The Globally Harmonized System for the Classification and Labelling of Chemicals (The GHS)

Implementation of the GHS in Canada

Workplace Hazardous Materials Information System (WHMIS)

TABLE 2 Comparison of Hazard Communication: WHMIS and the GHS [Physical]

Explosive

CPR	**Exempt from explosives within the meaning of the *Explosives Act*.**					
GHS	 **Danger** **Explosive; mass explosion hazard**	 **Danger** **Explosive; severe projection hazard**	 **Danger** **Explosive; fire, blast or projection hazard**	**1.4*** **No Symbol** **Warning** **Fire or projection hazard**	**1.5*** **No Symbol** **Warning** **May explode in fire**	**1.6***
Division	**1.1**	**1.2**	**1.3**	**1.4**	**1.5**	**1.6**

Analysis:

Explosives are exempt from the *CPR*.

Flammable Gases

CPR	**Class B** **Division 1** 	
GHS	**Category 1**  **Danger** **Extremely flammable gas**	**Category 2** **No Symbol** **Warning** **Flammable gas**

Analysis:

Under the *CPR* all gases that are flammable, B1 are be included in this category. There is no subdivision of this class in the *CPR* as there is for the GHS. This will require changes to the *CPR*. It will provide for a division between extremely flammable and flammable gases. It will allow inclusion of gases other than those which are ignitable when in a mixture of less than 13% or at a concentration range of at least 12%. There will be a symbol change.

Flammable Aerosols

CPR	**Class B** **Division 5** 	
GHS	**Category 1**  **Danger** **Extremely flammable aerosol**	**Category 2**  **Warning** **Flammable aerosol**

Analysis:

Under the *CP,R* all aerosols that are flammable B1 will be included in this category. There is no subdivision in the *CPR* as there is under the GHS. This will require changes to the *CPR*. Under the GHS there will be a division between extremely flammable and flammable aerosols. There will be a symbol change.

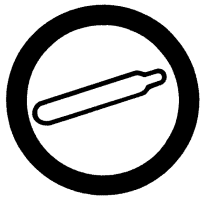
Oxidizing Gases

CPR	**Class C - oxidizing material** **Yields oxygen** **Organic peroxide or bivalent o-o structure** 
GHS	**Category 1**  **Danger** **May cause or intensify fire; oxidizer**

Analysis:

Under the *CPR*, any material including gases are included in Class C if they cause or contribute to the combustion of another material by yielding oxygen or another oxidizing substance or if the material is an organic peroxide that has the bivalent O-O structure. This is inclusive of the Category 1 for oxidizing gases under the GHS. Changes to the GHS will not be required for this end-point.

Gases Under Pressure

CPR	**Compressed Gas Class A** 			
GHS	**Compressed Gas**  **Warning** **Contains gas under pressure; may explode if heated**	**Liquified Gas**  **Warning** **Contains gas under pressure; may explode if heated**	**Refrigerated Liquified Gas**  **Warning** **Contains refrigerated gas; may cause cryogenic burns or injury**	**Dissolved Gas**  **Warning** **Contains gas under pressure; may explode if heated**

Analysis:

Under the *CPR* a compressed gas, Class A is any product under pressure, including: compressed gas, dissolved gas, liquified gas or liquified refrigerated gas critical temp< 50°C , absolute vapour pressure > 294 kilopascals at 50°C; an absolute pressure in the cylinder or other pressure vessel in which it is packaged greater than 275±1 kilopascals at 21.1°C (70°F), in a liquid state, an absolute vapour pressure exceeding 275 kilopascals at 37.8°C. The GHS splits this class into 4 categories, compressed gas, liquified gas, refrigerated liquid gas and dissolved gas. This will require changes to the *CPR*. Symbol changes will be required.

Flammable Liquids

CPR	**Flammable**  **Class B, Division 2** **Danger** **Flammable**		**Combustible**  **Class B, Division 3** **Keep away from flames or sparks.**	
GHS	**Category 1**  **Danger** **Extremely flammable liquid and vapour**	**Category 2**  **Danger** **Highly flammable liquid and vapour**	**Category 3**  **Warning** **Flammable liquid and vapour**	**Category 4** **No symbol** **Warning** **Combustible liquid**
Flashpoint	**<-18^{O}C**	**<23^{O}C**	**<23^{O}C**	
Initial Boiling Pt		**≤35^{O}C**	**>35^{O}C**	

Analysis: There are 4 GHS categories for flammable liquids. One of the categories includes combustible liquids with flash points between 60 ^{o}C and 93 ^{o}C. Under the *CPR* there is only one category for flammable liquids in Class B, Division 2 which is similar in range as the first 2 GHS categories, with an upper limit of 37.8 ^{o}C versus 35 ^{o}C for category 2. There is no *CPR* category for flammable liquid and vapours. The *CPR* includes a category for combustible liquids which has a similar but not identical end point to that in the GHS, Category 3, for flammable liquids and vapours and category 4 for combustible liquids. Symbol Changes will be required. Changes to the *CPR* will be required.

Flammable Solids

CPR	**Class B, Division 4** **Causes fire through friction or through retained heat from manufacturing or processing; can be ignited readily and when ignited burns so vigorously and persistently as to create a hazard; ignites readily and burns with a self-sustained flame at a rate of more than 0.254 centimetre (0.1 inch) per second** 	
GHS	**Category 1**  **Danger** **Flammable solid**	**Category 2**  **Warning** **Flammable solid**

Analysis:

Under GHS, a flammable solid is a material which is readily combustible or may cause or contribute to fire through friction. There are two categories, with differences in the screening test. Category 1 for substances or mixtures other than metal powders have (a) a wetted zone that does not stop fire & (b) a burning time < 45 sec or burning rate > 2.2 mm/sec ; and metal powders have a burning time < 5 min, while Category 2 for substances or mixtures other than metal powders have (a) a wetted zone that stops fire for at least 4 min & (b) a burning time < 45 sec or burning rate > 2.2 mm/sec and metal powders have a burning time > 5 min and ≤ 10 min. Under the *CPR* there is only one category. A flammable solid causes fire through friction or through retained heat from manufacturing or processing; can be ignited readily and when ignited burns so vigorously and persistently as to create a hazard; ignites readily and burns with a self-sustained flame at a rate of more than 0.254 centimetres (0.1 inch) per second. The differences between the *CPR* and the GHS will require changes to criteria in the *CPR*. Changes will be required for symbol changes.

Self-Reactive Substances

CPR	Exempt from explosives within the meaning of the Explosives Act		Class F Dangerously reactive substances 		
GHS	**Type A**  **Danger** **Heating may cause an explosion**	**Type B**   **Danger** **Heating may cause a fire or explosion**	**Type C & D**  **Danger** **Heating may cause a fire**	**Type E & F**  **Warning** **Heating may cause a fire**	**Type G** **No label elements**

Analysis:
Under GHS thermally unstable liquid or solid substances liable to undergo a strongly exothermic decomposition even without participation of oxygen (air). This definition excludes substances or mixtures classified under the GHS as explosive, organic peroxides, or as oxidizing. Therefore, types A and B are excluded from this analysis. Under the *CPR*, Class F - dangerously reactive materials are categorized by the fact that they may be products, materials or substances which (a) undergo vigorous polymerization, decomposition or condensation; (b) becomes self-reactive under conditions of shock or increase in pressure or temperature. There are differences between the GHS and *CPR* categories for these types of substances. The *CPR* will have to be amended to include these endpoints. Types A and B under the GHS can only be included if there are changes to the exemptions under the *HPA*.

Pyrophoric Liquids

CPR	**Class B** **Division 6** 
GHS	**Category 1**  **Danger** **Catches fire spontaneously if exposed to air**

Analysis:

Under the *CPR* pyrophoric liquids are materials which are combustible and liable to spontaneous heating under normal conditions of use or liable to heat in contact with air to the point where it begins to burn; or emits a flammable gas or becomes spontaneously combustible on contact with water or water vapour. Under GHS a pyrophoric liquid is a liquid which catches fire spontaneously if exposed to air. This definition is slightly modified to include a liquid ignites within 5 min when added to an inert carrier and exposed to air, or it ignites or chars a filter paper on contact with air within 5 min. Changes to the symbols will be required.

Pyrophoric Solids

CPR	**Class B** **Division 6** 
GHS	**Category 1**  **Danger** **Catches fire spontaneously if exposed to air**

Analysis:

Pyrophoric solids under the *CPR* are solid materials which are combustible and liable to spontaneous heating under normal conditions of use or liable to heat in contact with air to the point where it begins to burn; or it emits a flammable gas or becomes spontaneously combustible on contact with water or water vapour. Under GHS, they are solid materials which catch fire spontaneously if ignited - solid ignites within 5 min of coming into contact with air. Changes to the symbol are required.

Self Heating Substances

CPR	**Class B** **Division 6** 	
GHS	**Category 1**  **Danger** **Self-heating; may catch fire**	**Category 2**  **Warning** **Self-heating in large quantities; may catch fire**

Analysis:

Materials that are combustible and liable to spontaneous heating under normal conditions of use or liable to heat in contact with air to the point where it begins to burn; or if the material emits a flammable gas or becomes spontaneously combustible on contact with water or water vapour are included in class B, Division 6 under the *CPR*. Under the GHS the class is broken down into 2 categories, one which encompasses materials that are self-heating and which may catch fire and category 2 which encompasses materials which are self-heating in large quantities and may catch fire. Changes to the *CPR* will be required to incorporate the division of the class under the GHS. Changes to the symbol are required.

Substances, which in contact with water, emit flammable gase

CPR	**Class B Division 6** 		
GHS	**Category 1**  **Danger** **In contact with water releases flammable gases which may ignite spontaneously.**	**Category 2**  **Danger** **In contact with water releases flammable gases**	**Category 3**  **Warning** **In contact with water releases flammable gases**

Analysis:

As above, under the *CPR* , Class B, Division 6, encompasses materials that are combustible and liable to spontaneous heating under normal conditions of use or liable to heat in contact with air to the point where it begins to burn, or it emits a flammable gas or becomes spontaneously combustible on contact with water or water vapour. Under the GHS this class of materials is divided into 3 categories, they encompass solid or liquid substances which, when exposed to water are liable to become spontaneously flammable or give off flammable gasses. This will require changes to the *CPR*. Changes are also required to the symbol.

Oxidizing Liquids

CPR	**Class C** **Any product which causes or contributes to the combustion of another material by yielding oxygen or any other oxidizing substance, whether or not the product, material or substance is itself combustible or it is an organic peroxide that contains the bivalent 0-0 structure**. 		
GHS	**Category 1**  **Danger** **May cause fire or explosion; strong oxidizer**	**Category 2**  **Danger** **May intensify fire; oxidizer**	**Category 3**  **Warning** **May intensify fire; oxidizer**

Analysis:
Under GHS oxidizing liquids are categorized as liquids which, while in themselves are not necessarily combustible, may generally by yielding oxygen, cause, or contribute to, the combustion of other material. Under the *CPR* any product, material or substance shall be included in Class C - Oxidizing Material listed in Schedule II to the Act if: a) it causes or contributes to the combustion of another material by yielding oxygen or any other oxidizing substance, whether or not the product, material or substance is itself combustible; or (b) it is an organic peroxide that contains the bivalent 0-0 structure. Therefore, all materials that are included in this class under the GHS may also be included in this class under the *CPR*. The *CPR* defines the breakdown for oxidizing liquids a bit further in that it allows for organic peroxides to be included in this class. The *CPR* will require changes for the symbol.

Oxidizing Solids

CPR	**Class C** **Any product which causes or contributes to the combustion of another material by yielding oxygen or any other oxidizing substance, whether or not the product, material or substance is itself combustible; or it is an organic peroxide that contains the bivalent 0-0 structure.** 		
GHS	**Category 1**  **Danger** **May cause fire or explosion; strong oxidizer**	**Category 2**  **Danger** **May intensify fire; oxidizer**	**Category 3**  **Warning** **May intensify fire; oxidizer**

Analysis: Under GHS oxidizing solids are solid materials which, while in themselves are not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material. Under the *CPR* any product, material or substance shall be included in Class C - Oxidizing Material listed in Schedule II to the Act if a) it causes or contributes to the combustion of another material by yielding oxygen or any other oxidizing substance, whether or not the product, material or substance is itself combustible; or (b) it is an organic peroxide that contains the bivalent 0-0 structure. Therefore, all materials that are included in this class under the GHS may also be included in this class under the *CPR*. The *CPR* defines the breakdown for oxidizing solids or liquids a bit further in that it allows for organic peroxides to be included in this class, while the GHS breaks down the category into solids and liquids. There will have to be changes in the *CPR* for the symbol changes.

Organic Peroxides

CPR	Class C 				
GHS	**Type A**  **Danger** **Heating may cause an explosion**	**Type B**  **Danger** **Heating may cause a fire or explosion**	**Type C & D**  **Danger** **Heating may cause a fire**	**Type E & F**  **Warning** **Heating may cause a fire**	**Type G** **No label elements**

Analysis:

Under the *CPR*, organic peroxides are materials which cause or contribute to the combustion of another material by yielding oxygen or any other oxidizing substance, whether or not the product, material or substance is itself combustible; or it is an organic peroxide that contains the bivalent 0-0 structure. These materials are included in Class C. Under the GHS, organic peroxides are liquid or solid organic substances which contain the bivalent O-O structure and may be considered derivatives of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals. Organic peroxides are thermally unstable substances which may undergo exothermic self-accelerating decomposition. In addition, they may have one or more of the following properties: (i) be liable to explosive decomposition; (ii) burn rapidly; (iii) be sensitive to impact or friction; (iv) react dangerously with other substances. Type A and B are exempt from WHMIS *CPR*. The remaining categories can be included under the current end-points in the *CPR*. Changes are required to the *CPR* for the changes to the symbols.

Corrosive to Metals

CPR	**Class E** 
GHS	**Category 1**  **Warning** **May be corrosive to metals**

Analysis:
Under the *CPR*, a material is corrosive to metals in that by definition, such materials corrode SAE 1020 steel or 7075-T6 non-clad aluminum surfaces at a rate exceeding 6.25 millimetres per year at a test temperature of 55^{o}C when tested in accordance with *Test Method, Laboratory Corrosion Testing of Metals for the Process Industries*, NACE Standard TM-01-69 (1976 Revision) is included in Class E. Under the GHS, such a material is a substance or mixture which by chemical action, will materially damage or even destroy metals. Changes to the *CPR* for the symbol are required.