

## 2. GAPS IN CURRENT SOUTH AFRICAN PRACTICE

Gaps in current practice are presented according to the specified GHS elements. For completeness, a gap analysis of the 'Definitions' is also provided, as well as a section on 'Training and Awareness', which is considered this key area to the future successful implementation of the GHS in South Africa.

### 2.1 Definitions

The GHS document contains a section of some 61 definitions and abbreviations. The full list of the definitions and abbreviations contained in the GHS document is set out in **Annexure 1** for ease of reference. The GHS definitions provide a basis for ensuring that there is a common understanding regarding the meaning of terminology used in the GHS document and consequently serve the purpose of minimising potential deviations from the GHS provisions as a result of different interpretations of terminology. In this regard, the GHS document states that “[i]n order to ensure a full understanding of the provisions for classifying mixtures, definitions of certain terms are required. These definitions are for the purpose of evaluating or determining the hazards of a product for classification and labelling, and are not intended to be applied in other situations such as inventory reporting. The intent of the definitions as drawn is to ensure that (a) all products within the scope of the Globally Harmonized System are evaluated to determine their hazards, and are subsequently classified according to GHS criteria as appropriate; and (b) the evaluation is based on the actual product involved i.e. on a stable product...

*These definitions should be used to maintain consistency when classifying substances and mixtures in the GHS”.*<sup>4</sup>

A comparison of these definitions with those used in the South African context is therefore important to ensure that the implementation of the GHS system in the domestic context would not be inadvertently perverted by different understandings and consequent application of terminology. In this section (**also refer to Annexure 1 for the 'Definitions Gap Analysis'**), the definitions and terms which are key to understanding the cornerstones of the GHS are discussed and have been compared against the pertinent key domestic legislation pertaining to hazard communication as identified in Part 1 of this study, the Situation Analysis<sup>5</sup>.

Definitions which are of direct relevance to, for example, understanding the detailed requirements and elements of classification, labelling and safety data sheets, have been discussed in the appropriate subsequent sections.

The table in Annexure 1 indicates that the differences in or absences of definitions in respect of substances and mixtures may result in unintended deviations from the GHS system. Some of the key gaps include the following:

- The scope of substances that fall within the ambit of different Acts vary. This risk is minimised through the incorporation of SABS 0228 as the method of classification in most of the Acts;
- The different approach to mixtures in SABS 0228 could result in only the active ingredient being considered as opposed to all the ingredients, as envisaged by the GHS; and
- South African legislation may require harmonisation to ensure that it collectively facilitates the implementation of the GHS to all chemicals.

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<sup>4</sup> ST/SG/AC.10/C.a/2002/16/Add.1. Page 21

<sup>5</sup> Part 1: Study into the Implications of Implementing the Global Harmonised System of Chemical Hazard Communication and Development of an Implementation Strategy for South Africa: **Situation Analysis**, FRIDGE / UNITAR, Johannesburg, November 2003

## 2.2 Hazard Classification

### 2.2.1 GHS Baseline

The GHS uses the term “hazard classification” to indicate that only the intrinsic hazardous properties of substances or mixtures are considered.

The following three steps are followed to undertake *hazard classification* under the GHS:

- Identification of relevant data regarding the hazards of the substance or mixture.
- Review of the data to ascertain the hazards associated with the substance or mixture.
- Decision on whether the substance or mixture will be classified as a hazardous substance or mixture and the degree of hazard by comparison of the data with the agreed hazard classification criteria.

Route of exposure, mechanistic information and metabolism studies are pertinent to determining the relevance of an effect in humans. When such information raises doubts about relevance in humans a lower classification may be warranted. When it is clear that the mechanism or mode of action is not relevant to humans the substance or mixture should not be classified.

Expert judgement will be needed where the criteria in GHS are different from the existing systems or the quality of the data from older studies must be verified. All available information regarding the toxicity of the substance or mixture, or related substances and mixtures, must be considered when classification is based on the total weight of evidence.

The effect of a substance or mixture on biological and environmental systems is influenced among other factors by the physico-chemical properties of the substance or mixture and/or ingredients of the mixture and the way in which the ingredient substances are biologically available. A substance or mixture need not be classified when it can be shown by conclusive experimental data from internationally acceptable test methods (see section 2.4) that the substance or mixture is not biologically available.

#### 2.2.1.1 Classification of mixtures

The approach to *classification of a mixture* is a tiered approach and is dependent upon the amount of information that is available for the mixture itself and its ingredients:

- Where test data are available for the complete mixture, the classification of the mixture will be based on that data.
- For health and environmental classes, where the mixture itself has not been tested to determine the hazard but there are sufficient data on the individual ingredients and similar tested mixtures to adequately characterise the hazards of the mixture, these data are used in accordance with *bridging principles* (see below).
- For health and environmental classes, if test data is not available for the mixture and the available information does not allow the application of the bridging principles, then the agreed methods described for each hazard category for estimating hazards based on the information known will be applied to classify the mixture.

#### (a) *Bridging principles*

The application of *bridging principles* ensures that the classification process uses the available data to the greatest extent possible in characterising the mixture without the necessity for additional testing in animals. These principles include - dilution, batching, concentration of highly toxic mixtures, interpolation within one toxicity category and substantially similar mixture:

- *Dilution:* If a substance is diluted with a substance that has an equivalent or lower toxicity classification than the least toxic original ingredient and which is not expected to affect the toxicity

of other ingredients, then the new mixture may be classified as equivalent to the original mixture. If a mixture is diluted with water or other totally non-toxic substance, the toxicity of the mixture can be calculated from test data on the undiluted mixture.

- **Batching:** The toxicity of one production batch of a complex mixture can be assumed to be substantially equivalent to that of another production batch of the same commercial product and produced by or under the control of the same manufacturer, unless there is reason to believe that there is significant variation such that the toxicity of the batch has changed.
- **Concentration of highly toxic mixtures:** If a mixture is classified in Category 1 and the concentration of the ingredients of the mixture that are in Category 1 are increased, then the new mixture is classified in Category 1 without additional testing.
- **Interpolation within one toxicity category:** For three mixtures with identical ingredients, where A and B are in the same toxicity category and mixture C has the same toxicological active ingredients with concentrations intermediate to the concentration of those ingredients in mixtures A and B, then mixture C is assumed to be in the same toxicity category as A and B.
- **Substantially similar mixtures:** Given two mixtures (i) A + B and (ii) C + B, where the concentration of ingredient B is essentially the same in both mixtures, the concentration of ingredient A in mixture (i) equals that of ingredient C in mixture (ii) and data toxicity for A and C are available and substantially equivalent. If the mixture (i) is already classified based on test data, then mixture (ii) can be assigned to the same hazard category.

#### **(b) Classification of mixtures by calculation**

The *acute toxicity of a mixture* can be estimated when information is available for the ingredients. Where a mixture contains ingredients with a known acute toxicity then the acute toxicity estimate of the mixture for oral, dermal and inhalation toxicity can be determined by calculation from the acute toxicity estimate values for all the ingredients according to the following formula:

$$\frac{100}{ATE_{mix}} = \sum_n \frac{C_i}{ATE_i}$$

where

$C_i$  = Concentration of ingredient i

n = ingredients

i = 1 to n

$ATE_i$  = Acute toxicity estimate of ingredient i

This calculation method ignores ingredients that are presumed not toxic or the oral limit test does not show acute toxicity at 2,000 mg/kg body weight.

Where an acute toxicity estimate is not available for an individual ingredient of the mixture and the concentration of the ingredient is  $\leq 10\%$  but available information can provide a derived conversion value then the above formula can also be applied: This approach requires substantial supplemental technical information and a highly trained and experienced expert to reliably estimate the acute toxicity.

If the total concentration of the ingredient(s) with the unknown acute toxicity is  $> 10\%$  then the following formula is used which takes into account the percentage of the unknown ingredient in the mixture:

$$\frac{100 - (\sum C_{unknown} \text{ if } > 10\%)}{ATE_{mix}} = \sum_n \frac{C_i}{ATE_i}$$

Similarly, the approach to classifying mixtures as irritant or corrosive to skin when data are available on the components but not on the mixture as a whole is based on the additivity principle. Each corrosive or irritant component contributes to the overall irritant or corrosive property of the mixture in proportion to its potency and concentration. A weighting factor of 10 is used for corrosive components when they are present at a concentration below the concentration limit for classification with Category 1, but are at a concentration that will contribute to the classification of the mixture as an irritant. The mixture is classified as corrosive or irritant when the sum of concentrations of such components exceeds a cut-off value.

### (c) **Concentration limits**

When classifying a mixture based on the hazards of its ingredients, generic cut-off values or concentration limits for the classified ingredients are used for several health and environmental hazard classes. However, where the classifier has information that the hazard of an ingredient will be evident below the generic cut-off value or concentration limit, the mixture containing that ingredient should be classified accordingly. In addition, where conclusive data shows that the hazard of an ingredient will not be evident at a level above the generic cut-off or concentration limit, then the mixture should be classified accordingly. The data must show that the ingredient does not behave in the mixture in a manner that would increase the hazard over that of the pure substance. Documentation that supports the use of any value other than the generic cut-off values or concentration limits must be retained and made available for review on request.

The synergistic effects among the ingredients of a mixture must be taken into account when undertaking a classification. Supporting data must be available should a mixture be classified with a less hazardous category on the basis of antagonistic effects.

The GHS criteria for hazard classification are set out in **Annexures 4 and 5**.

## **2.2.2 South African Requirements and Practice in Respect of Classification**

### **2.2.2.1 Legal framework**

The legislative framework pertaining to classification is set out in the Situation Analysis. A summary of the most pertinent legislation and issues is summarised in Table 2.1 below. It will be noted from the table that there is currently no uniform approach to classification in national legislation. The analysis of the codes referred to in the table below is set out in the subsequent sections.

**Table 2.1: Summary of Legislation Pertaining to Classification**

Act	Classification Provisions	Comment
<b>Environment Conservation Act</b>	Section 20 of the Act deals with waste. In practice, classification is required on the basis set out in the Minimum Requirements Series i.e. by reference to SABS 0228 <sup>6</sup> and the Basel Convention. The Minimum Requirements Series have not been incorporated into law, but in practice acquire legal status through the incorporation in permitting procedures and approvals. The classification system set out in the Basel Convention has been incorporated into regulations.	
<b>Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act</b>	<p>The definition of agricultural remedy expressly excludes any substance which is regulated by the Hazardous Substances Act or the Medicines and Related Substances Control Act, 1965 (Act 101 of 1965). Reference is made to the SABS Code 0228 to determine the hazard classification of the substance. There is some ambiguity in practice as to the ambit of the Act in respect of consumer products. (For example, chlorine used in swimming pools is considered to fall within the ambit of the Act, but products for use in spa baths are not).</p> <p>Although regulations on agricultural remedies contained in GNR 2561, GG 7934, prescribe LD<sub>50</sub> values, the Department indicated that it has recently moved away from supporting a strong focus on the LD<sub>50</sub> test methodology for classification purposes. For the purposes of the regulations, however, classification into one of four groups is provided for, based on the LD<sub>50</sub> values.</p> <p>Fertilizers are classified into either Group I or II (GNR 799, GG 5552).</p>	<p>SABS 0228 is not directly referenced in the current Act or regulations. However, the recently developed SABS 0304<sup>7</sup> Code of the Classification of Pesticides does reference SABS 0228 for transportation purposes. Although SABS 0304 is not currently incorporated in legislation, it is anticipated that this code will be incorporated in the Act as part of the law reform process that is currently being undertaken.</p> <p>Although the Department has indicated that it has moved away from LD<sub>50</sub> values, this shift has not been supported by legislative amendments and the regulations currently in force still refer to LD<sub>50</sub> values.</p>

<sup>6</sup> SABS 0228, recently re-issued as SANS 10228:2003: South African National Standard: The Identification and Classification of Dangerous Goods for Transport, Edition 3, 2003, Pretoria, South Africa

<sup>7</sup> SABS 0304-1\* South Africa Bureau of Standards Code of Practice: The Classification of Pesticides and Stock Remedies for Sale and Handling in South Africa: Part 1: The Classification of Pesticides, Edition 1, 2002, Pretoria, South Africa

Act	Classification Provisions	Comment
	The requirements for each group are set out in the regulations.	
<b>Hazardous Substances Act</b>	<p>The Act makes provisions for declaration of substances into one of four groups. Group I and II consist of any substance or mixture of substances declared as such by notice in the <i>Government Gazette</i> and which, in the course of reasonable handling or use, including ingestion, might by reason of its toxic, corrosive, irritant, strongly sensitising or flammable nature, or because it generates pressure through decomposition, heat or other means cause injury, ill health or death to human beings. (Group I being more hazardous than Group II.) Groups III and IV are not relevant for the purposes of this study.</p> <p>The list of hazardous substances declared as Group I is set out in Government Notice R. 452 of 25 March 1977. The substances contained in SABS 0228 Code of Practice, Class 6.1 - toxic substances - (excluding Appendices E and F) are also included in the Group by reference in the regulations. (Annex E is the alphabetical list of pesticides and Annex F is the generic or N.O.S proper shipping names).</p> <p>Group II substances include all of those substances listed in SABS 0228 with the exception of Class 1 (Explosives) and Class 7 (Radioactive substances),<sup>8</sup></p>	<p>Although SABS 0228 is the primary mechanism used for allocating substances to different hazard groups, the Act does not limit the declarations to SABS 0228.</p> <p>The Act empowers the Minister to exempt certain substances. The GHS does not provide for such exemptions.</p>
<b>Mines Health and Safety Act</b>	No classification system is expressly provided for.	

<sup>8</sup> Although not expressly stated in the regulation, it also presumably excludes Class 6.1 which are identified as being Group I substances.

Act	Classification Provisions	Comment
<b>Occupational Health and Safety Act</b>	<p>The definition of a “<i>hazardous chemical substance</i>” is the same in both the GAR and HCSR i.e. (a) any toxic, harmful, corrosive, irritant or asphyxiant substance or a mixture of such substances for which an occupational exposure limit is prescribed in the Regulations (Annexure A2.1); or (b) such limit is not prescribed but which creates a hazard to health. Reference is made to in the regulation on labelling, packaging, transportation and storage for the need to be classified in terms of SABS 0228,</p> <p>The Explosive regulations provide for Classes 1.1 to 1.6 as defined in SABS 0228.</p> <p>The Major Hazard Installation Regulations do not classify substances.</p>	<p>Although reference is made to classification in the regulation on labelling, packaging, transportation and storage for the need to classify in terms of SABS 0228, the definition of an HCS indicates that an HCS for the purposes of the Act may be broader than those classified in SABS 0228.</p> <p>The chief inspector of explosives classifies substances as explosives. However, the inspector of occupational health and safety may classify or reclassify substances as explosives for the purposes of the regulations. This creates the potential for different lists of classified explosives.</p>
<b>National Road Traffic Act</b>	SABS 0228 is incorporated by regulation.	

### 2.2.2.2 Classification for sale and handling

SABS 0265<sup>9</sup> covers the classification of dangerous goods on the basis of their toxicological, physico-chemical and eco-toxicological properties that constitute a risk during normal sale, handling and use. It specifies the packaging requirements, the labelling requirements and the information supplemented by means of material safety data sheets. This Code of Practice is based on the European Commission Directive<sup>10</sup> relating to the classification, packaging and labelling of dangerous substances. *SABS 0265 is not referenced in legislation and is implemented on a voluntary basis.*

A large number of substances that are normally offered for sale and handling have already been classified. SABS 0265 lists the substances alphabetically, in accordance with the index number, the American Chemical Society’s Abstract Service number (CAS No) and the UN number. Where a substance is not listed the hazard classification is determined on the basis of:

- The physico-chemical properties of the substance; or
- Available results obtained from animal tests.

Preparations can be classified by taking into account:

- The properties of the dangerous components.
- The concentration limits allowed for the dangerous components in the preparation.

<sup>9</sup> SABS 0265:1999: South African Standard Code of Practice: The Classification and Labelling of Dangerous Substances and Preparations for Sale and Handling, First Edition, as amended in 2002, Pretoria, South Africa

<sup>10</sup> European Commission Directive 2000/32/EC of Council Directive 67/548/EEC

- The available results obtained from animal test.
- Conventional assessment by applying an appropriate calculation formula.

Formulae are provided for the classification of preparations as toxic, harmful, corrosive and irritant where the information is available of the individual ingredients and the hazard category into which they are allocated (see **Annexure 2**). The calculation is based on the summation of the quotients of the hazardous ingredients, which are obtained by dividing the percentage (by mass) of each substance by the concentration limit specified for the hazard category of that substance.

A new hazard classification is required if:

- Changes that have been made to the initial concentrations of one or more of the dangerous constituents of a preparation exceed the permitted variation limits (ranging from 2.5 – 15% by mass depending on the initial concentration range).
- The composition of a preparation is changed by the substitution or addition of one or more dangerous constituents.

Classification on the basis of health effects includes both the acute and long-term effects of a substance or preparation, whether the result of a single instance or exposure or a prolonged exposure. Dangerous substances and preparations are classified in accordance with twelve properties and the potentially adverse effects, namely: Explosives; Oxidising substances and preparations; Flammable substances and preparations, Acute toxicity; Corrosive; Irritants; Sensitisers; Carcinogenic; Mutagenic; Toxic to reproduction; Dangerous to the aquatic environment; and, Dangerous to the non-aquatic environment.

### 2.2.2.3 Classification for Transportation

The classification of dangerous goods for transportation is in accordance with SABS 0228 (covers all modes of transport) and the International Maritime Dangerous Goods (IMDG) Code (referenced in maritime legislation). The system is based on the “Recommendations on the Transport of Dangerous Goods” developed by the United Nations Economic and Social Council’s Committee of Experts on the Transport of Dangerous Goods (UN SCETDG). SABS 0228 is applied for classification of chemicals used in the workplace and for waste.

Dangerous goods are assigned to one of nine classes according to the hazard or the most predominant hazards they present, namely explosives; gases; flammable liquids; flammable solids; substances liable to spontaneous combustion, substances that on contact with water emit flammable gases; Oxidising substances and organic peroxides; toxic and infectious substances; Radioactive material; Corrosives; and, Miscellaneous dangerous substances and goods.

SABS 0228 lists the dangerous goods most commonly transported and allocates the class, UN number and packing requirements, as well as any special instructions. Dangerous goods that are not specifically listed by name in the dangerous goods list are classified under a generic or “not otherwise specified” (N.O.S.) name and classified according to the class that most appropriately describes the substance. This requires that the dangerous properties of the substance be determined and then it is classified in accordance with the class definitions and test criteria that cover all the subsidiary risks inherent in the substance. Dangerous goods and substances that cannot be classified into one of the other classes but are nevertheless of dangerous character are classified as Class 9.

If experimental data on the oral and dermal toxicities of a mixture are not available, the classification and packing group assignment can be calculated. Where the mixture contains only one active ingredient and the LD<sub>50</sub> of that constituent is known, the oral and dermal toxicity can be calculated by using the following formula:

$$LD_{50f} = \frac{LD_{50a}}{P_a} \times 100$$

where

$LD_{50f}$  =  $LD_{50}$  value for the mixture

$LD_{50a}$  =  $LD_{50}$  value for the active ingredient

$P_a$  = Percentage (by mass) of the active ingredient in the mixture

There are three possible approaches to determining the oral or dermal toxicities of a preparation that contains several ingredients. Where experimental test data is not available on the mixture, the mixture can be classified according to the most hazardous ingredient as if that constituent were present in the same concentration as the total concentration of all the active ingredients. Alternatively a formula can be applied that takes into account the concentrations of all the constituents classified as toxic:

$$\frac{C_a}{T_a} + \frac{C_b}{T_b} + \frac{C_z}{T_z} = \frac{100}{T_m}$$

where

C = Concentration of constituents a, b, ...z in the preparation as a percentage (by mass)

T = Oral  $LD_{50}$  values of constituents a, b, ...z

$T_m$  = Oral  $LD_{50}$  value of the preparation

The formula can also be used for dermal toxicities, provided that information is available on the same route of toxicity for all constituents.

Mixtures of liquids that are toxic by inhalation can be assigned to packing groups by applying a calculation where test data is not available. The ratio of the volatility to the  $LC_{50}$  of the liquid mixture is determined and depending on the value obtained a danger group is assigned. Ratios  $\geq 10$  are assigned to packing group I, those  $\geq 1$  to packing group II and  $\geq 0.2$  to packing group 3.

The transport sector classification system focuses on acute health effects and physical hazards and does not cover chronic effects due to the types of expected exposures encountered during transportation.

Where substances present multiple risks, classification is based on the most stringent packing group assigned to the respective hazard.

SABS 0228 recommends consultation with the competent authorities should there be any doubt about classification.

#### 2.2.2.4 Classification of Explosives

The Explosives Regulations of January 2003 classify explosives in accordance to SABS 0228 with reference to classes 1.1 to 1.6. Explosives are to be transported and stored in accordance with SABS 0228 and where explosives can be categorised in more than one group, they are deemed to belong exclusively to the higher risk compatibility group.

Proclamation No. 221/1977 of 16 September 1977 (Explosives Act, No. 26 of 1956) defines all chlorates and ammonium nitrates as explosives for packaging and transport purposes. Vehicles transporting chlorates and ammonium nitrate would have to display placards and labels for class 1.1 when transporting the products in South Africa. When exported, the labelling would be changed to

display a 5.1 hazard class. However, this has recently been changed in South Africa and these chemicals are now transported and labelled as 5.1 hazard class products.<sup>11</sup>

### 2.2.2.5 Classification of Agricultural and Stock Remedies

Regulations issued under the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act allocates substances and mixtures to one of four hazard groups according to the LD<sub>50</sub> values. However, in accordance with international developments, guidelines have been developed based on the World Health Organisation (WHO) guidelines<sup>12</sup>, as amended in accordance with South African requirements. These guidelines have been compiled in SABS 0304<sup>13</sup>, which covers the classification of pesticides and stock remedies for sale and handling. Five danger groups have been allocated which are in accordance with the degree of intrinsic toxic properties. An alphabetical list of pesticides for sale and handling in South Africa is given in an annexure, including the common name of the active ingredient,

The classification system allocates five danger groups:

- Danger group Ia – Very severe risk of poisoning
- Danger group Ib - High risk of poisoning
- Danger group II – Moderate risk of poisoning
- Danger group III – Slight risk of poisoning
- Danger group IV – Unlikely to present a risk of poisoning in the course of normal use.

The fourth category Group IV is applied in South Africa for those products that are unlikely to present an acute hazard or risk of poisoning in normal use.

The classification system defines the requirements for labelling of the product, which is based on the degree of toxicity of the remedy. The hazard that is considered is the acute risk to health that might be encountered in the event of an incident. The classification is based on the acute oral and dermal LD<sub>50</sub> values using the toxicity data of an active ingredient as determined by the WHO. If WHO toxicity data are not available, the value of another internationally recognised source is used.

Experimental toxicity data takes precedence over a calculated toxicity value for the classification of a pesticide formulation. In allocating a preparation to a danger group, cognisance is taken of accidental poisoning in humans, any special properties of an individual formulation, any special likelihood of penetration and special biological effects. If there is evidence that shows that the active ingredient produces irreversible damage to vital organs, or is highly volatile, is markedly cumulative in its effect, or is found after direct observations to be particularly hazardous or significantly allergenic to man, then adjustments to the classification can be made by classifying the group indicating a higher hazard. Alternatively, if evidence indicates that the preparation is less toxic or hazardous than expected from consideration of the LD<sub>50</sub> values of the ingredient, the preparation can be classified in a group indicating a lower hazard.

In cases where there no history of poisoning is available, the allocation of a preparation to a danger group is based on data obtained from animal experiments.

Where it is not practical to determine the experimental toxicity of a dry solid preparation that contains a single active ingredient and the LD<sub>50</sub> of the active ingredient is known, the LD<sub>50</sub> of the preparation can be calculated according to the percentage of the active ingredient in the formulation:

<sup>11</sup> Senior Superintendent van Sittert, Chief Inspector of Explosives

<sup>12</sup> The WHO recommended classification of pesticides by hazard and guidelines to classification 1990 – 1991. WHO/PCS/90.1 Rev. 1. International Programme on Chemical Safety, Division of Environmental Health, World Health Organisation.

<sup>13</sup> South African Bureau of Standards. 2002. SABS 0304. The classification of pesticides and stock remedies for sale and handling. Part 1: The classification of pesticides. Part 2: The classification of stock remedies.

$$LD_{50f} = \frac{LD_{50a} \times 100}{P_a}$$

where

$LD_{50f}$  =  $LD_{50}$  value for the preparation (mg/kg)

$LD_{50a}$  =  $LD_{50}$  for the active ingredient (mg/kg)

$P_a$  = Percentage by mass of the active ingredient in the preparation.

Where a preparation contains several active ingredients, the danger group allocation is based on the LD<sub>50</sub> of the preparation as a whole determined by experimental testing. Where it is not practical to determine experimental toxicity data and the LD<sub>50</sub> of each individual active ingredient are known, the LD<sub>50</sub> of the preparation can be summation calculation of the percentage composition of each ingredient and the LD<sub>50</sub>:

$$\frac{100}{T_m} = \frac{C_a}{T_a} + \frac{C_b}{T_b} + \frac{C_z}{T_z}$$

where

C = Percentage concentration (by mass) of active ingredients a, b, ...z in the preparation

T = Oral LD<sub>50</sub> of the active ingredients a, b, ...z (mg/kg)

T<sub>m</sub> = Oral LD<sub>50</sub> of the preparation (mg/kg)

This formula can also be used to calculate the dermal toxicity providing the information is available of the dermal toxicity for each active ingredient.

Where it is not practical to determine the experimental toxicity of a liquid preparation, classification will be undertaken in accordance with the LD<sub>50</sub> of the active ingredient. If more than one active ingredient is present, the preparation is classified in accordance with the most toxic active ingredient.

Special provisions are allocated for the danger grouping of rodenticides for sale and handling:

Danger Group Ia – liquid formulations

Danger group II – single feed formulations

Danger group III – multiple feed formulations.

Before an agricultural remedy containing a new active ingredient may be registered in South Africa, approval must be obtained from the Department of Health (DOH). A Material Safety Data Sheet (MSDS), residue data, specifications and toxicological data are submitted to the Department for evaluation of the data and preparation of a risk assessment and establishing the hazard classification. A register of agricultural and stock remedies and their classification is maintained by the DOH.

Classification is based on the hazard of the active ingredient only and does not take into account the impact of additional hazardous ingredients in the preparation.

### 2.2.3 Classification of Waste

The Department of Water Affairs and Forestry (DWAF) Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste<sup>14</sup> classifies hazardous waste in accordance with SABS 0228. The different aspects of hazardous waste management are based on the principles of SABS 0228. Where the chemical is not listed in SABS 0228, but is dealt with by the Basel Convention, or the Waste Classification Table in the Minimum Requirements, the waste is deemed to be hazardous.

Where a substance is allocated to Class 6 substances, a hazard rating is determined according to the degree of hazard. This is based on Mammalian acute and Chronic toxicity (LD<sub>50</sub>), Eco-toxicity (LC<sub>50</sub>), and Environmental Fate. Based on this hazardous waste is classified as follows:

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<sup>14</sup> Department of Water Affairs and Forestry. 1998. Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste. Second Edition.

- Hazard Rating 1 – Extreme hazard
- Hazard Rating 2 – High hazard
- Hazard Rating 3 – Moderate hazard
- Hazard Rating 4 – Low hazard

The criteria are based on the acute toxicity and acute eco-toxicity as shown in Table 2.2.

**Table 2.2: Toxicity criteria for hazard rating of class 6 substances**

Hazard Rating	LD <sub>50</sub> (mg/kg)	LC <sub>50</sub> (mg/l)
Hazard Rating 1	<5	<1
Hazard Rating 2	5 – 50	1 -100
Hazard Rating 3	50 – 500	10 - 100
Hazard Rating 4	500 – 5 000	100 –1 000

To determine the hazard rating, the Estimated Environmental Concentration (EEC) of the waste is calculated in grams disposed per hectare per month multiplied by a factor of 0.66. If the EEC is higher than the acceptable risk of  $0.1 \times LC_{50}$ , then the waste remains in the originally classified hazard rating. If the EEC is lower than the acceptable risk, the waste may be delisted to a lower hazard rating. The EEC of the most hazardous substance in a waste stream will determine the hazard rating. The hazard rating determines the class of landfill at which a waste is disposed.

#### 2.2.4 Gap Analysis

An analysis of the current practices implemented in South Africa for the classification of dangerous goods and hazardous substances against the requirements of GHS is presented in the table in **Annexure 3**. Current practices include the application of systems that are referenced in the legislation (SABS 0228), as well as those that are currently voluntary initiatives (SABS 0304 and SABS 0265).

#### 2.2.5 Implementation Issues

The GHS provides 16 physical hazards and 10 environmental and health hazards for classification of chemicals. The GHS classifies chemicals according to a set of specified criteria for each class of hazard. Although the competent authorities can decide which of the components of the GHS to apply in different parts of the classification systems to meet the needs and that of the target audiences, wherever a system includes a hazard class that is covered in the GHS then the system must follow the GHS harmonised approach.

Currently, chemicals are classified according to the Hazardous Substances Act, SABS 0228 and SABS 0265. The intention of SABS 0228, which is based on the UN Model Regulations<sup>15</sup>, is to address acute toxicity and physical hazards. In developing the GHS, the UN Model Regulations were used as a basis for the work as they were already substantially harmonised. Thus for the physical hazards, with one exception, SABS 0228 is aligned with the GHS classification although there are more hazard classes defined in the GHS. The exception to the alignment is:

- For flammable liquids, the GHS specifies an upper flash point of 93°C compared with an upper limit of 60.5°C in SABS 0228.

SABS 0265, which covers the classification of chemicals for the purposes of handling and sale, is not aligned to the UN Model Transport Regulations. Only three classes of physical hazard are addressed that take into account the properties of explosivity, oxidising potential and flammability.

The GHS addresses both acute and chronic toxicity. SABS 0228 and SABS 0304 only cover acute toxicity, which is aligned with the acute toxicity class of hazard in GHS with the exception of the

<sup>15</sup> United Nations Recommendations on the Transport of Dangerous Goods: Model Regulations, 12<sup>th</sup> Revised Edition, New York, 2001

exclusion of criteria for inhalation toxicity in SABS 0304. Chronic toxicity is included in SABS 0265 but this is not aligned with GHS in respect of the definition of serious eye damage/eye irritation or hazards to the aquatic environment. In addition, the classes of Target organ systemic toxicity – single exposure and Target organ systemic toxicity – repeated exposure are not included in SABS 0265.

The Hazardous Substances Act allocates chemicals to one of four groups and references SABS 0228 for allocation to group 1 or 2. A methodology for classification of chemicals that are not included in SABS 0228 is not described.

### 2.2.5.1 Key gaps

A number of gaps between the current practice and the GHS have been identified.

- The current practice of hazard classification does not cover all the classes of hazards that are defined in the GHS. In addition, the hazard classes currently applied are not harmonised in all the sectors and along the life cycle of the chemical.
- GHS specifies cut-off concentration limits for health and toxicity hazards above which impurities, additives or individual constituents that have themselves been classified, must be taken into account during classification. If the classifier has information that the hazard of the ingredient below the generic cut-off values/concentration limits, the mixture is to be classified accordingly. SABS 0228 and SABS 0304 currently base the classification of a mixture on the active ingredient and do not take into account other constituents that may be classified as hazardous. Alignment with GHS would require the hazardous properties of a substance or mixture to be identified and compared with the criteria defined for GHS to determine the hazard class of the chemical.
- Classification of preparations in the GHS for health and environmental hazards implements bridging principles where the mixture itself has not been tested but sufficient information is available on the individual ingredients. Where insufficient information is available on the individual ingredients, formulae are specified based on the concentration of each component. The principles of bridging principles are currently not formalised in the classification systems currently applied.
- For many classes in GHS the criteria are semi-quantitative or qualitative and expert judgment is required to interpret the data for classification purposes. The classification process needs to be standardised so that results are reproducible.
- The observation of the effects of chemicals on humans in the event of accidental poisoning relies on the availability of occupational data and accident databases. Centralised information on accidents and incidents impacting on human health is limited.

### 2.2.5.2 Discretionary Issues

The GHS document allows competent authorities to decide on how to apply the various elements of the GHS based on the needs of the competent authorities and the target audience. As long as the hazards covered by a sector or system are covered consistently with the GHS criteria and requirements, it will be considered appropriate implementation of the GHS. For transport, it is expected that application of the GHS will be similar to application of current transport requirements while in the workplace, it is expected that all of the GHS elements will be adopted. The decision to amend the current classification systems to include additional classes of hazard that are included in the GHS may depend on the recommendations that are made by organisations such as the Food and Agriculture Organization of the United Nations (FAO) and the UN Committee of Experts on the Transport Of Dangerous Goods (UN CETDG). A FAO meeting is to be held in June 2003 at which the GHS is to be discussed and its implementation for agricultural products. In addition, the UN CETDG is to meet during July 2003 to discuss issues relating to the implementation of GHS within the transport sector.

### 2.2.5.3 Legislative implications

A comparison between current South African legislative requirements in respect of classification and the GHS requirements indicate several gaps. These are summarised below.

- Hazard classification requirements in South African law are not dealt with uniformly or comprehensively in all the sectors contemplated in the GHS document (see Table 2.1 and **Annexure 3**). The approach to the “classification” of substances for the purposes of the legislation referred to above differs. For example, the Hazardous Chemical Substances Regulations (HCSR) base the identification of substances falling within the scope of the regulations on the potential to cause hazard (i.e. the exposure level) whereas the Major Hazard Installation Regulations adopt an approach of looking at consequences of installations and substances in terms of their potential to constitute a “*major incident*”. These differences tend to reflect the underlying objective of each Act. Furthermore, the terminology used is not consistent – legislation refers variously to hazardous chemical substances, hazardous substances and dangerous goods.
- Although there has been a move towards streamlining the classification of chemicals through the application of SABS 0228 by incorporation in legislation (see Table 2.1 and **Annexure 3**), certain legislation either has additional identification procedures, or no specified procedures. For example, the Occupational Health and Safety Act (OHSA) HCSR refer both to an annexure to the regulations or any substance which creates a hazard to health and the Minimum Requirements Series (which do not have the force of law, but are implemented through permitting procedures) deal with waste classification by reference to SABS 0228 and the Basel Convention. Furthermore, there may be overlaps and more than one classification mechanism for the same substance. For example, although explosives may be classified in terms of the Explosives Act, the Chief Inspector of Occupational Health and Safety may, *inter alia*, reclassify for the purposes of the explosive regulations in terms of the OHSA.
- Some legislation does not explain what is meant by classification or what process should be followed. For example, the definition of a hazardous chemical substance (HCS) in the OHSA and the lack of reference in the Mines Health and Safety Act. Classification, especially in the OHSA underpins the application of the regulations. In other words, the objectives of certain legislation can only be achieved, *inter alia*, if it is clearly understood what chemicals fall within the scope of the legislation. This means that a clearly understood approach to classification of chemicals is important. However, many of the Acts do not define classification or provide an indication of the methodology to be used in classifying chemicals for the purposes of the Act.
- Notwithstanding the move to using SABS 0228 to provide for consistency, it should be noted, however, that SABS 0228 does not comply fully with the requirements of the GHS.
- Furthermore, certain of the Acts have either not kept pace with standards that have been developed or have not specified sufficient detail. In this regard, pesticides are *de facto* classified according to SABS 0304 although this is not incorporated in legislation. Notwithstanding this there are some areas in which SABS 0304 does not comply with GHS requirements and would therefore require amendment. SABS 0265 is also used in practice in respect of sale and handling, but has not legislative standing. It is anticipated that SABS 0304 will be incorporated in the Act as part of the law reform process that is currently being undertaken by National Department of Agriculture (NDA).
- To the extent that SABS 0265 is used in practice, it is noted that it is not incorporated into legislation and is accordingly not binding or enforceable. The code also has several discrepancies with the GHS system and can therefore not be used to achieve compliance with the GHS requirements.
- Most of the Acts contain an empowering provision enabling the relevant Minister to exempt substances from the provisions of the Act. The exercise of such powers has the potential to conflict with the requirements of the GHS and would therefore require checking against the GHS prior to any such regulations being passed.

## 2.3 Criteria for Classification

### 2.3.1 GHS Baseline

The GHS system provides harmonised criteria for classifying substances and mixtures according to their health, environmental and physical hazards. Classification criteria are presented for each specific hazard class or a group of closely related hazard classes.

### 2.3.2 South African Requirements and Practice in Respect of Classification Criteria

#### 2.3.2.1 Legal Framework

The legislative position on criteria has been discussed in the section on classification and is not repeated here.

#### 2.3.2.2 Criteria for the Classification for Sale and Handling

The criteria for the classification of dangerous substances and preparations for sale and handling are set out in SABS 0265 and included in the Gap Analysis in **Annexure 4**.

#### 2.3.2.3 Criteria for the Classification for Transportation

The criteria for the classification of dangerous goods for transportation are set out in SABS 0228 and the IMDG Code and included in the Gap Analysis in **Annexure 4**.

#### 2.3.2.4 Criteria for the Classification of Agricultural and Stock Remedies

The criteria that are referenced in the Regulations issued under the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act are set out in Table 2.3.

**Table 2.3: LD<sub>50</sub> values for the classification of agricultural remedies in respect to toxicity and potential hazards (Regulation 12)**

Group	Oral (mg/kg)	Dermal (mg/kg)	Inhalation (mg/l/h)
I	≤ 50	≤ 200	≤ 2
II	>50 ≤ 500	> 200 ≤ 2,000	>2 ≤ 20
III	> 500 ≤ 5,000	> 2,000	> 20 ≤ 200
IV	> 5 000	> 2,000	> 200

In practice SABS 0304 is currently applied for the classification of agricultural and stock remedies. Five danger groups are allocated for agricultural and stock remedies. The danger grouping is based on the LD<sub>50</sub> toxicity data of the active ingredient. The danger criteria grouping are applicable to the labelling and marking requirements for the purposes of sale and handling only. Classification for the purposes of transportation is in accordance with SABS 0228. The criteria for the five danger groups are compared with the GHS criteria in the Gap Analysis in **Annexure 5**.

Allowance is made for the lower hazard associated with a solid remedy compared to liquids. The classification does not include inhalation toxicity as under most conditions of outdoor use, absorption is more often via the skin or oral routes than by inhalation.

### 2.3.3 Gap Analysis

A gap analysis between the criteria for the classification of hazardous substances and mixtures specified by the GHS and the criteria specified for the classification of dangerous goods and hazardous substances in South Africa (SABS 0265 and SABS 0228/IMDG Code) is presented in the table in **Annexure 4**. Current practices include the application of systems that are referenced in the legislation (SABS 0228/IMDG Code), as well as those that are currently voluntary initiatives (SABS 0265). As SABS 0304 only includes the hazard category for acute toxicity, the criteria that are set out in the SABS Code of Practice are evaluated against GHS criteria for the acute toxicity hazard category in the table in **Annexure 5**.

### 2.3.4 Implementation Issues

The GHS specifies criteria against which the physical, environmental and health hazard properties of a substance or preparation must be compared to allocate the hazard class. In developing the GHS, the UN Model Regulations were used as a basis for the work as they were already substantially harmonised.

The hazard classes for which criteria differ from those specified in the GHS are summarised in Table 2.4 below.

**Table 2.4: Hazard classes for which South African criteria differ from those specified in the GHS**

SABS 0265	SABS 0228/IMDG Code	SABS 0304
Explosives		Acute toxicity
Flammable liquids, Category 1, 3 and 4	Flammable aerosols	
Flammable solids	Compressed gases	
Oxidising liquids	Flammable liquids, Category 1, 3 and 4	
Organic peroxides	Acute toxicity	
Acute toxicity	Corrosive – criteria for preparations	
Corrosive – criteria for preparations		
Skin irritation Category 2		
Serious eye damage/eye irritation		
Germ cell mutagenicity Category 2		
Carcinogenicity, Category 2		

Reproductive toxicity		
Hazardous to the aquatic environment – Criteria for mixtures		

In addition, criteria are currently not provided in existing systems for the GHS classes of - Effectson lactation; Specific organ systemic toxicity – single exposure; Specific organ systemic toxicity – repeat exposure; and Hazardous to the aquatic environment – chronic toxicity categories.

#### 2.3.4.1 Key gaps

The key gaps identified in the criteria currently applied and GHS that will require intervention by the competent authorities are as follows:

- The current practice of hazard classification does not cover all the classes of hazards that are defined in the GHS. In addition, the hazard classes currently applied are not harmonised in all the sectors and along the life cycle of the chemical.
- The criteria specified in the GHS, including the bridging principles and calculation of hazards of mixtures, are not fully aligned with those currently applied in SABS 0228/IMDG Code, SABS 0265 and SABS 0304. The gaps are summarised in the table above.
- Chemicals will have to be re-classified in accordance with GHS against the GHS criteria. Re-classification will require expert judgment of a highly trained and experienced expert to be applied where the criteria are different from the existing systems in place or for the verification of data from older studies.

#### 2.3.4.2 Legislative implications

A comparison between current South African legislative requirements in respect of criteria and the GHS requirements indicate the following implementation issues:

- SABS 0228 does not comply with GHS requirements for criteria in all respects. Because the code has been incorporated into legislation, it will require amendment and/or revision to ensure compliance with the GHS.
- As indicated in the section on classification, the legislation is not consistent in its approach to classification and the approach followed is based on mechanisms other than GHS. Similarly, the criteria used in the different approaches to classification vary. In this regard, some legislation implies a classification system, but because the system is not detailed, criteria are not clear. In these instances, the criteria are described in very general ways, usually in the definitions. For example:
  - the HCS and GAR regulations refer to (a) any toxic, harmful, corrosive, irritant or asphyxiant substance or a mixture of such substances for which an occupational exposure limit is prescribed in the Regulations (Annexure A2.1); or (b) such limit is not prescribed but which creates a hazard to health;
  - the Hazardous Substances Act refers to the power to declare a substance as a Group I or II substance where in the course of reasonable handling or use, including ingestion, might by reason of its toxic, corrosive, irritant, strongly sensitising or flammable nature, or because it generates pressure through decomposition, heat or other means, cause injury, ill health or death to human beings; and
  - the Explosive regulations under the Occupational health and Safety Act give the Chief Director a broad power to classify or reclassify without defining the criteria.

## 2.4 Test Methods

### 2.4.1 GHS Baseline

The GHS prescribes *physico-chemical* test methods for hazardous substances and mixtures. The prescribed test methodologies are referenced in the GHS Document ST/SG/AC.10/C.4/2002/16 (Oct. 2002). The majority of test methods prescribed are taken from the *UN Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria (3<sup>rd</sup> Revised Edition, 1999)*. Certain test methodologies have not yet been finalised but the UN intends publishing the 4<sup>th</sup> Revised Edition of the *Manual of Tests and Criteria* in October 2003. In addition, a number of other test methods are referenced, for example ISO 10156: 1996; ISO 1523; ASTM G31-72; and ASTM D 56-93.

The GHS does not prescribe mandatory test methods for *health and environmental hazards*. Test methodologies that determine hazardous properties, which are conducted according to internationally recognised scientific principles, are considered acceptable. While the Organisation for Economic and Co-operation Development (OECD) is the lead organisation for developing harmonised health hazard criteria, the GHS is also not prescriptive about the OECD Test Guidelines Programme. According to the general principles of the GHS, test data already generated for the classification of chemicals under existing systems are accepted when classifying these chemicals under the harmonised system, thereby avoiding duplicate testing and the unnecessary use of test animals.

Where possible and appropriate, tests and experiments that do not require the use of live animals are preferred to those using sentient live experimental animals. To that end, for certain hazards (skin and eye irritation/corrosion or serious damage) testing schemes starting with non-animal observations/measurements are included as part of the classification system. For other hazards, such as acute toxicity, alternative animal tests, using fewer animals or causing less suffering are internationally accepted and are preferred to the conventional LD<sub>50</sub> test.

The GHS explicitly acknowledges the existence and use of all appropriate and relevant test method information concerning hazards or the likelihood of harmful effects (i.e. risk), viz. ethically obtained human data or available human experience.

### 2.4.2 South African Requirements and Practice in Respect of Test Methods

#### 2.4.2.1 Legal framework

Apart from the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, South African legislation does not expressly detail test methods. However, in certain Acts, SABS 0228 (which reference test methods) is incorporated into the legislation. These Acts include the National Road Traffic Act and the OHS Act. The IMDG Code is incorporated into the Merchant Shipping Act. The incorporation of the SABS 0228 Code of Practice has been set out in more detail in Section 2.2: Hazard Classification). The regulation GNR 2561, GG 7934 on agricultural remedies passed in terms of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act prescribe LD<sub>50</sub> values. However, the NDA has recently moved away from supporting a strong focus on the LD<sub>50</sub> test methodology for classification purposes. For the purposes of the regulations, however, classification into one of four groups is provided for based on the LD<sub>50</sub> values.

SABS 0228 references test methods for the following (also refer to **Annexure 6**):

- explosives of class 1;
- gasses of class 2;
- flammable liquids of class 3, including: flash point, viscosity; solvent separation; and combustibility.
- substances of class 4, including test methods for readily combustible solids and solids that can cause, or contribute to, fire through friction; substances liable to spontaneous combustion; test methods for water reactive substances;

- oxidizing substances and organic peroxides of class 5
- toxic and infectious substances of class 6
- radioactive material of class 7
- corrosive substances of class 8
- miscellaneous dangerous substances and goods of class 9, including test methods for ammonium nitrate fertilizers capable of self-sustaining decomposition; and test methods for lithium batteries

### 2.4.2.2 Gap Analysis

**Physico-chemical test methods:** A gap analysis between the test methods for the classification of hazardous substances and mixtures specified by the GHS and the test methods specified for dangerous goods and hazardous substances in South Africa (SABS 0228 and SABS 0265) is presented in **Annexure 6**. Current practices include the application of systems that are referenced in the legislation (SABS 0228), as well as those that are currently voluntary initiatives (SABS 0265).

**Health and environmental test methods:** A comparison between the discretionary test methods for the classification of hazardous substances and mixtures by the GHS and the test methods for dangerous goods and hazardous substances required in South Africa (SABS 0228, SABS 0265 and SABS 0304) is presented in the table in **Annexure 7**. Current practices include the application of a voluntary initiative (SABS 0265) for acute toxicity, as well as impacts both on the aquatic and non-aquatic environment (SABS 0265). SABS 0304 only includes reference to test methods for acute toxicity. SABS 0228 includes a test methodology for Class 6 Toxic substances.

The gap analysis in this section focuses on the test method/methodology *per se*. When applying the test method, there may be variances in the specific criteria being tested for. The gaps in criteria are extensively dealt with in the section on Classification Criteria, Section 2.3 and **Annexures 4 and 5**.

## 2.4.3 Implementation Issues

### 2.4.3.1 Key gaps

The physico-chemical test methods currently applied for hazardous substances and mixtures in South Africa (SABS 0228 and SABS 0265) are not fully aligned with those prescribed by the GHS, e.g. in the category *Flammable Liquids* the SABS 0228 test method is similar but the test procedure is not identical to the GHS method (the upper flash point of the GHS method is 93°C compared to 60.5°C for SABS 0228 test method). Furthermore, the GHS prescribes the use of the methods as per *The UN Manual: Tests and Criteria (3<sup>rd</sup> Ed.)*, but the *Manual* does not as yet provide certain test method, e.g. it only reserves Section 37 for a future test method in the category *Corrosive to Metals*.

South African companies are either able to test for physical properties of new formulations or mixtures or access local expertise in this regard. Larger South African companies and Multi-National Companies have appropriate facilities and/or resources to undertake such testing.

The discretionary test methodologies for environmental and health hazard properties proposed in the GHS are not fully aligned with those currently required by SABS 0228, SABS 0265 and SABS 0304. Since these methodologies are discretionary, i.e. any scientifically acceptable international methodologies are accepted by the GHS, and hence no changes would be required. However, the following requires attention:

- *Specific Target Organ Systemic Toxicity – Single & Multiple Exposure:* Neither SABS 0265 or SABS 0304 provide for this test methodology.
- *Hazardous to the Aquatic Environment:* SABS 0265:1999 does not provide appropriate test methodologies for Bioaccumulation Potential and Chronic Aquatic Toxicity.

A limited number of research laboratories in South Africa have capacity to undertake toxicity testing for new substances or mixtures. Currently one commercial laboratory in South Africa is working toward accredited with the South African National Accreditation System (SANAS) to undertake toxicity testing.

In the main the international companies providing that undertake the original research and development for the formulations or mixtures, undertake the toxicity testing. Thus proprietary technology is accompanied by details of test results on the chemical processes and substances utilised. In order to comply with the requirements of the GHS in the future, laboratories that wish to undertake these analyses, both in the larger companies as well as commercial laboratories will have to be accredited with SANAS. The high costs associated with access to toxicity test methodology documentation, as well as the significant costs to undertake these tests may present a barrier to medium to small companies.

#### 2.4.3.2 Legal implications

A comparison between current South African legislative requirements in respect of test methods and the GHS requirements indicate the following legal implementation issues:

- SABS 0228, which has been incorporated in certain legislation, does not comply with GHS requirements for test methods in all respects.
- SABS 0265 and SABS 0304, which set out test methodologies for hazard substances and mixtures, are not referenced in legislation.

## 2.5 Hazard Communication: Labelling

### 2.5.1 GHS Baseline

The GHS harmonised system for hazard communication includes labelling tools to convey information about each of the hazard classes and categories in the GHS.

A “label” is defined as *an appropriate group of written, printed or graphic information elements concerning a hazardous product, selected as relevant to the target sector(s) that is affixed to, printed on, or attached to the immediate container of a hazardous product or to the outside packaging of a hazardous product.*

The GHS has identified the needs of the target audiences that will be the primary end-users of the harmonized hazard communication scheme. *Employers and workers* need to know the hazards specific to the chemicals used and/or handled in the workplace, as well as information about the specific protective measures required to avoid the adverse effects that might be caused by those hazards. For *consumers*, the label in most cases is likely to be the sole source of information readily available to the consumer, which must therefore be sufficiently detailed and relevant to the use of the product. *Emergency responders* need accurate, detailed and sufficiently clear information for immediate responses. Such personnel are highly trained in the use of graphical and coded information. *Transport workers* need information concerning general safe practices that are appropriate for all transport situations. It is recognised that there will be circumstances where the demands and rationale of the systems may warrant some flexibility in whether to incorporate certain hazard classes and categories for certain target audiences. It is further recognised that as the UN Model Regulations provide label information primarily in a graphic form, that the UNSCETDG may choose not to include signal words and hazard statements as part of the information provided on the label under the Model Regulations.

For labels, the hazards symbols, signal words and hazard statements have all been standardised and assigned to each of the hazard categories. *Precautionary information* was considered for standardisation but this has not yet been finalised. Competent authorities may require additional information or suppliers may choose to provide additional information. However, in order to ensure that the use of non-standardised information does not lead to a wide variation in information or undermine the GHS information, the use of supplementary information is to be limited to the following circumstances:

- The supplementary information provides further detail and does not contradict or cast doubt on the validity of the standardised information; and
- The supplementary information provides information about hazards not yet incorporated into the GHS.

The hazard statement should be used as the mechanism to convey supplementary information regarding the hazard, such as the physical state or route of exposure, rather than in the supplementary information section on the label.

Nine standard *hazard symbols* are to be used in the GHS. With the exception of the new symbol that will be used for certain health hazards, the exclamation mark and the fish and tree, the symbols are part of the standard symbol set used in the UN Recommendations on the Transport of Dangerous Goods, Model Regulations.

The *pictogram* is in the shape of a square set at a point. For transport the pictograms prescribed by the UN Model Regulations on the Transport of Dangerous Goods are used. The UN Model Regulations prescribe transport pictogram specifications, including colour, symbol, size, background, contrast, additional safety information and general format. Pictograms prescribed by GHS but not the UN Recommendations on Transport of Dangerous Goods, Model Regulations, have a black symbol on a white background with a red frame sufficiently wide to be clearly visible. When the label is used on a package that will not be exported, the competent authorities may choose to give suppliers and employers discretion to use a black border. In addition, the competent authorities may allow the use of UN Recommendations on the Transport of Dangerous Goods, Model Regulations pictograms in other use settings where the package is not covered by the Regulations.

Regarding the allocation of the label elements, the information required for packages covered by the UN Regulations on the Transport of Dangerous Goods is defined in the GHS document. Where a UN Model Regulation pictogram appears on a label, a GHS pictogram for the same hazard should not appear. The GHS pictograms not required for the transport of dangerous goods should not be displayed on freight containers, road vehicles or railway wagons.

A *signal word* is used to indicate the relative level of severity of hazard and alert the reader to a potential hazard. The signal words used in the GHS are “Danger” and “Warning”. Danger is used for the more severe hazards and warning for the less severe.

A *hazard statement* means a phrase assigned to a hazard class and category that describes the nature of the hazard, including the degree of hazard where appropriate. All assigned hazard statements should appear on the label. The competent authorities may choose to specify the order in which they appear.

A *product identifier* should be used on a GHS label, which should match the product identifier used on the Safety Data Sheet (SDS). Where a substance or mixture is covered by the UN Model Regulations, the UN proper shipping names should be used. The label for a substance should include the chemical identity of the substance. For mixtures or alloys the label should include the chemical identities of all ingredients or alloying elements that contribute to a GHS health hazard when these hazards appear on the label. Alternatively, the competent authorities may require the inclusion of all ingredients or alloying elements that contribute to the hazard of the mixture or alloy. Where a substance is supplied exclusively for workplace use, the competent authorities may choose to give suppliers discretion to include chemical identities on the SDS rather than the label.

*Supplier information* is to be provided on the label, including the name, address and telephone number of the manufacturer or supplier of the substance or mixture. GHS does not specify that local telephone contact numbers have to be displayed.

For substances and mixtures covered by the UN Model Regulations, the precedence of symbols for physical hazards should comply with the rules in the Regulations. In workplace situations, the competent authorities may require all symbols for physical hazards to be used. For health hazards, the following principles of precedence apply:

- If the skull and crossbones applies, the exclamation mark should not appear;
- If the corrosive symbol applies, the exclamation mark should not appear where it is used for skin or eye irritation; and
- If the new health hazard symbol appears for respiratory sensitisation, the exclamation mark should not appear where it is used for skin sensitisation or for skin or eye irritation.

The GHS hazard pictogram, signal word and hazard statements should be located together on the label. The competent authorities may choose to provide a specified layout for the presentation of these and precautionary information or allow supplier discretion. The competent authorities may choose to allow the use of colour in other areas of the label to implement special labelling requirements for signal words and hazard statements or as background to them. This could include the use of colour for the pesticide bands as specified in the FAO labelling guide, or as otherwise provided for by the competent authorities.

The competent authorities may choose to allow communication of certain hazard information for carcinogens, reproductive toxicity and target organ systemic toxicity repeat exposure on the label and the SDS or through the SDS alone. Similarly the competent authorities may choose to allow communication of hazards for metals and alloys supplied in massive non-dispersible form through the SDS alone.

The GHS label should be maintained on the supplied container in the workplace, as well as any container that is used. The competent authorities can allow employers to use alternative means of giving workers the same information in a different written or displayed format if this is more appropriate to the workplace and communicates the information as effectively as the GHS label. Where it is impractical to attach a complete label to a container in the workplace, decanted chemicals intended for immediate use can be labelled with the main components and reference made to the supplier label information or SDS.

For consumer product labelling, the competent authorities may authorise risk based labelling systems. If this system is authorised, the competent authorities should establish procedures for determining the potential exposure and risk for use of the product. Labels based on this approach provide targeted information on identified risks but may not include certain information on chronic health effects that would be displayed on a label based on hazard alone.

Where tactile warnings are used, the technical specifications should conform to ISO 11683 (1997) relating to tactile warning of dangers.

Where labels are translated, the words and phrases must retain their comprehensibility and convey the same meaning.

Labels are to be updated when new and significant information is obtained about the hazard of a chemical that results in a change in the classification. The competent authorities may choose to specify a time limit within which information should be revised. However, in pesticide labelling systems where the label is part of the product approval mechanism, suppliers cannot independently update labels. Suppliers should also periodically review the information on which the label is based. The competent authorities may choose to specify a time (typically 3 – 5 years) from the date of original compilation.

#### **2.5.1.1 Confidential Business Information**

The protection of confidential business information (CBI) should not compromise the effectiveness of the GHS in the protection of health and safety of workers, the public and the protection of the environment. Where provision is made for the protection of CBI, the competent authorities should establish mechanisms in accordance with national law and practice, taking into consideration the following:

- Whether the inclusion of certain chemicals or classes of chemicals in the arrangements is appropriate to the needs of the system;

- What definition of “CBI” should apply, taking into account factors such as the accessibility of information by competitors, intellectual property rights and the potential harm disclosure would cause the employer or suppliers’ business; and
- Appropriate procedures for the disclosure of confidential business information, where necessary to protect the health and safety of workers or consumers of to protect the environment and measure to prevent further disclosures.

The following principles should be followed with regard to the protection of business information:

- CBI should be limited to the names of chemicals and their concentrations in mixtures. All other information should be disclosed on the label;
- Where CBI has been withheld, this should be indicated on the label;
- CBI should be disclosed to the competent authorities upon request. The competent authorities should protect the confidentiality of the information in accordance with applicable law and practice;
- Where a medical professional determines that a medical emergency exists due to exposure to a hazardous chemical or a chemical mixture, mechanisms should be in place to ensure timely disclosure by the supplier or employer or competent authorities of any specific confidential information necessary for treatment. The medical professional should maintain the confidentiality of the information;
- For non-emergency situations, the supplier or employer should ensure disclosure of confidential information to a safety or health professional providing medical or other safety and health services to exposed workers or consumers, and to workers of worker’s representatives. Persons requesting the information should provide specific reasons for the disclosure and should agree to use the information only for the purpose of consumer or worker protection and to otherwise maintain its confidentiality; and
- When non-disclosure of confidential business information is challenged, the competent authorities should address such challenges or provide for an alternative process for challenges. The supplier or employer should be responsible for an alternative process for challenges. The supplier of employer should be responsible for supporting the assertion that the withheld information qualifies for CBI protection.

## 2.5.2 South African Requirements and Practice in Respect of Labelling

This section outlines the legislation and practices pertaining to labelling in South Africa.

### 2.5.2.1 Legal framework

The legislative framework pertaining to labelling was set out in the Situation Analysis. A summary of the most pertinent legislation and issues is summarised in Table 2.5 below. It will be noted from the table that there is no unified approach to labelling in the legislation. The sectors of transport and agriculture have extensive provisions for the regulation of labelling, whilst there is very limited regulation of labelling in the industrial sector (including the workplace) and consumer sector. The analysis of the codes referred to in the table below is set out in the subsequent sections.

**Table 2.5: Summary of Legislation Pertaining to Labelling**

Act	Labelling provisions	Comment
<b>Hazardous Substances Act</b>	Section 29 empowers the Minister to make regulations regarding, <i>inter alia</i> , Group I and II substances including the packaging and labelling of Group I and II substances.	Although the Act provides for the comprehensive regulation of hazard communication, to date the Minister has used these powers sparingly.  Regulations in respect of the disposal of empty containers used for Group I substances. (GG5467, R543 dated 25 March 1977) stipulate that where a container does not have a label stating

Act	Labelling provisions	Comment
		that it must be returned to the supplier, it must be perforated, flattened and buried in the ground or disposed of in any other safe manner.
<b>Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act</b>	<p>The Act contains several provisions of relevance to labelling i.e.</p> <ul style="list-style-type: none"> <li>• the sale (which includes manufacture, advertise, distribution and disposal) of agricultural products is prohibited unless, <i>inter alia</i>, it is labelled or marked as may be prescribed, and if it is not in a container, it is accompanied by an invoice complying with the provisions of section 9 and its composition complies with the requirements.</li> <li>• Details of the requirements regarding containers, packaging and labelling have been prescribed in GNR 1449 and GNR 799 for fertilizers,<sup>16</sup> and in GNR 1449, GNR 1375 and GNR 2561<sup>17</sup> for agricultural remedies. The labelling requirements of agricultural remedies are based on the WHO system, with the exception of the fourth group which is not explicitly provided for in the WHO guidelines.</li> <li>• Details of the labels must be submitted with all applications for registration or renewal of registration.</li> <li>• Labelling requirements in respect of products which are sold to the public may have limited information owing to the container size, but are required to have a pamphlet insert.</li> </ul>	<p>The requirement that agricultural products that are not sold in containers be accompanied by an invoice instead of a label is not compliant with the GHS. GHS makes provision for alternative systems to be used to convey information in the workplace where it is not possible to produce a complete label for decanted products. However, this is applicable only for situations where the decanted chemicals are for immediate use and not when sold.</p> <p>The GHS does not make provision for the use of package inserts for products intended for sale. With regard to consumer labelling, the GHS recognises that the label may be the sole source of information and must be sufficiently detailed and relevant to the use of the product.</p> <p>It is understood that the regulations pertaining to labelling are not enforced as they have been superseded in practice by a guideline on labelling.</p>
<b>Occupational Health and Safety Act</b>	<p>The HCSR place the employer under an obligation to ensure that contamination of HCS does not take place by taking steps to ensure that –</p> <ul style="list-style-type: none"> <li>• the hazardous chemical substance in storage or distributed is properly identified, classified and handled in accordance with SABS Code 072 and SABS Code 0228;<sup>18</sup></li> <li>• a container or vehicle in which hazardous chemicals are transported is clearly identified, classified and packed in accordance with SABS Code 0228 and SABS Code 0229;</li> <li>• any container into which a hazardous chemical substance is decanted is clearly labelled with regard to the contents thereof;<sup>19</sup> and</li> <li>• SABS 072:1993 outlines the precautions to be taken when pesticides are handled, including at storage facilities. Pesticide storage facilities are to be demarcated with the appropriate safety signs and warning pictograms displayed. The warning notices are to be in both official languages (English and Afrikaans at the time of publishing the Code of Practice) and in at least one language indigenous to the region that are legible from a distance of 8m and bear a skull and crossbones. The code indicates that packages and containers are to be clearly, indelibly and correctly labelled.</li> </ul>	<p>The regulation does not provide the detail of labelling requirements, either directly or by incorporation of relevant SABS codes.</p> <p>Although SABS 072 indicates that packages and containers are to be clearly and correctly labelled, it does not specify how this should be done.</p>
<b>National Road Traffic Act</b>	<p>Regulations to the Act incorporate, <i>inter alia</i>, SABS 0232-1 "Transportation of dangerous goods - Emergency information systems". Part 1: "Emergency information system for road</p>	None

<sup>16</sup> GG8783, 31 July 1983 and GG5552, 20 May 1977, as amended

<sup>17</sup> GG3629, 11 August 1972 and GG7934, 27 November 1981 (as amended)

<sup>18</sup> Note that the SABS codes are in the process of being renamed and numbered. However, for the sake of clarity and consistency, the code reference as reflected in legislation is used in this report.

<sup>19</sup> Regulation 14

Act	Labelling provisions	Comment
	<p>systems", Part 1: "Emergency information system for road transportation" which details labelling requirements for placards, which are based on the UN recommendations.</p> <p>SABS 0232-2 – "Transportation of dangerous goods - Emergency information systems", Part 1: "Emergency information system for rail transportation" which details labelling requirements for placards to be displayed on wagons and containers, which are based on the IMDG Code.</p>	
<b>Merchant Shipping Act</b>	GNR 1904, GG 16068, 11 November 1994 (as amended) incorporates the IMDG codes which specify the placarding requirements for containers to be transported by sea.	None

### 2.5.2.2 Sale and handling

SABS 0265 covers the labelling of dangerous substances and preparations for sale and handling to indicate the main hazards and precautions associated with them in order to protect the user, the general public, property and the environment. The code has not been incorporated in legislation and therefore is not enforceable. In terms of the code, each label contains the following information:

- The name and the complete address of the supplier, the manufacturer, the distributor or importer.
- The name of the substance as listed in the Annexure or where not listed in accordance with internationally recognised nomenclature.
- The nominal quantity, mass or volume of the contents.
- The batch identification.
- The danger symbol and an indication of the danger involved in the handling and the use of the substance or preparation. The danger symbol is in the form of a square that covers at least 1/10 of the surface of the label. The symbol is printed in black on an orange-yellow background (See Table 2.6).
- Standard phrases indicating the special risks that arise from such dangers.
- Standard phrases containing safety advice with regard to the use of the substance.
- The SIN (UN number) and hazard class in accordance with SABS 0228.
- Any additional information required in terms of the regulations promulgated.

A preparation that contains substances classified as very toxic, toxic, harmful, corrosive, skin and respiratory sensitisers, present in concentrations that equal or exceed the lowest hazard limit or specified limits for each of the substances shall be displayed. Preparations that contain substances that can cause irreversible effects, mutagens and carcinogens must display the chemical names.

Only those substances that are present in a preparation at a concentration that equals or exceeds the lower hazard limit are to be displayed. If the disclosure of the chemical identity of a harmful substance will put the confidential nature of a preparation at risk, reference to that substance by means of a name that identifies the most important functional chemical groups or by means of an alternative name is permissible.

The package is to be accompanied by safety advice in the form of an insert or a MSDS on the use of the substances or preparation if it is physically impossible to include the advice on the label of the package.

Appropriate pictograms in the form of a square are depicted on the label in conjunction with the risk and safety phrases pertaining to the product. The pictogram is printed in black on a white background.

The danger symbol is to be printed in black on an orange-yellow background. The symbol is in the form of a square that covers at least 1/10 of the surface of the label but not smaller than 10 mm x 10 mm.

**Table 2.6: Hazard Class and Label Element Specified in SABS 0265**

Hazard	Danger Symbol
Explosive	Exploding bomb
Oxidising	Flame over circle
Flammable	Flame
Toxic	Skull and crossbones
Corrosive	Liquid burning hand and metal
Harmful/irritant	St. Andrew's cross
Dangerous to the environment	Tree and fish

Should more than one danger symbol be assigned to a substance, the following symbols take precedence:

- The toxic symbols take precedence over the corrosive, harmful and irritant symbols.
- The corrosive symbol takes precedence over the harmful and irritant symbols.
- The explosive symbol takes precedence over the flammable and oxidising symbols.
- The harmful symbol takes precedence over the irritant symbol.

The following are exempt from labelling requirements:

- Munitions and explosives placed on the market to produce a practical effect by explosion or a pyrotechnical effect;
- A package that is too small or unsuitable for labelling as required by SANS 0265; and
- Dangerous substances not regarded as explosive, very toxic or toxic and in small quantities that there is no reason to fear any danger to persons handling such substances or to other persons.

### 2.5.2.3 Transportation

SABS 0232-1 and the IMDG specify the labelling requirements for transportation, which have been based on the UN Recommendations on the Transport of Dangerous Goods, Model Regulations. For transportation, enlarged labels (placards) are affixed to the vehicles or freight containers to ensure that they are clearly visible. The information is provided primarily in a graphic form because of the needs of the target audience. SABS 0232-1 labelling system is based on the classification of dangerous goods as described in SABS 0228. SABS 0232-2 covers the requirements for placarding of wagons and containers for the transport of dangerous goods by rail and is based on the IMDG Code.

Labels used are in the form of a square set at an angle of 45°, which correspond to the class of the dangerous goods with respect to the colour and the symbol (see Table 2.7). The number of the class or division is included on the label. Where subsidiary risks are identified in terms of SABS 0228, the subsidiary risk diamonds are attached to the sides of the hazard class warning diamond. Signal words, such as explosive, toxic and flammable, are used on the placards that indicate the potential hazard.

**Table 2.7: Hazard Class and Label Element Specified in SABS 0232-1 and SABS 0232-2**

Hazard	Label Elements					
	Symbol	Background Colour	Class No.	Sub-class No.	Compatibility Group	Hazard Statement
Class 1: Explosives						
Division 1.1	Exploding bomb: Black	Orange	Figure "1" in bottom corner	Figure "1.1" below symbol	Yes	No
Division 1.2	Exploding bomb: Black	Orange	Figure "1" in bottom corner	Figure "1.2" below symbol	Yes	No
Division 1.3	Exploding bomb: Black	Orange	Figure "1" in bottom corner	Figure "1.3" below symbol	Yes	No
Division 1.4	1.4: Black	Orange	Figure "1" in bottom corner	-	Yes	No
Division 1.5	1.5: Black	Orange	Figure "1" in bottom corner	-	Yes	No
Division 1.6	1.6: Black	Orange	Figure "1" in bottom corner	-	Yes	No
Class 2: Gases						
Class 2.1	Flame: Black or white	Red	Figure "2" in bottom corner	No	No	Flammable Gas
Class 2.2	Gas cylinder: White or black	Green	Figure "2" in bottom corner	No	No	Non-flammable Non-toxic gas
Class 2.3	Skull and cross bones: black	White	Figure "6" in bottom corner	No	No	Toxic
Class 3: Flammable liquids	Flame: Black or white	Red	Figure "3" in bottom corner	No	No	Flammable liquid
Class 4: Flammable Solids, substances liable to spontaneous combustion, substances that on contact with water emit flammable gases						
Class 4.1	Flame: Black	Red/White diagonal stripes	Figure "4" in bottom corner	No	No	Flammable solid
Class 4.2	Flame: Black	White upper/red lower	Figure "4" in bottom corner	No	No	Spontaneously
Class 4.3	Flame: Black or white	Blue	Figure "4" in bottom corner	No	No	Dangerous
Class 5: Oxidising substance and organic peroxides						
Class 5.1	Flame over circle: Black	Yellow	No	Figure "5.1" in bottom corner	No	Oxidiser
Class 5.2	Flame over circle: Black	Yellow	No	Figure "5.2" in bottom corner	No	Organic peroxide

Hazard	Label Elements					
	Symbol	Background Colour	Class No.	Sub-class No.	Compatibility Group	Hazard Statement
Class 6: Toxic and infectious substances						
Class 6.1	Skull and cross bones: black	White	Figure "6" in bottom corner	No	No	Toxic
Class 6.2	Black	White	Figure "6" in bottom corner	No	No	Infectious substance
Class 7: Radioactive material: Not included in GHS						
Class 8: Corrosives	Corrosive symbol	White upper/black lower	Figure "8" in bottom corner	No	No	Corrosive
Class 9: Miscellaneous dangerous substances and goods	No	Black/white diagonal stripes upper/white lower	Figure "9" in bottom corner	No	No	No

The four digit UN number of the dangerous goods is also displayed for all modes of transport and a 24-hour contact telephone number of the operator, where details of the consignment and the route of the vehicle can be obtained, as well as a specialist advice telephone number where specialist information on the hazard of the consignment can be obtained. Placards are affixed to road vehicle, rail wagons and freight containers.

Other emergency signage displayed by rail wagons includes an elevated temperature triangle, which is used when the temperature of the goods is maintained at a temperature above 50°C during transport and shunting signs.

When waste is transported the word WASTE precedes the UN number and where the consignment contains a mixed load with different emergency response procedures, the word MULTILOAD is displayed instead of the UN number.

The precedence of hazards where the substance or mixture has more than one hazard characteristic are defined in SABS 0228 and apply to transportation labels. In the case of goods that present multiple risks and that are not specifically listed by name, the most stringent packing group allocated to the respective hazards of the goods takes precedence over the packing groups, irrespective of the precedence given in the table. The following primary hazards always take precedence:

- Explosives and articles of class 1
- Gases of class 2
- Liquid desensitised explosives of class 3
- Self-reactive substances and desensitised explosives of class 4.1
- Pyrophoric substances of division 4.2
- Organic peroxides of division 5.2
- Toxic substances of division 6.1 with a packing group 1 inhalation toxicity
- Infectious substances of division 6.2
- Radioactive material of class 7

### 2.5.3 Storage Areas

SABS 0263 covers the design features and procedures to be followed for the warehousing of dangerous goods in enclosed storage areas and covered and uncovered outdoor storage yards. This includes storage that forms part of the manufacturing operation, in distributors' warehouses and in storage areas of wholesale and retail premises, and on farms. The standard does not apply to areas where limited materials are displayed and advertised on shelves for sale to the public or storage areas in laboratories.

The standard covers all dangerous goods defined in SABS 0228 in quantities greater than those specified in SABS 0263. At the entrance to each warehouse, primary hazard warning diamonds in accordance with SABS 0232-1 are to be displayed to indicate the specific class of hazard presented. Where more than one class of goods are stored, the multi-load warning diamond is to be displayed.

SABS 072:1993<sup>20</sup> gives guidance on the precautions to be taken when pesticides are handled, including storage facilities. Pesticide storage facilities are to be demarcated with the appropriate safety signs and warning pictograms displayed. The warning notices are to be in the official languages (English and Afrikaans at the time of publishing the Code of Practice) and in at least one language indigenous to the region that are legible from a distance of 8m and bear a skull and crossbones.

### 2.5.4 Agricultural and Stock Remedies

The labelling system is based on the recommendations of the FAO, which is used in conjunction with the WHO hazard classification. The FAO guidelines<sup>21</sup> recommend specific signal words and pictorial references for each hazard group.

In accordance with the Fertilizers, Farm feeds, Agricultural Remedies and Stock Remedies Act, Act 36 of 1947, all information symbols and art work on the product labelling and packaging material are to be submitted to the Registrar in draft format for approval prior to printing. The language to be used on the label is not specified in the legislation, which recognises only English and Afrikaans as the official languages, although the Registrar must approve the language that is used.

Labelling requirements are specified in Regulations GNR. 2561, GG7934, 27 November 1981, issued under the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, and set out in the NDA and the Crop Protection and Animal Health Association (AVCASA) guideline document<sup>22</sup>. Although not referenced in legislation, in practice labelling of agricultural and stock remedies is undertaken in accordance with these Guidelines. Information that is optional (i.e. not required by the Regulations) but recommended is indicated in the list overleaf.

Labels for agricultural and stock remedies are divided into a main or sales panel and one or more side panels. The information to be included on the different panels is as follows:

- Trade mark or logo;
- Trade name of product;
- Sale and user restrictions, where applicable;
- Registration number;
- Product use declaration, type of formulation and the purpose for which it has been registered;
- Composition statement of the pure active ingredient (gm/kg or g/l) and, when possible, the chemical group to which the active ingredient belongs;

<sup>20</sup> South African Bureau of Standards. 1993. SABS 072: The safe handling of pesticides.

<sup>21</sup> Guidelines on good labelling practice for pesticides. Food and Agriculture Organisation of the United Nations, Rome. 1989.

<sup>22</sup> Department of Agriculture and AVCASA. Guidelines for the RSA Classification Code of Agricultural and Stock remedies and Associated Labelling Practices, November 1991.

- Nett volume or mass;
- Name, address, company registration number and telephone number of registration holder;
- Name of formulator and distributor (optional);
- Batch number and date of manufacture of expiry date;
- Classification code, hazard symbol and applicable pictograms;
- Additional information, such as the UN classification number and the company emergency or accident response telephone number; and
- Herbicide identification colour square.

Entries on the side panel are to conform to the regulations. Information displayed is generally:

- Warnings;
- Precautions;
- Triple rinse statement;
- Symptoms of human poisoning (compulsory for Groups Ia and Ib);
- Note to physician (compulsory for Groups Ia and Ib);
- Note to veterinarian (compulsory for Groups Ia and Ib); and
- Direction for use.

The NDA and AVCASA guideline document makes the following recommendations and requirements for the labelling (see Table 2.8 below):

**Table 2.8: Recommended labelling elements for agricultural and stock remedies**

Label Element	Recommendations
Multi-lingual labels	Labels are usually printed in English and Afrikaans although this is not a requirement. Where the label is printed in more than one language, each language must constitute a complete label. Translations must convey the same meaning in each language as that in the official languages originally approved by the Registrar
Type face and size	Use the largest typeface possible, taking into consideration the maximum label area and the amount of information required for that area. A typeface of 8 point (2mm height) is the minimum size that will be allowed on printed labels. No kerning or reduced word spacing is allowed. Larger type size is to be used for important safety information, such as safety precautions, warning phrases and hazard symbols. Italic typeface is only to be used for scientific names. The pictorial hazard symbol must not be smaller than 10 mm x 10 mm.

Label Element	Recommendations
Use of colour	<p>Colour coding is based on the WHO classification system:</p> <p>Group Ia Extremely hazardous - Red</p> <p>Group Ib Highly hazardous – Red</p> <p>Group II Moderately hazardous – Yellow</p> <p>Group III Slightly hazardous – Blue</p> <p>Group IV Products unlikely to present a hazard in normal use -- Green</p> <p>A colour band at the bottom of the main or sales panel of the label is to be a height of at least 15 mm.</p> <p>A purple square with a minimum size of 10 mm x 10 mm is printed in the top right hand corner on herbicide preparations</p>
Hazard symbols	<p>Two hazard symbols are used, the skull and crossbones (very toxic and toxic) for Group Ia and Ib and the St. Andrews Cross (Harmful) for Group II. The symbols are printed in black on white in a diamond shaped frame in the bottom middle of the panel.</p> <p>Group III substances display the warning “Caution”</p>
Pictograms	<p>Pictograms in black on a white background are to be printed in the hazard warning colour band.</p> <p>The hazard pictorial hazard symbol is located in the centre of the label for Groups Ia, Ib and II.</p> <p>An activity pictogram regarding the handling of the concentrate is to the left of the centre line and applying the diluted spray mixture to the right.</p> <p>The advice pictograms are arranged adjacent to the activity pictograms in a clearly defined box together with the activity pictogram to show that they are linked.</p> <p>The storage pictogram is placed to the extreme left.</p> <p>Warning pictograms are placed to the extreme right.</p>

The recommendations and requirements for labelling set out in the guideline document differ from the Regulations with regard to the hazard symbols that are specified. Specifically, the Regulations prescribe the use of the hazard statement “Poison - extremely toxic; Vergif - uifers giftig” preferably in red on a contrasting background with the skull and crossbones fully coloured in red for preparations classified in Group I. Group II preparations are to display the hazard statement “Poisonous - Giftig” preferably in red on a contrasting background. Group III preparations are to display the hazard statement “Caution - Versigtig” preferably in red on a contrasting background. The use of colour bands is not prescribed and the label relating to herbicides is to have at least 10% of the total surface are coloured purple. The recommended labelling requirements in the Guideline document are applied

in practice. Adjustments to the labelling are proposed for products to suit special markets or end-users.

*Home and garden products* for use on a small-scale are as far as possible kept within classification groups III and IV in order to reduce the risk of hazard to the user. Labels of containers smaller than 1kg or 1l are exempted from pictograms and colour banding, as well as the ready to use products up to 5kg or 5l unless required by the Registrar. The appropriate hazard symbols and hazard statements must appear on the label in black. Labels may be divided between the immediate container and the outer packaging or an accompanying label leaflet. Labels on pressurised aerosol cans must include the prescribed warnings related to a product containing a propellant gas or liquid.

*Chemically treated seed* is to be labelled on the outside of the seed bag with warning phrases. The company treating the seed is responsible for appropriate labelling of the seed bag.

Remedies that are applied by *aerial application* can be labelled with the appropriate warning phrases and general recommendations. These are specified in the SABS Code of Practice for the Aerial Application of Agricultural Remedies SABS 0118-1990. A pictogram is used when a product has not been approved for aerial application.

## 2.5.5 Gap Analysis

An analysis of the requirements of GHS and the current practices implemented in South Africa for the labelling of dangerous goods and hazardous substances is presented in the table in **Annexure 8**. Current practices include the application of systems that are referenced in the legislation (SABS 0232-1), as well as those that are currently voluntary initiatives (SABS 0265, Guidelines for the labelling of agricultural and stock remedies).

Specific labelling requirements set out in the GHS are analysed with labelling specified in SABS 0265, SABS 0232-1, SABS 0232-2 and the IMDG Code. SABS 0265 covers labelling of dangerous substances and preparations for sale and handling and labelling, labelling for storage facilities is covered by SABS 0232-1 and the transport sector by SABS 0232-1, SABS 0232-2 and the IMDG Code. The analysis is presented in the table in **Annexure 9** and is based on the Gap Analysis developed for the Hazard Classification Criteria in Section 2.3.

Labelling for agricultural and stock remedies is based on the acute toxicity. An analysis of the GHS requirements for acute toxicity and the recommended labelling for agricultural and stock remedies is presented in the table in **Annexure 10**.

## 2.5.6 Implementation Issues

### 2.5.6.1 Key gaps

The analysis of the labelling requirements specified in GHS with the current practice as set out in **Annexures 8** and **9** have identified a number of gaps.

In developing the GHS the UN Model Regulations were used as a basis for the work as they were already substantially harmonised. Thus the labelling for physical hazards specified in SABS 0232-1/2 and the IMDG Code is aligned with the GHS labelling system with three exceptions. The Table 2.9 below summarises the class of hazard for which current labelling systems differ with the GHS.

**Table 2.9: Classes of hazard for which current labelling systems differ with the GHS**

SABS 0265	SABS 0232-1/2 and IMDG Code	SABS 0304
Flammable gases	Oxidising gases	Acute toxicity group 4
Flammable liquids	Self reactive substances type A, B and G	
Flammable solids	Organic peroxide type A, B and G	
Organic peroxides		
Acute toxicity category 4		
Skin irritation category 2		
Serious eye damage/eye irritation category 1 and 2		
Respiratory sensitisers		
Germ cell mutagenicity		
Carcinogenicity		
Reproductive toxicity		
Aquatic environment category 2 and 3		
Pictogram shape		
Precedence of hazards		

Signal words and hazard statements are specified in SABS 0265 and SABS 0304 but the phrases that are used do not align with GHS. Labelling for transport purposes as specified in the UN Model Regulations and applied through SABS 0232-1/2 and the IMDG Code does not include the use of signal words or hazard statements. The UN Committee of Experts on the Transport of Dangerous has still to decide which elements of GHS to apply to the transport sector.

The issues that need to be addressed by the competent authorities to comply with the labelling requirements of GHS are as follows:

- The competent authorities must decide which components of the GHS to apply in the different situations within the life cycle of the chemical, i.e. production, storage, transport, workplace use, consumer use and presence in the environment.
- The GHS specifies that where information is translated that words and phrases need to retain their comprehensibility while conveying the same meaning. Currently, it is only the Regulations related to the labelling of agricultural and stock remedies that specify the language requirements on a label, which have to be submitted in English and Afrikaans, which were the only official languages at the time of their promulgation and at storage facilities warning signs have to be in English, Afrikaans and one language indigenous to the area. In addition, some imported chemicals have information printed in the language of the country of origin. Although in the workplace information is supplemented by MSDS and training, the consumer does not have access to information that is printed in a language that is not comprehensible. Although the use of pictograms assists in conveying hazardous information where the written format is not comprehensible, this will require appropriate training particularly in the consumer sector. The standardised phrases and words that

are used in the GHS would have to be correctly translated into other languages should a decision be made to include labels in different languages that are indigenous to South Africa.

- The GHS specifies that the label must be updated when new information becomes available. In addition, the information on which the label is based must be reviewed periodically. Currently, no mechanism has been formalised for the updating of label information when new information is made available or for the regular review of the information of the product. In addition, the registration process for approval of agricultural and stock remedies precludes the manufacturer from updating the label once approval has been received. Companies that are accredited with ISO 9 000 and ISO 14 000 are required to review and update labels for compliance.
- Harmonised labelling is to be applied in all sectors. Currently, labelling requirements for transportation are specified and formalised in legislation. Labelling requirements for agricultural and stock remedies are referenced in legislation but have subsequently been revised in a NDA and AVCASA Guideline document that is implemented in practice but not referenced in legislation. With the exception of agricultural products, no labelling requirements are implemented for consumer products. Where labels are based on the UN Model Regulations, these are compliant with GHS. Harmonised labelling specifications need to be developed for application in all sectors that comply with GHS requirements. However, prior to the implementation of a harmonised labelling system, the criteria applied to the classification of chemicals and the process of classification must be harmonised with the GHS process.
- The competent authorities must establish appropriate mechanisms for the protection of confidential business information in accordance with the principles of GHS and national law in order to ensure that health and safety is not compromised.
- For mixtures, the label should include the chemical identities of all the ingredients that contribute to acute toxicity, skin corrosion or serious eye damage, germ cell mutagenicity, carcinogenicity, reproductive toxicity, skin or respiratory sensitisation or target organ systemic toxicity.

#### 2.5.6.2 Discretionary Issues

A number of issues are included in the GHS labelling requirements for which the competent authorities have been given discretion for implementation. These will need a policy decision from the competent authorities with regard to their adoption before a strategy can be finalised for the implementation of the GHS. Discretionary issues include:

- Once a chemical is classified, the competent authorities must decide what information is to be provided for the different target audiences based on the likelihood of adverse effect. This issue is under consideration by the UN SCETDG and the FAO who are discussing the GHS and the parts of the GHS that should be incorporated into the systems for the transport and agricultural sectors.
- The GHS recognises that there are different approaches to providing information to the consumer. The competent authorities can decide to adopt risk-based labelling for consumer products or provide label information, which is solely based on the product's hazards. Risk based labelling can only be applied to the chronic health hazards of chemicals in the consumer sector. All acute health, environmental and physical hazards will be labelled based on intrinsic hazards. Risk based labelling systems provide information based on an assessment of risk or the likelihood of injury occurring from exposure to the products. The only chemicals that it can be applied to are those to which exposures are limited in quantity and duration. Should risk based labelling be adopted, specific procedures for determining the potential exposure and risk for the use of the product would have to be developed and implemented by the competent authorities.
- Precautionary statements have not yet been standardised in the GHS although examples of precautionary statements and pictograms that can be used are provided. The competent authorities or labeller may choose the appropriate precautionary information and pictogram to be included on a label.
- It is the responsibility of the competent authorities to specify a time limit within which information on a label should be revised after the receipt of new information and the review period (typically 3 – 5 years) from the date of original preparation.

- Pictograms that are prescribed by the GHS but not the UN Regulations have a black symbol on a white background with a red frame. When displayed on a package that is not to be exported the competent authorities may choose to give suppliers and employers discretion to use a black border. The competent authorities may also allow the use of UN Regulation pictograms in other use settings where the package is not covered by the regulations. Formalised labelling procedures will have to take into account the GHS recommendations on the use of pictograms for the different sectors.
- The competent authorities can decide to make it a requirement to include all the ingredients that contribute to the hazard of the mixture on a label. Should the competent authorities decide that all ingredients that contribute to a hazard be displayed, labelling undertaken in accordance with the Regulations for agricultural and stock remedies will be impacted, as these require only the active ingredient to be included. Often consumer products do not include any information about the ingredients on the label.
- The GHS specifies the label elements that must be used on the label but does not specify a layout for the presentation of the information on the label. The competent authorities may choose to provide a specific layout of label. Currently, labelling is well defined in SABS 0232-1/2 and the IMDG Code and the agricultural guidelines. However, workers and consumers have experienced problems with labels that are not conducive to comprehensibility because of the small size of the label and the font used for the information.
- The GHS allows the competent authorities to decide on the use of colour to implement special labelling requirements. Currently, this is only implemented in accordance with the agricultural guidelines based on the FAO system of labelling, where colour is used to indicate the level of the toxicity of the preparation and to indicate that the product is an herbicide.
- GHS specifies that a label should be maintained on the container that is used in the workplace. The competent authorities may however allow employers to use alternative means of giving the workers the same information in a different written or displayed format when such a format is more appropriate to the workplace and communicates the information as effectively as the GHS label, e.g. displayed in the work area or on the SDS. The Hazardous Chemical Substances Regulations specify that all decanted chemicals are to be clearly labelled with the contents although reference is not made to the MSDS on the label. Problems are experienced in all sectors with the lack of labelling of decanted chemicals. New containers in the workplace are not always adequately labelled, containers in which pesticides are diluted for use and subsequent storage are often not labelled and formal and informal retailers in the consumer sector do not label the container into which the chemical; is decanted.
- The competent authorities may choose to allow information related to the hazards of carcinogens, reproductive toxicity and target organ systemic toxicity repeat exposure on the label and the MSDS or only on the MSDS.
- The GHS specifies that the name, address and telephone number of the manufacturer or supplier of the substance or mixture must be provided on the label. Despite this provision being included in SABS 0232-1/2, SABS 0265 and the agricultural regulations and guidelines, problems have been experienced with accessing information in an emergency. Often a local contact number is not provided for imported chemicals or the emergency number displayed does not directly contact the appropriate person who will be able to offer assistance in the event of an emergency. Display of correct information needs to be enforced.
- The GHS specifies the use of a product identifier on the label that matches the product identifier used on the SDS. Where the chemical is covered by the UN Regulations, the UN proper shipping name is to be used. However, labels often include trade names of chemicals, or code names that are specific to the workplace.

### 2.5.6.3 Legislative implications

Labelling requirements are not dealt with uniformly or comprehensively in all the sectors contemplated in the GHS document (see **Annexure 8**). In this regard, the sectors of transport and agriculture have extensive provisions for the regulation of labelling. However, there is very limited regulation of labelling in the industrial sector (including the workplace) and consumer sector. Even where labelling

requirements are legislated, there are gaps between the domestic provisions and the GHS requirements. This will necessitate amendments to the current legislative regime and/or the SABS codes which are incorporated into the legislation. Furthermore, labelling in practice is often based on the requirements of SABS 0265, which is not incorporated into legislation and therefore has no legal standing.

More detailed comments on the implications of implementing the GHS labelling requirements are set out below.

- Labelling for sale and handling is required as part of the approval process for pesticides in terms of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act and labels can therefore not be updated regularly. This is not a contradiction with GHS. However, the regulations which are of current force and effect are not implemented as a more recently developed guideline is being used. The labelling requirements for the transportation of agricultural and stock remedies are done in accordance with SABS 0232-1. The programme to review the UN Recommendations is still underway. Furthermore, labelling for pesticides only requires the active ingredients to be displayed and not any other ingredients that may also be hazardous.
- As indicated above, a key source document on labelling requirements for sale and handling is SABS 0265 which is not incorporated into legislation and is accordingly not binding or enforceable. The code also has several discrepancies with the GHS system and can therefore not be used to achieve compliance with the GHS requirements and accordingly the current legislative lacunae cannot be remedied by the incorporation of this code unless it is revised.
- The GHS requires that labels are to be updated when new information becomes available and that information contained on labels is periodically reviewed. The competent authorities may specify time periods within which these activities must take place. At present there are no legal requirements in South African legislation requiring these activities to take place. In order to make these requirements enforceable, legislation pertaining to labelling would have to be amended to incorporate the provision. (This does not apply to products which are subject to an approval mechanism such as pesticides where the label is part of the approval process and suppliers cannot update information at their own initiative). It is not clear from the GHS document whether this exclusion would also apply to the licensing provisions of the Hazardous Substances Act.
- Countries adopting the GHS must consider what provisions may be appropriate for the protection of confidential business information. The specific system may differ from country to country, but they must comply with general principles set out in the GHS. The general approach to access to information is regulated by the Constitution and the Promotion of Access to Information Act (PAIA). (Several of the pieces of legislation which were promulgated prior to the Constitution contain so-called secrecy clauses. These are not considered here as their constitutionality is questionable and would therefore be overridden by the Constitution and PAIA). The PAIA provides for the protection of CBI. However, specific provisions reflecting all the principles of the GHS are not itemised in legislation, such as the principle that where CBI has been withheld, the label or chemical SDS reflects that this is the case. To ensure that the principles are reflected in an enforceable manner, and to avoid disputes regarding access to or the withholding of CBI under the Promotion of Access to Information Act, a legislative intervention would be required.
- GHS has standardised the use of signal words. These are not reflected in South African legislation or codes and would accordingly require a legislative intervention or change to the appropriate code. Other areas which would require legislative intervention include GHS requirements in respect of the product identifier (with the exception of transport), the chemical identity, contact details, precedence of symbols for physical hazards and the use of tactile warnings.
- Based on the classification classes in SABS 0228, SABS 232-1 sets out the labelling requirements for transportation. (SABS 232-1 is incorporated into legislation by the National Road Traffic Act Regulations). There are several discrepancies between the requirements of the SABS 232-1 and the GHS system.
- The GHS indicates that training is an integral part of the GHS and that the competent authorities should identify the appropriate education for GHS target audiences. The system must also consider strategies for educating consumers on the interpretation of labels. Legislation provides

for the mandatory training of workers in respect of hazardous substances and communication through, for example, the Occupational Health and Safety Act. The vehicles for implementing such training have also been contained in legislation, specifically, the Skills Development Act. (However, the state of operationalisation of these Acts is relatively new and the implementation thereof in respect of chemicals is limited). The regulation of consumer protection is extremely limited in South Africa and accordingly, legislative requirements for the education of consumers are not provided for.

## 2.6 Hazard Communication: Safety Data Sheets

### 2.6.1 GHS Baseline

The GHS requires that the SDS provides comprehensive information about a chemical substance or mixture for use in workplace chemical control. Both employers and workers use it as a source of information about hazards, including environmental hazards, and to obtain advice on safety precautions. This information acts as a reference source for the management of hazardous chemicals in the workplace. The information should enable the employer:

- to develop an active programme of worker protection measures, including training, which is specific to the individual workplace, and
- to consider any measures that may be necessary to protect the environment.

The primary use of the SDS is for workplace users.

The SDS also provides an important source of information for other target audiences using the GHS. Elements of information contained in the SDS are used by those involved with the transport of dangerous goods, emergency responders (including poison centres), those involved in the professional use of pesticides and consumers.

The GHS requires that SDSs should be produced for all substances and mixtures which meet the GHS harmonized criteria for physical, health or environmental hazards, and for all mixtures which contain substances that meet the criteria for carcinogenic, toxic to reproduction or target organ systemic toxicity in concentrations exceeding the cut-off limits for SDS specified by the criteria for mixtures. On a discretionary basis, competent authorities may choose also to require SDSs for mixtures not meeting the criteria for classification as hazardous, but which contain hazardous substances in certain concentrations.

### 2.6.2 South African Requirements and Practice in Respect of SDSs

#### 2.6.2.1 Legal framework

The primary legislative vehicle in South African which regulates SDSs in the workplace is the GAR, which were passed in terms of the OHS Act and which provide for the furnishing of MSDSs. Regulation 7 stipulates that every person who manufactures, imports, sells or supplies a hazardous chemical substance for use at work, shall as far as is reasonably practicable provide the party receiving the substance with a MSDS in the form prescribed in the regulation. The MSDS must contain all the information contemplated either in ISO 11014 or ANSI Z400.1.1993.<sup>23</sup> The SABS has issued an equivalent standard, i.e. SABS ISO 11014:1994. Where it is not reasonably practicable to do so, the manufacturer or importer must supply sufficient information to enable the user to take the necessary

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<sup>23</sup> There are a number of internationally recognised standards that provide guidance in the preparation of SDSs, including the ILO Standard under the Recommendation 177 on Safety in the Use of Chemicals at Work, the International Standard 11014 of the International Standard Organization (ISO), the European Union Safety Data Sheet Directive 91/155/EEC and the American National Standard Institute (ANSI) standard Z 400.1. Further guidance on preparation of an SDS are being developed by the GHS Subcommittee, for example a draft 'Guidance Document on the Preparation of Safety Data Sheets (SDS)' was released during December 2002.

measures to ensure health and safety. The MSDS must be made available to employees and interested and, on request, affected parties. This requirement is expressly linked to the manufacturer, importer, seller and supplier's duty in the Act. This provision only applies to hazardous chemical substances, which are to be used in the workplace and does not cover other uses.

In the transport sector, emergency information for road transportation must be provided in the form of a transport emergency card (Tremcard) that lists the hazards and emergency information for the substances being transported, which is intended for use by the driver or the emergency services during an incident. SABS 0232-1 prescribes the Tremcard format and is incorporated into the National Road Traffic Act regulations. The code is currently under review.

### 2.6.2.2 Gap analysis for Safety Data Sheets

A gap analysis between the GHS requirements for SDSs for hazardous substances and mixtures and the South African requirements for MSDSs for chemical product (SABS ISO 11014:1994) is presented in the **Annexure 11**. Current practices include the application of systems that are referenced in the legislation (SABS 0228), as well as those that are currently voluntary initiatives (SABS 0265).

## 2.6.3 Implementation Issues

### 2.6.4 Key Gaps

Key gaps related to the GHS requirements for SDSs for hazardous substances and mixtures and the South African requirements for MSDSs for chemical products are as follows:

- Although the South African MSDS requirements specify 16 headings as required by the GHS, the order of the headings differs. The first three headings are similar but not identical; and the order of headings 2 and 3 are reversed.
- Terminology differs, i.e. the GHS uses the terms substance or mixture whereas the MSDS uses product and preparations.
- The MSDS requirements in certain instances are less prescriptive than the GHS requirements, e.g. for 'Hazard(s) Identification' does not specifically require GHS label elements or other hazards that do not result in classification.
- The relevant authorities do not audit the content and quality of MSDSs.
- There are currently no requirements for the review of MSDSs.

Issues related to the implementation of the GHS requirement for SDSs include the following:

- Manufacturers that source their raw materials from international parent companies tend to not adapt these MSDSs for local use.
- Companies experience the difficulties with incorporating information from their suppliers into their MSDSs. Information is sourced from different countries in the development of MSDSs leading to the use of more than one standard in the compilation of these documents.
- Some manufacturers do not compile MSDSs from raw materials which have not been manufactured by them because they do not accept responsibility for the data provided by the supplier. However they refer to specific hazards of chemicals specified in the suppliers MSDSs in their own product MSDSs.
- South Africa has adopted the European Council of Chemical Manufacturers' Federation (CEFIC) transport documents as the basis for the compilation of the South African Tremcards. To ensure conformity in the implementation, Standards South Africa received permission from CEFIC to become an agent and has purchased the software to compile the Tremcard and to act in an advisory capacity. This service is available to those companies that are not able to afford the software to generate their own Tremcards. Standards South Africa is currently developing a standard for a Driver Emergency Information Document that would replace the current Tremcard. This standard will define the requirements of the document which will be similar to the Tremcard but which could be generated without specialised software.

### 2.6.4.1 Legal implications

The following legal implications arise out of the GHS requirements on SDS -

- The GHS regulations qualify the imperative to produce an MSDS by stating that this must be done where it is “*reasonably practicable*” to do so. The GHS requirement does not contain a similar qualification. In view of this, the implementation of the GHS regulations as currently worded may result in deviations from compliance with the GHS where persons required to produce an MSDS indicate that it is not reasonably practicable to do so.
- The GHS regulations are based on the ISO 11014 or ANSI Z400.1.1993 standards. The order in Annexure to the regulations differs slightly from the order prescribed by the GHS. Implementation of the GHS requirements pertaining to SDS would therefore require either that or that the GHS regulations be amended to reflect the correct order and either that the ISO/ANSI standards be changed, or that reference to these standards in the regulations is removed and replaced by incorporation or reference to the correct relevant requirements. ISO 11014 is being realigned with the GHS requirements, and consequently so will SABS 11014.
- Whilst the standard headings to be contained in the MSDS are the same as those indicated by the GHS system, the comparison with South African legislative requirements identified certain discrepancies in the information to be provided under each of the headings and the order of the headings.
- Certain sectors, namely mining and merchant shipping are excluded from the scope of the OHS Act. The Mines Health and Safety Act regulates mining. Section 21 of this Act stipulates that any person who designs, manufactures, repairs, imports or supplies any article for use in a mine must provide information regarding a range of issues, including the use of the substance; the risk to health and safety associated with the substance; any restriction or control on use transport and storage, including exposure limits; safety precautions to ensure that the substances is without risk; the procedure to be followed in the event of an accident of emergency; the disposal of used containers and waste. Although broad, this provision does not expressly refer to the SDS in the format prescribed by the GHS. Information may therefore be provided for in a form that does not comply with the GHS provisions.

## 2.7 Training and Awareness

### 2.7.1 GHS Baseline

Training and awareness raising, using of hazard information, is an integral part of hazard communication. The GHS requires that systems should identify the appropriate education and training for GHS target audiences who use labels and/or SDS information. Training requirements have to be appropriate for, and commensurate with the nature of the work or exposure. Key target audiences for training include: workers, emergency responders, those involved in the preparation of labels, SDS and hazard communication strategies as part of risk management systems; as well as those in the transport and supply of hazardous chemicals. In addition, systems have to consider strategies required for educating consumers in interpreting label information on the products that they use.

The GHS has identified the needs of the target audiences that will be the primary end-users of the GHS communication system as follows:

**Workplace:** Employers and workers need to know the hazards specific to the chemicals used and handled in the workplace, as well as specific protective measures required to avoid adverse effects that may be caused by those hazards. In the case of an accident at a storage facility, information is required that can be read at a distance for workers and emergency responders to know what mitigation measures are appropriate. Information in the workplace is accessed from the label, the

SDS and risk management systems. Training needs to be provided for hazard identification and prevention.

*Consumers:* In most cases, the label is the sole source of information readily available to the consumer. The label therefore needs to be sufficiently detailed and relevant to the use of the product. Providing sufficient information to consumers in the simplest and most easily understandable terms presents a considerable challenge. Consumer education is more difficult and less efficient than education for other audiences.

*Emergency Responders:* Emergency responders require information on a range of levels. To facilitate immediate responses they need accurate, detailed and sufficiently clear information. Such personnel need to be trained in the use of graphical and coded information. Emergency responders also need more detailed information about hazards and response techniques. The information needs of medical personnel responsible for treating victims of an emergency or accident may differ from those of fire fighters.

*Transport:* The UN Regulations on the Transport of Dangerous Goods, Model Regulations cater for a wide range of target audiences, with a focus on transport workers and emergency responders. Other audiences include employers, consignors, and personnel who load and/or unloading dangerous goods.

Comprehensibility of the information provided is one of the most important issues addressed in the development of GHS. This has been addressed in a parallel study within this project, as reported by the University of Cape Town (UCT) Team.<sup>24</sup>

## 2.7.2 South African Requirements and Practice in Respect of Training

### 2.7.2.1 Legal framework

The obligation on institutions/organisations to train their staff/users on, *inter alia*, hazard communication, is indicated in the following Acts:

- Fire Brigade Services Act No. 99 of 1987
- Hazardous Substance Act No. 15 of 1973
- Mines Health and Safety Act No. 29 of 1996
- National Railway Safety Regulator Act No. 16 of 2002
- National Road Traffic Act No. 93 of 1996
- Occupational Health and Safety Act No. 85 of 1993
- Skills Development Act No 97 of 1998

In addition, the Department of Labour's *Five Year Programme of Action*, which was initiated in 1994, was a strategy for addressing the inadequacies of the existing labour dispensation. The implementation of the *Five Year Programme of Action* resulted, *inter alia*, in the promulgation of several Acts, including the Skills Development Act<sup>25</sup> and the Skills Development Levies Act.<sup>26</sup>

The Skills Development Act was passed in order to address the problems of skills shortage in South Africa and has the potential to play an important role in the training aspects of chemical hazard communication as it provides for training of workers. The Act provides for the achievement of these purposes through the establishment of an institutional and financial framework comprising of the National Skills Authority, the National Skills Fund, the skills development levy-financing system

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<sup>24</sup> Part 3: Study into the Implications of Implementing the Global Harmonised System of Chemical Hazard Communication and Development of an Implementation Strategy for South Africa: **Chemical Hazard Communication Comprehensibility Testing**, FRIDGE/UNITAR, Johannesburg, July 2003

<sup>25</sup> Act 97 of 1998

<sup>26</sup> Act 9 of 1999

(through the Skills Development Levies Act), Sector and Education Training Authorities (SETAs), labour centres and the Skills Development Planning Unit.<sup>27</sup>

The Skills Development Levies Act complements the Skills Development Act. It provides for employers (unless exempted) to pay a skills levy currently in the amount of 1% of their monthly payroll. A SETA has been established for each sector. Eighty percent of the levies collected are transferred to the relevant SETAs, which administer grant payments to employers in the sector against prescribed criteria, with the remaining 20% being transferred to the National Skills Fund.

### 2.7.2.2 Sector Education and Training Authorities

The main objective of the SETAs is the raising and bringing of skills to the employed, or those wanting to be employed in each sector. In terms of Chapter 2 of the South African Qualification Authority (SAQA) Regulation No. 6290 for the accreditation of Education and Training Quality Assurance (ETQA) bodies, each SETA must be accredited as an ETQA for their relevant sector. Each SETA must be recognised by SAQA as an ETQA.

*The Chemical Industries Education and Training Authority (CHIETA)* has existing accredited courses which are implemented at the workplace regarding the understanding of legislation and competency with respect of the OHS and MSHA. However, the CHIETA has not yet established a Standards Generating Board for Health and Safety. A generic course of the safe handling of chemicals that can also be used by other SETAs has not yet been developed and no qualifications have been registered. Although quality assurance is maintained through the National Qualifications Framework (NQF), minimal training is carried out in terms of the NQF at present. Current constraints include the development of units, learning material and provision of trainers. A process to develop a unit standard for health, safety and the environment has been initiated.

*The Primary Agricultural Education and Training Authority (PAETA)* and *the Secondary Agricultural Sector Education and Training Authority (SETASA)* provide training for the agricultural sector. The importance of occupational health and safety issues has been highlighted in the SETAs Sector Skills Plan 2001/2002. However, to date no courses specific to hazard communication have been developed.

Leaverships in the transport sector are provided through the *Transport Education and Training Authority (TETA)*. TETA has a number of qualifications as leaverships, which cover training on hazardous goods:

- On *Freight Handling*
  - Maintaining occupational health, safety and general housekeeping (NQF3).
  - Controlling hazardous/dangerous and dangerous goods (NQF3).
  - Managing hazardous/dangerous goods logistics (NQF5).
- On Professional Driving:
  - Moving dangerous goods (NQF3).
  - Conveying dangerous goods (NQF3).
  - Forwarding
  - Packing, marking, documentation and handling of export Hazmat cargo (surface).

In the Maritime Industry (forwarding and clearing of dangerous goods), the qualifications required for certain categories of occupation are legislated. The standards within the Maritime Industry include the regulatory requirements of the International Maritime Organisation (IMO).

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<sup>27</sup> Section 2(2)

Registration and accreditation of training courses within this SETA system has however not yet been finalised. Currently, there are only two organisations that have been certified as service providers by TETA.

The local authority emergency response services fall within the *Local Government, Water and Related Services Education and Training Authority (LGWSETA)*. However, the LGWSETA to date has not accredited any service providers for emergency response training. A fire fighter's course has been registered with the LGWSETA, but it has not yet been accredited. The South African Emergency Services Institute (SAESI) is working with the SETA to fast track the process of accreditation.

### 2.7.2.3 Current Government Training Initiatives

The training initiatives that are ongoing within the responsible government departments and the identified concerns are briefly described below:

*Department of Labour (DOL)*: In 2000, the Department had 82 inspectors in its occupational health and safety directorate with a vacancy rate of 47%. In a recent restructuring, the inspection functions have been combined with inspection functions of all the other legislation administered by the Department and are now located in the provinces, leaving a total of 15 staff members at the Head Office (of which 5 are administrative posts). There are 56 inspectors with occupational health and safety qualifications, but only about 1% of inspections relate to hazardous substances.<sup>28</sup> There is a shortage of skilled practitioners in relation to occupational health and safety, particularly in the public sector. This relates to the recognition and treatment of occupational disease and to the prevention of exposure of workers through appropriate hazard identification and management. Although 30 learner inspectors were trained in the learner inspectors training scheme during the year 2000, only 2 succeeded.<sup>29</sup>

*National Department of Agriculture (NDA)*: The training of these officials is undertaken by means of on the job mentoring. In addition to inspections, the Department strongly supports awareness raising as a mechanism. The Department has itself initiated limited production of information leaflets and has liaised with AVCASA regarding training in the provinces. The Department itself produces material to facilitate compliance such as the guidelines for registration, which are on the Department's web site. The Department does not have the capacity for in-house testing, but uses the resources of the SABS for this purpose.

*National Department of Transport (NDOT)*: In order to enforce the new legislation, including the National Road Traffic Act, the Department is currently implementing several initiatives, such as the training of traffic officers and preparation of licensing centres.

*South African Maritime Safety Authority (SAMSA)*: At present SAMSA has a staff complement of about 100. Many of the professional staff have been drawn from the regulated industry and have a high degree of experience. Training for staff on dangerous goods is included in the professional surveyor's core education such as the certificate of competency. Where people join as juniors they participate in a six-month in-house training programme. As far as ongoing training is concerned, peer discussions on the implications of new regulations take place as soon as there is a change in legislation. In addition, international meetings of the IMO are attended by senior members of staff and it is anticipated that money from the training budget will be allocated for sending junior members to accompany the senior members as a capacity building exercise. Implementation of the legislation is done through a review of declarations that have to be submitted by the agent to check that storage plans are in accordance with the regulations and physical inspections for Class 1 substances such as explosives and a couple of others that are extreme hazards. Permission is not granted for a ship to leave with dangerous goods unless all conditions have been complied with. SAMSA does not have facilities for testing and classifying chemicals and although some officials have worked on chemical tankers, SAMSA relies on industry experts for assistance in respect of chemical issues.

<sup>28</sup> Department of Labour Annual Report 2001/2 Page 18

<sup>29</sup> Department of Labour Annual Report 2001/2, Page 31

*Department of Minerals and Energy:* The inspectorate comprises of 265 posts of which 161 were allocated to inspectors and 50 to administrative staff.<sup>30</sup> The Department believes that there are insufficient officials in the key disciplines such as hygiene and health. Furthermore, many of the staff are junior and/or inexperienced. The Department believes that the training needs are well understood and acts proactively to meet these needs.<sup>31</sup> The Department actively commissions focused training courses. Inspections are structured in accordance with the risk profiles of the companies.

*Department of Environmental Affairs and Tourism:* The Marine and Coastal Management Branch comprises a deputy director supported by 1 other professional officer and 3 artisans. Training needs are not well catered for in the field of hazard communication and there is generally a lack of experience in dealing with chemical incidents.

*National Disaster Management Centre:* The Centre recognises that there is a need for training and capacity building in disaster management and to raise awareness at all levels through the development and implementation of specific interventions. One area that has been identified is the requisite skills and expertise of persons appointed to the Disaster Management functions at the provincial and local government. The current approach is generally to react to incidents rather than developing and implementing proactive programmes of operation. Currently, the consideration of disaster management and risk assessment in local planning with regard to existing infrastructure and future developments and recommendation of mitigation measures is limited. The level of awareness for the need to maintain a fully operational emergency service is particularly lacking at the senior management level where many priorities have to be considered for funding. A specific course on disaster management is in the process of being developed for certification with the LGWSETA.

#### 2.7.2.4 Industrial Production Sector Training Initiatives

The level of training that is offered to workers is variable and depends to a large extent on the size of the company and the available capacity to provide training. Larger companies tend to make all personnel aware of the hazards of chemicals while downstream companies concentrate their training on the hazards specific to workers undertaking a particular operation. Although some companies do provide training to contractors on the hazards of chemicals, organised labour have raised concerns about the level of training given to contract and casual workers.

Training is largely provided through in-house facilities and supplemented through outside organisations where specific skills and accreditation are required. Organised labour also provides basic training for shop stewards for Occupational Health and Safety (OHS) although this is not considered to be sufficiently widespread. The assistance provided in this respect by OHS Non-Governmental Organisations (NGOs) has been restricted due to funding constraints. Organised labour indicated that in general training in relation to labels and MSDSs is insufficient to provide an adequate base to understand and use chemicals safely. Education and literacy levels impact on the way in which training is provided and the success of such training.

Mechanisms for monitoring effectiveness of training include behaviour-based performance monitoring programmes, employee surveys, reviewing compliance with legislation. ISO 9001 audits are also utilised to evaluate current training provisions. Training is reviewed when problems relating to the use of chemicals arise.

Training of workers is also provided by NGOs. These organisations were formed in the early 1980's and have been largely dependent on foreign funding. However, since 1994 the shift in focus of donor funding has impacted seriously on the operations of these organisations. Key organisations that provide training in worker health and safety include:

- The *Industrial Health Research Group at UCT* provides services to the trade unions with respect to health and safety and develops training material and trains workers and worker representatives

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<sup>30</sup> DME Annual Report 2001/2, Page 5

<sup>31</sup> Interview with Ms M Hermanus

- The *Industrial Health and Safety Education Project (IHSEP)* is based in East London and focuses on the training and empowerment of workers.
- The *National Occupational Health and Safety Association (NOSA)* provides safety management systems, which include occupational health and safety training.

The Chemical and Allied Industries' Association (CAIA) is the main association representing the chemical industry. It promotes and monitors the implementation of the international Responsible Care (RC) programme in South Africa; which addresses health, safety and environmental issues in the workplace. CAIA has prepared a guideline to assist members in the preparation of MSDSs and holds workshops covering issues such as the implementation of the Road Traffic Act, including the preparation and use of Tremcards. CAIA and CEPPWAWU have signed an accord to improve health, safety and environmental performance of chemical companies through capacity building in the workplace.

The environmental impact assessment process *inter alia* is used to inform the public of hazardous chemical related activities that might impact on communities. Community Awareness and Emergency Response (CAER) committees are established at sites where hazardous chemicals are produced, handled and stored, in order to interact with the community and to arrange safety drills, where necessary. Companies use 'road shows' at strategic points on proposed transportation routes to inform communities of the hazards associated with the chemicals being transported and the associated emergency, safety and health measure to manage the risk. Nonetheless, several companies believe that the legal responsibility for informing the public on transportation related matters to be the responsibility of the transport contractor.

#### 2.7.2.5 Agricultural Sector Training Initiatives

The low literacy and educational levels of employees in the agricultural sector are a problem for the dissemination of information relating to chemical hazards. There are currently no specific programmes on chemical labelling and MSDSs available through the relevant SETAs.

On the job training of employees on farms is undertaken by farmers who themselves receive training from the grower/farmer' organisations in association with several universities, such as the University of Stellenbosch and the University of the Free State. Often training is given in two languages that are indigenous to the area. Programmes include the identification of symptoms of poisoning, first aid and the treatment of affected persons.

Chemical training is usually directed only at those who handle chemicals or chemically contaminated items. Contract or seasonal workers do not usually handle chemicals, but if required to are provided with guidance on the hazards of the chemicals.

CropLife SA represents companies regulated by the Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No 36 of 1947). It supports its members and agricultural associations through the provision of information and guidelines on classification, labelling, the responsible handling, storage of products, and disposal of waste and empty containers. It provides publications and training relating to the handling of pesticides for farmers and employees. In addition it also addresses the requirements of emerging farmers.

#### 2.7.2.6 Transport Sector Training Initiatives

The IMDG Code and SABS 0231 set out requirements for training related to the transportation of dangerous goods.

For *road transport*, it is the responsibility of the operator to ensure that the driver of a vehicle is able to interpret and implement the instructions on a Tremcard and that the driver has received general and comprehensive theoretical and practical training on the transportation of dangerous goods to the standards approved by the National Road Traffic Act. It is a statutory requirement to undertake refresher training for drivers every 2 years. Many private companies have developed their own training programmes to meet the requirements of their companies, which are based on the SABS

Codes of Practice and the operating experience gained by the transporters. Some in-house programmes have been registered and accredited with SETA. The level of training implemented by the smaller transport companies is not known, but has been identified as an area of concern.

For *sea transport*, ship based personnel must be certificated through internationally approved training courses. Maritime certificate training courses, which meet international standards of Standards of Training and Certification of Watch Keeping Officers, are offered by the Technikon at Cape Town and Natal and are approved by SAMSA. These courses provide training on theory related to transportation, including the management of hazardous consignments. Ongoing refresher training is implemented and ship personnel for obtaining certification by writing formal examinations. Certificates are only valid for a period of two years. On board training is also undertaken to ensure that all personnel are aware of the practical aspects of the management of hazardous cargoes and associated risks. Training recommendations for shore-based personnel are provided in the IMDG Code. The proposed training comprises general awareness training, function-specific training and safety training. The level of training is commensurate with responsibilities and is undertaken on appointment and through refresher training. One private company has developed a pilot safety officer training course with the Cape Technikon, which is based on in-house company safety manuals. This course could be offered more widely following accreditation with SAMSA and ultimately become a SETA accredited course.

Formalised training programmes have been developed for *rail transport* to ensure that appropriate training is given to rail personnel. Hazmat training is part of the functional training courses. Ongoing training is undertaken.

Personnel involved in *pipeline transportation* receive initial training, which includes training on hazards and the hazards of exposure to the products conveyed. When new products are introduced, the MSDS is used to make the staff aware of the hazards. Refresher training is currently not routinely undertaken and it is planned that a reassessment of competencies and knowledge and retraining will be implemented in the future. Emergency plans and procedures have been compiled and have been communicated to the potentially affected communities and the local authorities. Liaison with landowners is undertaken when work is undertaken on the pipe servitudes. An extensive awareness campaign has also been implemented to inform the communities located along the pipelines of the potential hazards and emergency procedures.

#### **2.7.2.7 Emergency Response Training Initiatives**

A standardised training programme for the emergency services has been adapted for local application from the standards of the American National Fire Protection Association. The training programme is internationally accredited through the Institute of Fire Services Accreditation Congress (IFSAC). To date, 24 training centres have been accredited throughout the country by the IFSAC. The next level of training for Hazmat Technician was accredited by the IFSAC in 2001 and is currently available at one training centre.

The training Programme includes the use of the SABS 0232-3 emergency response guidebook how to identify the products, and appropriate reaction to make the scene of an incident safe. The Fire Fighters: Course 1 and 2 run for 10 weeks and the Dangerous Goods training comprises one week during this training. The Hazmat Awareness module is part of Fire Fighter: Course 1 training and the Hazmat operations module is undertaken during the Fire Fighter: Course 2 training. The course is open to anyone in the local authority, as well as interested persons in the private sector. The aim of the courses is to ensure that all emergency responders can isolate the scene of an incident and identify and manage the hazard.

The Technikon at Port Elizabeth, Pretoria and Cape Town run courses in Fire Technology at a National Diploma, B. Tech. and M. Tech. level. One requirement of this course is that participants must have passed the Fire Fighter: Courses 1 and 2.

Some local authorities hold in-house training courses for the other emergency response services, such as the traffic police. SAESI has been involved in training the trainers of the traffic police to

enable them to identify chemical hazards and implement the appropriate response through the correct use of the SABS 0232-3 guidebook.

#### **2.7.2.8 Consumer Sector Training Initiatives**

The consumer market is diverse and large. South Africa has between 50 and 60 Consumer Forums that are involved in awareness raising campaigns. However, due to capacity constraints the level of training and awareness raising is limited. The Poison Information Centres assist consumer organisations in the development of resources for public awareness and training. Some organisations make use of posters and pamphlets to communicate the hazards of their particular chemical. Drama is also being used as an effective mechanism to communicate the hazards associated with decanted chemicals.

The industry associations are better resourced as they are generally funded by the industries they represent. The Paraffin Safety Association of Southern Africa (PSASA) undertakes awareness campaigns throughout South Africa. The awareness training is in the form of community-based education and training programmes that are carried out at schools, clinics, churches and religious institutions and development structures. These workshops expose the participants to the dangers of paraffin and how to prevent accidents. The principle focus of awareness includes ingestion, fire and inhalation of fumes. PSASA arranges safe sites where paraffin is delivered in bulk and decanted into 5 litre containers that display labels and instructions on how to remove the 'child-resistant' top. Public awareness raising mechanisms used include: billboards, taxi-based adverts, community-based theatre, radio, newspaper, magazines and a promotional vehicle.

The Domestic Workers Union does not have ready access to information to inform their members of the hazardous household chemicals. The DOL has undertaken to arrange workshops for the domestic workers union in 2003 to raise awareness about hazardous household chemicals with domestic workers.

#### **2.7.2.9 Organised Labour Training Initiatives**

The joint project of the Congress of South African Trade Unions (COSATU) and the Federation of Unions of South Africa (FEDUSA), Development Institute for Training, Support and Education for Labour (Ditsela), runs an annual Health, Safety and Environment course. Ditsela receives the major part of its funding from the DOL, as part of its "Strengthening of Civil Society Fund". However, financial constraints have limited the activities of the programme.

#### **2.7.2.10 Sectoral Training Requirements**

In compiling the Situation Analysis a number of issues and concerns were raised with regard to the current training with regard to communication of chemical hazards. In addition, in compiling the Gap Analysis, specific training requirements have been identified to ensure the successful implementation of the GHS. These have been categorised sectorally below.

##### **a) Government**

The government will be responsible for the overall implementation and enforcement of the GHS. A number of government departments have responsibilities for the safe management of chemicals, including those departments primarily making up the occupational health and safety matrix, those that manage chemicals directly and those managing the environment. The specific training that will be required by the different departments will depend on their responsibilities for implementing the various aspects of the GHS.

- All relevant government departments will need to be trained on the GHS system and its implementation in South Africa.
- Appropriate government representatives need to be identified to attend international meetings related to the implementation of the GHS. This includes the meetings of the UNCETDG, where a member of Standards South Africa represents South Africa.

- Specific interventions are required to operationalise the SETA training structures. Appropriate hazard communication training programmes need to be developed and accredited and a programme of implementation developed.
- There is a shortage of skilled practitioners in relation to occupational health and safety, particularly in the public sector. This relates to the recognition and treatment of occupational disease and to the prevention of exposure of workers through appropriate hazard identification and management.
- A re-assessment of the current training programmes within the DOL is required to identify the reason for the high failure rate for learner inspectors and to take corrective action.
- The NDOT is currently implementing training programmes for the inspectorate to enforce the new transport legislation. This however does not extend to the local government level for traffic officers that are responsible for enforcing legislation. Appropriate training needs to be provided to personnel at the provincial and local government levels to ensure compliance with legislation.
- There is inadequate training and experience in the field of hazard communication within the Department of Environmental Affairs and Tourism (DEAT) to effectively respond to chemical incidents. There is a need for the staff to receive training on chemical hazard communication and incident management.
- Capacity and awareness raising is needed at all levels of government and in all relevant departments with regard to incident management. Specific intervention is required at the provincial and local government level to promote proactive management of hazards and risk assessment.

#### **b) Industrial Production**

- Awareness needs to be raised on the GHS system and appropriate training programmes developed for management and workers.
- Mechanisms need to be developed to provide training on chemical hazards and hazard communication at smaller companies that currently are not able to afford the necessary training or allow workers the necessary time to attend courses.
- Awareness needs to be raised on the requirements for generating and issuing of MSDSs. Many customers also lack the technical expertise to interpret MSDS. Training needs to be provided by manufacturers to other components of the product chain on the safe use and management of their chemicals.
- The training needs of the different job positions within a company need to be identified with regard to the interpretation and use of the MSDSs and labels to ensure safe management and use of chemicals. Training must take into account the level of education and literacy of the worker. Mechanisms need to be developed to ensure that contract and seasonal workers receive the necessary training. Due cognisance should be taken of safety committees in respect of the development of training material. Training should be evaluated against some agreed performance criteria.
- Companies provide limited training to communities that are adjacent to their facilities or are located on main transportation routes. Communities are generally not aware of the potential hazards, able to understand placard information on road vehicles or know how to obtain additional information from the supplier in the event of an incident. Mechanisms need to be developed to ensure that communities are trained on chemical hazards and communication systems.

#### **c) Agricultural sector**

- Awareness needs to be raised on the GHS system and appropriate training programmes developed for management and workers.
- Training programmes need to be extended to the smaller and emerging growers/farmers on chemical hazards and hazard communication.

- The low literacy and educational levels of employees in the agricultural sector are a problem for the dissemination of information relating to chemical hazards. Appropriate training programmes need to be more widely implemented or developed where necessary.

**d) Transport sector**

- Awareness needs to be raised on the GHS system and appropriate training programmes developed for management and workers.
- Awareness needs to be raised on the responsibilities of the consignor and transporters under the new legislation.
- Clearing agents need to be trained on their responsibilities to provide the necessary transport documentation and placards when consignments are received by sea and to ensure that dangerous goods drivers are appropriately trained.
- Law enforcement personnel at the local government level need to be trained on the new transport legislation and the associated SABS Codes of Practice.
- Customs officials need to be trained on transport requirements with respect to the transportation of dangerous goods to ensure that all transporters from neighbouring countries comply with legislation.
- Encroachment of informal settlements along the rail routes and pilfering from trains is problematic and a potential risk. Awareness needs to be raised with regard to chemical hazards.
- The level of training implemented by the smaller transport companies is not known but it has been identified as an area of concern. Programmes need to be developed to ensure that these smaller transporters comply with their responsibilities for providing training.

**e) Emergency Response**

- Awareness needs to be raised on the GHS system and appropriate training programmes developed for management and workers.
- There is only limited understanding by the general public of hazard placards. Awareness raising programmes need to be developed with regard to hazard communication using placards and labels.
- Towing companies are often the first responders at a scene of an incident that may involve dangerous goods. This sector has generally not received any formal hazmat training and is not aware of the procedures to be followed. Appropriate training needs to be provided to ensure that personnel understand hazard labelling and the procedures to be followed.
- All emergency responders that attend an incident that involves dangerous goods should be trained on the recognition of hazard placards.
- Manufacturers should provide training to the fire and traffic services to inform them about their products and how these must be handled.
- The training needs of the local authorities need to be identified with regard to the control of dangerous goods being transported through their area of jurisdiction to ensure risk assessments are undertaken and mitigation measures implemented.
- The disparity in training between rural and metropolitan areas needs to be addressed. Often the limited staff complement in the rural areas does not permit staff members to be absent from their position for extended (e.g. 10-week) training courses. The training needs of the emergency services throughout the country need to be assessed and the critical areas identified.
- The training centres focus on the training of new recruits and do not have the resources to offer refresher training. This becomes the responsibility of the employer who must remain updated on new legal requirements and implement appropriate training. The lack of refresher training has impacted negatively in many areas, particularly the rural areas, where adequate resources are not allocated to maintain the level of training required. Awareness needs to be raised at the management level with regard to the importance of undertaking refresher training and to incorporate any new developments.

**f) Consumer Sector**

- Consumer training programmes on hazard information need to take into account the problems of illiteracy and language restrictions.
- Health clinics play an important role in disseminating information particularly during an exposure incident. Training needs to be provided to clinic personnel on hazard communication and mechanisms developed to assist in disseminating information more widely.