b>METHYL PARATHION</b>	<b>298-00-0</b>	<b>mg/m<sup>3</sup></b>	<b>0.2</b>		
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
<b>NATURAL RUBBER LATEX, AS TOTAL PROTEINS, INHALABLE</b>	<b>9006-04-6</b>	<b>mg/m<sup>3</sup></b>	<b>0.001</b>		
NICKEL, ELEMENTAL, SOLUBLE INORGANIC COMPOUNDS (NOS)	7440-02-0	mg/m <sup>3</sup>	0.05		
NICKEL, INSOLUBLE INORGANIC COMPOUNDS (NOS)	7440-02-0	mg/m <sup>3</sup>	0.05		
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	
<b>POLYVINYL CHLORIDE, TOTAL DUST</b>	<b>9002-86-2</b>	<b>mg/m<sup>3</sup></b>	<b>5</b>		
PORTLAND CEMENT	65997-15-1	mg/m <sup>3</sup>	10 (E,N)		
<b>PROPYLENEIMINE</b>	<b>75-55-8</b>	<b>ppm</b>	<b>2</b>		

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	
<b>SULFUR DIOXIDE</b>	<b>7446-09-5</b>	<b>ppm</b>	<b>2</b>	<b>5</b>	
<b>SULPROFOS</b>	<b>35400-43-2</b>	<b>mg/m<sup>3</sup></b>	<b>1</b>		
TANTALUM and TANTALUM OXIDE dusts, as Ta	7440-25-7	mg/m <sup>3</sup>	5		
<b>1,1,1,2-TETRACHLORO-2,2-DIFLUOROETHANE</b>	<b>76-11-9</b>	<b>ppm</b>	<b>500</b>		
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		
TETRAMETHYL LEAD, as Pb	75-74-1	mg/m <sup>3</sup>	0.075		
THALLIUM AND SOLUBLE COMPOUNDS	7440-28-0	mg/m <sup>3</sup>	0.1		
THIONYL CHLORIDE	7719-09-7	ppm			1
<b>THIRAM</b>	<b>137-26-8</b>	<b>mg/m<sup>3</sup></b>	<b>1</b>		
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	
<b>TRIMELLITIC ANHYDRIDE</b>	<b>552-30-7</b>	<b>mg/m<sup>3</sup></b>			<b>0.04</b>
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	

(E) = the value is for particulate matter containing no asbestos and less than 1% crystalline silica

(N) = the 8-hour TWA listed in the Table is for the total dust. The substance also has an 8-hour TWA of 3 mg/m<sup>3</sup> for the respirable fraction

(G) = as measured by the vertical elutriator, cotton-dust sampler, see TLV Documentation

## 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.

**PRACTICE**

For any relevant PRACTICE information regarding exposure limits or appropriate sampling methods for dusts, readers should consult the Guidelines available on the WorkSafeBC website at [worksafebc.com](http://worksafebc.com).

**EFFECTIVE DATE:**

September 1, 2010

**AUTHORITY:**s. 5.48, *Occupational Health and Safety Regulation***CROSS REFERENCES:****HISTORY:**

The Table of Occupational Exposure Limits for Excluded Substances has been amended to include new or revised substances for which the American Conference of Governmental Industrial Hygienists has changed the Threshold Limit Values in 2010. The effect of this amendment was that the existing occupational exposure limits for these substances continue to be in effect. These substances were added to the Table effective April 1, 2010.

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.

This item was originally developed to implement the amendments made to the *Occupational Health and Safety Regulation*, 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 Table of Occupational Exposure Limits for Excluded Substances has been amended to include 18 substances for which the Board of Directors has made an exception to the adoption of these substances for which the American Conference of Governmental Industrial Hygienists changed the Threshold Limit Values in 2008 and 2009. The effect of this amendment is that the substances will be re-assigned the OELs that were in effect prior to the revision by ACGIH. The Table of Occupational Exposure Limits for Excluded Substances has been amended to delete two substances so the more protective American Conference of Governmental Industrial Hygienists Threshold Limit Values will now apply to these substances. The revisions were made to the Table effective September 1, 2010.