

# OVERVIEW

## TITLE:

Part 1, Definitions  
Section 1.1, Definitions

Part 5, Chemical and Biological Substances  
Section 5.1, Definitions  
Section 5.57, Designated substances  
Section 5.58, Protective policy

## 1. NATURE OF THE PROBLEM TO BE SOLVED

In 2006 the ACGIH altered its reporting of reproductive and sensitization effects. As a result, given the specific wording in section 5.57, 20 substances listed as reproductive toxins by WorkSafeBC will have these designations removed, along with 9 substances currently designated as sensitizers. The effect is that for many of these affected substances, there will no longer be an obligation to

- substitute for a less toxic substance where practicable,
- keep exposures to as low as reasonably achievable,
- institute protective policies under s. 5.58, including those for pregnant workers, or
- implement an exposure control plan under s. 5.54.

An additional issue is the fact that information on reproductive effects in the ACGIH booklet is not complete because the effects are listed only when they are the basis for the threshold limit value ("TLV"). If a substance has reproductive effects, and such effects are not the basis for the TLV, then they are not recorded in the ACGIH TLV booklet.

Workers in a broad range of sectors are affected, including those in health care, pharmaceuticals, dental, veterinary, electronics, petroleum/service stations, metal fabrication, painting, agriculture, construction, smelters, furniture repair, autobody work, and printing. It may be reasonable to estimate that 15 - 20% of the BC workforce would be affected. The issues for such workers will primarily be the ability to have children, and the health of children born. WorkSafeBC has periodically received claims for exposure to a reproductive agent. In some cases WorkSafeBC has covered the costs of claimant treatment at reproductive clinics.

On the matter of sensitizers, it should be noted that respiratory and dermal sensitization can represent a substantial impact for a worker. For just one category of sensitizer (for the period 2001 - 2005) claims averaged 46 days lost, at a cost of \$82,000.

## **2. PURPOSE OF THE PROPOSED AMENDMENTS**

To address the above problems, it is proposed that sections 1.1, 5.1, 5.57 (1), and 5.58 be amended to address the change in reporting by the ACGIH, and that a means be retained to adequately identify reproductive toxins and sensitizers.

## **3. SOURCE OF REQUEST**

Worker and Employer Services Division

## PART 1: DEFINITIONS

**Definitions**      1.1      In this Occupational Health and Safety Regulation:

***“reproductive toxin”***

**means a substance that could cause**

- (a) adverse reproductive effects on male or female reproductive organs, tissues, or cells,**
- (b) adverse effects on fertility,**
- (c) adverse health effects on the embryo, fetus, or newborn including developmental abnormalities, or**
- (d) tumours of the reproductive system;**

*“sensitizer”*

means a substance that has been shown to elicit **could cause** an allergic type of response in humans after an initial exposure, resulting in development of symptoms upon subsequent exposure at much lower concentrations;

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### EXPLANATORY NOTE

Refer to the next page for information on these proposed amendments – a new definition for “reproductive toxin” and a revision to the definition for “sensitizer”.

## PART 5: CHEMICAL AND BIOLOGICAL SUBSTANCES

<b>Definitions</b>	<b>5.1</b>	In this Part:  "ACGIH"  means the American Conference of Governmental Industrial Hygienists publication entitled "Threshold Limit Values and Biological Exposure Indices", dated 2002, as amended from time to time, <b>and the American Conference of Governmental Industrial Hygienists publication entitled "Documentation of the Threshold Limit Values and Biological Exposure Indices", as amended from time to time;</b>
<b>Designated substances</b>	<b>5.57</b>	(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: <b>If a substance identified as an</b> (a) ACGIH A1 or A2, or IARC 1, 2A or 2B carcinogen; (b) <del>reproductive critical effects;</del> <b>ACGIH reproductive toxin,</b> (c) <del>sensitization critical effect or SEN notation;</del> <b>ACGIH sensitizer, or</b> (d) <del>by an ACGIH L endnote,</del> <b>is present in the workplace, the employer must replace it, if practicable, with a material which reduces the risk to workers.</b>  (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) The exposure control plan must meet the requirements of section 5.48.
<b>Protective policy</b>	<b>5.58</b>	(1) At any worksite where a worker is exposed to a substance which is identified in section 5.57 (1) as <del>having a reproductive</del> <b>toxin or a sensitizer</b> <del>critical effect, a sensitization critical effect or SEN notation,</del> the employer must develop policy and procedures appropriate to the risk, which may include protective reassignment.  (2) The policy and procedures required by subsection (1) must (a) inform workers about the reproductive toxin and identify ways to minimize exposure to the toxin for a worker who has advised the employer of pregnancy or intent to conceive a child, and (b) identify ways to eliminate or minimize exposure to a sensitizer for a worker who is or may be sensitized to that substance.

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### EXPLANATORY NOTE

In 2006, the American Conference of Governmental Industrial Hygienists ("ACGIH") changed the reporting system for recording critical health effects for substances, as it was listed in the annually published Threshold Limit Value ("TLV") booklet. The "Critical effects" column of the Adopted Values Table of the TLV booklet was re-titled "TLV® Basis", to reflect the change in reporting. Therefore, starting in 2006, the column lists the reproductive and sensitizing health effects only for those substances for which the TLV is specifically based on the critical health effect. Prior to the change, the column listed both TLV-based critical effects and other critical health effects.

This change has meant that the ACGIH is no longer identifying the reproductive or sensitization effects of substances in their annual publication of the TLV booklet if these effects are not the basis for establishing the TLV. Given the current wording of OHSR section 5.57, many of the substances that were previously identified as having reproductive or sensitizing critical effects are no longer explicitly identified after the change in the reporting structure.

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Here is an example of a substance that was affected by the change:

Prior to the change, the ACGIH TLV booklet (2005) stated the following:

Substance	TWA	STEL	Notations	TLV Basis – Critical Effect(s)
Acrylic Acid	2 ppm	---	Skin; A4	Irritation, <b>reproductive</b>

After the change, the ACGIH TLV booklet (2006) stated the following:

Substance	TWA	STEL	Notations	TLV® Basis
Acrylic Acid	2 ppm	---	Skin; A4	URT Irritation

Therefore, acrylic acid is no longer listed as a reproductive toxin effective 2006 since the TLV is based on other adverse health effects, namely its irritative effects on the upper respiratory tract (URT). ACGIH still considers this substance as having reproductive effects and this information is contained in the *Documentation of the Threshold Limit Values and Biological Exposure Indices* – the primary source publication for all ACGIH evaluated substances.

The proposal is for WorkSafeBC to maintain the mechanism of identifying substances with reproductive and/or sensitizing effects by the ACGIH identifying the substance in the “TLV® Basis” column of the TLV booklet or identifying the substance as a reproductive toxin or sensitizer in the *Documentation* publication. In essence, this means the current list of reproductive toxins and sensitizers is maintained so that employers can continue their current obligation to protect workers from these adverse health effects.

To accommodate these changes, it is proposed that Parts 1.1 Definitions, 5.1 Definitions, 5.57 Designated Substances, and 5.58 Protective Policy of the regulation be amended so that substances with these health effects will remain identified as such.

The proposal is to add a new definition for “reproductive toxin” to section 1.1 and to amend the definition for “sensitizer” as currently defined in section 1.1. Note that these terms are already used in sections 5.58 (“protective policy”) and 6.49 (“reproductive toxins”) to describe such substances.

As proposed, a reproductive toxin will be defined to include those substances that could cause:

- adverse reproductive effects on male or female reproductive organs, tissues or cells
- adverse effects on fertility,
- adverse health effects on the embryo, fetus, or newborn, including developmental abnormalities, or
- tumours of the reproductive system.

As a matter of clarification and consistency, it is proposed that the definition for “sensitizer” in section 1.1 be amended to read (amendment in **bold**) as “a substance **that could cause** an allergenic type of response in human after an initial exposure, resulting in development of symptoms upon subsequent exposure at much lower concentrations”.

In order to recognize the *ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices* as a primary source of information regarding reproductive and sensitizing effects of substances, it is proposed that the definition of ACGIH be amended in section 5.1 to include the ACGIH TLV booklet as well as the supporting ACGIH Documentation publication related to each TLV.

The proposed amendments will not affect the current requirement that an employer must consider substitution for designated substances. The proposed amendment to section 5.58 is simply to keep the terminology consistent with those of section 5.57. An employer is required to comply with section 5.58 Protective Policy once a substance is identified as being a reproductive toxin or a sensitizer.

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**Currently listed substances**

The following table lists the substances that are currently identified by the ACGIH and the WorkSafeBC Table of Exposure Limits as a reproductive toxin or sensitizer. The proposed amendments will not result in any changes to this list. This applies to substances that WorkSafeBC has excluded from adopting the ACGIH TLV. For substances listed on the WorkSafeBC Table of Occupational Exposure Limits for Excluded Substances contained in the Policy Item R5.48-1, the adoption of the ACGIH TLV is excluded, but not the ACGIH designations specific to section 5.57.

For the purposes of the consultation process and this explanatory note, the substances exhibiting reproductive or sensitizing effects and whose ACGIH TLV is not based on these effects are identified by an asterisk; i.e., R\*, S\* in the table below.

WorkSafeBC is considering mechanisms being used by other jurisdictions to identify substances with reproductive or sensitizing health effects, i.e. Workplace Hazardous Materials Information System (WHMIS) under Health Canada's Hazardous Products Act and the Controlled Products Regulations.

**Table 1: Substances with reproductive and/or sensitizing effects**

<b>Substance</b>	<b>Previous ACGIH Notation (up to 2005)</b>	<b>Current ACGIH Notation (since 2006)</b>	<b>Designation</b>
Acrylic Acid	Reproductive	URT irritation	R*
Allyl glycidyl ether	Sensitization	URT irritation, dermatitis, eye & skin irritation	S*
Ally propyl disulfide	Sensitizer	Sensitizer	S
Amitrole	Reproductive	Thyroid effects	R*
Tert-Amyl methyl ether (TAME)	Reproductive	Embryo/fetal damage	R
Azinphos-methyl	Sensitizer	Sensitizer	S
Benomyl	Reproductive	Eye irritation	R*
1-bromopropane	Reproductive	Embryo/fetal damage	R
n-butyl acrylate	Sensitizer	Sensitizer	S
n-butyl glycidyl ether (BGE)	Reproductive, Sensitizer	Testicular damage, Sensitizer	R, S
n-butyl mercaptan	Reproductive	URT irritation	R*
Captafol	Sensitization	Skin irritation	S*
Captan, inhalable	Sensitizer	Sensitizer	S
Carbaryl	Reproductive	Cholinesterase inhibitor	R*
Carbon monoxide**	Reproductive	COHb-emia	R*
1-chloro-2-propanol	Reproductive	Liver damage	R*
2-chloro-1-propanol	Reproductive	Liver damage	R*
2-chloroacetophenone	Sensitization	Eye, URT, skin irritation	S*
Chloroform**	Reproductive	Embryo/fetal damage	R
Beta-chloroprene	Reproductive	URT & eye irritation	R*
2-chloropropionic acid	Reproductive	Male reproductive damage	R
Demeton-S-methyl	Sensitizer	Sensitizer	S
Dibuyl phthalate	Reproductive	Testicular damage	R
Dichloroacetic acid	Male reproductive effects	Testicular damage	R
Dichlorvos (DDVP), Inhalable	Sensitizer	Sensitizer	S
Diethylene triamine	Sensitization	URT and eye irritation	S*
Diglycidyl ether (DGE)	Reproductive	URT irritation, hematologic effects	R*
N,N-dimethylacetamide	Reproductive	Embryo/fetal damage	R

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<b>Substance</b>	<b>Previous ACGIH Notation (up to 2005)</b>	<b>Current ACGIH Notation (since 2006)</b>	<b>Designation</b>
Dinitrotoluene	Reproductive	Reproductive effects	R
Dodecyl mercaptan	Sensitizer	Sensitizer	S
1,3-dioxolane	Reproductive	Hematologic effects	R*
Epichlorohydrin	Irritation, liver, kidney	Male reproductive effects	R
2-ethoxyethanol (EGEE)	Reproductive	Male reproductive damage, embryo/fetal damage	R
2-ethoxyethyl acetate (EGEEA)	Reproductive	Male reproductive damage	R
Ethyl acrylate	Sensitization	Sensitizer	S
Ethyl tert-butyl ether (ETBE)	Reproductive	Testicular damage	R
Ethylenediamine	Sensitization	---	S*
Ethylene oxide**	Reproductive	Cancer, CNS impairment	R*
2-ethylhexanoic acid	Reproductive	Teratogenic effects	R
Flour Dust, Inhalable	Sensitizer	Sensitizer	S
Formaldehyde**	Sensitizer	Sensitizer	S
Glutaraldehyde	Sensitizer	Sensitizer	S
Glyoxal	Sensitizer	Sensitizer	S
Halothane**	Reproductive	Liver damage, CNS impairment, vasodilation	R*
Hexafluoroacetone	Reproductive	Testicular damage	R
Hexahydrophthalic anhydride, all isomers	Sensitizer	Sensitizer	S
Hexamethylene diisocyanate (HDI)**	Sensitization	Sensitizer	S
1-hexene	Reproductive	CNS impairment	R*
2-hydroxypropyl acrylate	Sensitizer	Sensitizer	S
Isophorone diisocyanate**	Sensitization	Respiratory sensitizer	S
Lead, elemental & inorganic compounds	Reproductive	CNS & PNS impairment, hematologic effects	R*
Lead arsenate	Reproductive	GI damage, CNS impairment, kidney damage, hematologic effects	R*
Lead chromate, as Cr	Reproductive	Male reproductive damage	R
Lead chromate, as Pb	Reproductive	Male reproductive damage	R
Maleic anhydride	Sensitizer	Sensitizer	S
Manganese, elemental & inorganic compounds	Reproductive	CNS impairment	R*
Mercury – elemental, as Hg	Reproductive	CNS impairment, kidney damage	R*
Mercury – inorganic compounds	Reproductive	CNS impairment, kidney damage	R*
2-methoxyethanol (EGME)	Reproductive	Reproductive effect	R
2-methoxyethyl acetate (EGMEA)	Reproductive	Reproductive effect	R
Methyl acrylate	Sensitizer	Sensitizer	S
Methyl chloride	Reproductive	Testicular damage, teratogenic effects	R
Methyl isocyanate	Sensitizer	Skin, URT irritation	S*
Methyl methacrylate	Sensitizer	Sensitizer	S

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<b>Substance</b>	<b>Previous ACGIH Notation (up to 2005)</b>	<b>Current ACGIH Notation (since 2006)</b>	<b>Designation</b>
Methyl tert-butyl ether (MTBE)	Reproductive	URT irritation, kidney damage	R*
Methyl n-butyl ketone	Neuropathy	Testicular damage	R
Methyl vinyl ketone	Sensitizer	Sensitizer	S
Methylene bisphenyl isocyanate (MDI) **	Sensitization	Respiratory sensitizer	S
Naled, Inhalable	Sensitizer	Sensitizer	S
Natural rubber latex	Sensitizer	Sensitizer	S
Nitrous oxide**	Reproductive	Embryo/fetal damage	R
p,p'-oxybis(benzenesulfonyl hydrazide), inhalable	Irritation	Teratogenic effects	R
p-phenylenediamine	Sensitization	Skin sensitizer	S
Phenyl glycidyl ether (PGE)	Sensitizer, irritation, dermatitis	Sensitizer, testicular damage	S, R
Phenylphosphine	Reproductive	Testicular damage	R
Phthalic anhydride	Sensitizer	Sensitizer	S
Picric acid	Sensitization	Skin sensitization	S
Piperazine and its salts **	Sensitization	Skin sensitization	S
Platinum – soluble salts	Sensitization	Asthma	S
Propylene dichloride	---	Sensitizer	S
Propylene oxide	Sensitizer	Sensitizer	S
Pyrethrum	Sensitization	Liver damage, LRT irritation	S*
Rosin cores solder thermal decomposition products	Sensitizer	Sensitizer	S
Subtilisins	Sensitization	Asthma, skin, URT and LRT irritation	S
Tetrakis (hydroxymethyl) phosphonium sulfate	Sensitizer	Sensitizer	S
Tetryl	Sensitization	URT irritation	S*
Toluene	CNS	Female reproductive effect, pregnancy loss	R
Toluene-2,4 or 2,6-diisocyanate (TDI)	Sensitizer	Sensitizer	S
1,3,5-Triglycidyl-s-triazinetrione	Sensitization, reproductive	Male reproductive damage	S*, R
Trimellitic anhydride	Sensitization	Respiratory sensitizer	S
Turpentine	Sensitizer	Sensitizer	S
4-vinyl cyclohexene	Reproductive	Female and male reproductive damage	R
Vinyl cyclohexene dioxide	Reproductive	Female and male reproductive damage	R

\* A substance which the ACGIH considers to have an adverse reproductive and/or sensitizing effect, but these effects are not the basis of the TLV. Substances for which the reproductive and/or sensitizing effect form the basis for the TLV are unmarked (no asterisk).  
 \*\* Indicate substances that are listed in the Table of OELs for Excluded Substances – WorkSafeBC's Policy Item R5.48-1