ANNEXURE 3

Hazard Classification: Gap analysis of current practice against GHS requirements

GHS	Current Practice	Compliance or Gap
1. Classification based on the intrinsic hazardous properties, including physical, environmental and health.	SABS 0228/IMDG Code: Classification based on goods that are capable of posing a significant risk to health and safety or to property or the environment during transport. SABS 0265: Classification of dangerous goods on the basis of their toxicological, physico-chemical and eco-toxicological properties that constitute a risk during normal sale and handling and use. SABS 0304: Classification is based on the degree of the intrinsic toxic properties of the formulation.	Complies with GHS
2. Classification is to be undertaken by reviewing the available information of a substance or mixture and classifying in accordance with specified criteria for each hazard class.	Hazard classes and associated criteria are specified in SABS 0228, IMDG Code, SABS 0265 and SABS 0304. Annexures in the codes lists the substances and preparations that have been classified and the UN and the CAS number in SABS 0265 are assigned. For unlisted chemicals, appropriately skilled personnel in companies review published data, data obtained from physical hazard determination or information from suppliers to classify the chemical according to the specified criteria.	Complies with GHS
3. Physical hazards are to be identified by specified test methods to establish intrinsic physical properties for comparison with GHS criteria	Criteria and test methods are specified in SABS 0228 and SABS 0265. Larger companies have the capacity to undertake physical analyses	Complies with GHS

GHS	Current Practice	Compliance or Gap
4. Where test data is not available on the mixture itself, in order to limit the number of additional animal test that are undertaken, classification of mixtures according to the health and environmental hazards can be determined by: ii) Bridging principles, (See section 2.2.1) iii) Where information is not available to apply the bridging principles, Identification of hazards of the ingredients and use of generic cut-off values or concentration limits for the classified ingredients.	SABS 0228/IMDG Code, SABS 0265 and SABS 0304 specify methodologies for the classification of the health and environmental hazards of mixtures for which test data is not available for the mixtures. SABS 0228/IMDG Code specifies: i) By formula when information is available for each active ingredient. ii) Classification according to the most hazardous constituent SABS 0265 specifies: i) Concentrations exceed specified concentrations for substances ii) Where the substance is not specified, application of specific concentration limits iii) By formula using the information for each identified hazardous component SABS 0304 specifies: i) By formula using the information for each identified hazardous component. The active ingredient is the only constituent that is taken into consideration. In practice, companies base the classification of the mixture with regard to the environmental and health hazards on the percentage constituents of the individual ingredients. However, classification is sometimes based only on the main ingredient. Alternatively, available information on similar products is reviewed and the appropriate classification applied.	Not fully compliant with GHS. Bridging principles are not specified in codes applied in South Africa although companies do evaluate information that is available on similar products

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5. Synergistic effects among the ingredients are to be taken into account The method of achieving this is not yet defined in the GHS. Synergistic and antagonistic effects of chemicals can be determined by animal testing but one principle of the GHS is that new testing should not be undertaken for classification according to the GHS and that the use on animal testing be minimised. The use of reliable epidemiological data and experience on the effects of chemicals on humans is taken into account in the evaluation of human health hazards.	SABS 0265, 0304 and 0228 all state that cognisance should be taken of instances of accidental poisoning in humans and any evidence is available to demonstrate that toxicological effects of a substance or preparation on humans differ form those suggested by toxicological determination or by calculation. In these cases the substance or preparation is to be classified according to its effects on humans. The OHS Regulations specify that toxicological data must be assessed to establish whether any synergistic effect impacts on the recommended exposure limits for mixtures. Classification based on the percentage composition of ingredients and formula does not take into account synergistic or potentiation effects	Complies with GHS if the basis is the observation of effect on humans in the event of an accidental poisoning
6. When classifying an untested mixture based on the hazards of its ingredients, generic cut-off values or concentration limits for the classified ingredients of the mixture are used for several hazard classes in the GHS unless information is available that the hazard of the ingredient is evident at higher or lower values.	Concentration limits for dangerous components in the preparation specified in SABS 0265 SABS 0304 and SABS 0228 classification is based only on the active ingredient in the preparation. No concentration limits for classification specified.	SABS 0228 and SABS 0304 do not comply The specific concentration limits and calculation formulae are compared with the GHS requirements in Annexure 4
7. GHS includes 16 physical hazard categories and 10 environmental and health categories	SABS 0228 allocates nine classes. Class 9 provides for known dangerous substances that cannot be classified into one of the other classes. This includes wastes that are not subject to the requirements of the standard but are dealt with by the Basel Convention. Hazards	Not compliant with GHS

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	of the standard but are dealt with by the Basel Convention. Hazards include physical and acute toxicity. SABS 0265 allocates twelve classes. Hazards include physical, acute and chronic toxicity and environmental.	
Physical hazards		
8. *Explosives*: A solid or liquid (substance or mixture) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at a speed as to cause damage to the surroundings. Pyrotechnic substances are included even when they do not evolve gases. The class of explosives comprises: • Explosive substances or mixtures • Explosive articles, except devices containing explosive substances or mixtures in such a quantity or of such a character that their inadvertent or accidental ignition or initiation shall not cause any effect external to the device either by projection. Fire, smoke, heat or loud noise • Substances, mixture or articles not mentioned above which are manufactured with the view to producing a practical, explosive or pyrotechnic effect.	SABS 0228: Class 1: Explosive substances include: • *Explosive substances:* A solid, liquid or a mixture that in itself is capable by chemical reaction of producing gas a such a temperature, pressure and speed as to cause damage to the surroundings. • *Pyrotechnic substances:* Designed to produce an effect by heat, light, sound, gas or smoke, or a combination of these as a result of non-detonative self-sustaining exothermic chemical reactions. • *Explosive articles:* that contain one or more explosive substance or an article that is manufactured with a view to producing a practical explosive. SABS 0265: A substance or preparation is classified as explosive after it has been tested in accordance with the UN Test and Criteria.	Complies with GHS
9. *Flammable gases*: A gas having a flammable range with air at 20°C and a standard pressure of 101.3 kPa. Ammonia and methyl bromide may be regarded as special cases for some regulatory purposes	SABS 0228: Class 2: Gases, Division 2.1: Flammable gases. Gases at a temperature of 20°C and a standard pressure of 101.3 kPa are ignitable in a mixture of 13% or less with air and have a flammable range of at least 12%. SABS 0265: Extremely flammable substances and preparations: A gas that at 20°C and at a pressure of 101.3 kPa is ignitable in a mixture of 13% or less (by volume) with air or has a flammability range with air of at least 12 percentage points regardless of the lower flammable range.	Complies with GHS Ammonia and methyl bromide are currently classified as Class 2: Gases, Division 2.3: Toxic gases in SABS 0228. This category is not specified in the GHS document. Current

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	flammable range.	regulation has therefore allocated them to a specific category for transportation purposes.
10. *Flammable aerosols*: Any non-refillable receptacles made of metal, glass or plastics and containing a gas compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder, and fitted with a release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder or in a liquid state in a gaseous state.	SABS 0228: Class 2: Gases, Division 2.1: Flammable gases A non-refillable receptacle made of metal, glass or plastic, that contains a gas that is compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder and that is fitted with a release device to allow the contents to be ejected as a solid or liquid particles in suspension in a gas or as a foam, a paste or powder, or in a liquid state, or in a gaseous form.	Complies with GHS
11. *Oxidising gases*: A gas, which may, generally by providing oxygen cause or contribute to the combustion of other material more than air does. Artificial air containing up to 23.5% (by volume) oxygen may be regarded as not oxidising for some regulatory purposes, e.g. transport	SABS 0228: Class2: Gases Division 2.2: Non-flammable, non-toxic gases. Oxidising gases that can generally by providing oxygen cause or contribute to the combustion of other material to a greater extent than air does. SABS 0265: Oxidising substances and preparations. A gas that has an oxygen index ≥ 21. This is estimated by comparing the oxidising potential of the gases with that of oxygen in air	Complies with GHS
12. *Gases under pressure:* Gases, which are contained in a receptacle at a pressure not less that 280 kPa at 20°C or as a refrigerated liquid. Comprises compressed gas, liquefied gas, refrigerated liquefied gas and dissolved gas.	Class 2: Gases. SABS 0228: Gases include permanent gas, compressed gas, liquefied gas, refrigerated liquefied gas, and dissolved gas. A permanent gas is a gas that at a temperature of 50°C has a vapour pressure exceeding 300 kPa or is completely gaseous at a temperature of 20°C and at a standard pressure of 101.3 kPa.	Complies with GHS
13. *Flammable liquids*: A liquid having a flash point of not more than 93°C. A flammable liquid is classified in one of four categories for this class according to the flash point and initial boiling point of the liquid.	SABS 0228: Class 3: Flammable liquids. This includes • *Flammable liquids*: Liquids, mixture of liquids or liquids that contain solids in solution or suspension that have a closed-cup flash point) not exceeding 60.5°C.	Not compliant with GHS The upper flash point of GHS is 93°C compared to 60.5°C for SABS

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Gas, oils, diesel and light heating oils in the flash point range of 55°C to 75°C may be regarded as a special group for some regulatory purposes. Liquids with a flash point of more than 35°C may be regarded as non-flammable liquids for some regulatory purposes, e.g. transport, if negative results are obtained in the sustained combustibility test. Viscous flammable liquids, such as paints, enamels, lacquers, varnishes, adhesives and polishes may be regarded as a special groups for some regulatory purpose, e.g. transport. The decision to consider these liquids as non-flammable may be determined by the pertinent regulation or competent authorities.	• *Liquid desensitised explosive*: An explosive substance that is dissolved or suspended in water or another liquid substance to form a homogeneous liquid mixture to suppress the explosive properties. Three levels of hazard are defined for packaging purposes based on the flash points and initial boiling point: SABS 0265: Extremely flammable, highly flammable and flammable substances and preparations. Substances are classified according to the initial boiling point and flash point. The upper limit of flash point for flammable substances is 60.5°C.	to 60.5°C for SABS 0228 and SABS 0265. Liquid desensitised explosives are classified as flammable liquids. Gas, oils, diesel and light heating oils are classified as SABS 0228 Class 3: Flammable liquids in SABS 0228. Viscous flammable liquids, including paints, varnishes, enamels, adhesives, and polishes are classified as Class3: Flammable liquids on the basis of viscosity, closed cup flash point and solvent separation test.
14. *Flammable solids*: A solid which is readily combustible, or may cause or contribute to fire through friction. Explosive substances and preparations desensitised with water or alcohol or by dilution may be treated differently from explosives for regulatory purposes, e.g. transport.	SABS 0228 Class 4: Flammable solids, substances liable to spontaneous combustion, substances that on contact with water emit flammable gases, Division 4.1: Flammable solids, self reactive substances and solid desensitised explosives Flammable solids are readily combustible and can cause, or contribute to fire through friction. Solid desensitised explosives are explosive substances that are wetted with water or alcohols or dilutes to form a homogenous solid mixture to suppress their explosive properties	Complies with GHS for flammable solids. Desensitised explosives classified as: SABS 0228 classifies solid desensitised explosives as flammable solids.

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	mixture to suppress their explosive properties. SABS 0265 Highly flammable substances and preparations. A solid is easily ignited by external source, is readily combustible and liable to cause or contribute to a fire through friction. Includes desensitised explosives	SABS 0265 classifies solid desensitised explosives as highly flammable substances and preparations.
15. *Self reactive substances:* Thermally unstable liquid or solid substances or mixtures liable to undergo a strongly exothermic decomposition even without participation of oxygen (air). This excludes substances and mixtures classified under the GHS as explosives, organic peroxides or as oxidising liquids or solids.	SABS 0228 Class 4: Flammable solids, substances liable to spontaneous combustion, substances that on contact with water emit flammable gases. Division 4.1: Flammable solids, self reactive substances and solid desensitised explosives. Self reactive substances are thermally unstable substances that are liable to undergo a strong exothermic decomposition, even without the participation of oxygen of air. This excludes explosives, oxidising substances, and organic peroxides.	Complies with GHS
16. *Pyrophoric liquids:* A liquid, which, even in small quantities, is liable to ignite within five minutes after coming into contact with air.	SABS 0228 Class 4: Flammable solids, substances liable to spontaneous combustion, substances that on contact with water emit flammable gases. Division 4.2: Substances liable to spontaneous combustion. Substances liable to spontaneous heating under normal conditions or to heating when they come into contact with air, and are then able to catch fire. Pyrophoric substances are substances that even in small quantities ignite within 5 minutes of their coming into contact with air.	Complies with GHS
17. *Pyrophoric solids:* A solid, which, even in small quantities, is liable to ignite within five minutes after coming into contact with air.	SABS 0228 Class 4: Flammable solids, substances liable to spontaneous combustion, substances that on contact with water emit flammable gases, Division 4.2: Substances liable to spontaneous combustion. Pyrophoric substances are substances that even in small quantities	Complies with GHS

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	ignite within 5 minutes of their coming into contact with air.	
18. *Self heating substances:* A solid or mixture, other than pyrophoric liquid or solid, which, by reaction with air and without energy supply, is liable to self-heat. This substance or mixture differs from a pyrophoric liquid or solid in that it will ignite only when in large amounts (kilograms) and after long periods of time (hours or days).	SABS 0228 Class 4: Flammable solids, substances liable to spontaneous combustion, substances that on contact with water emit flammable gases, Division 4.2: Substances liable to spontaneous combustion. Self heating substances are substances that on contact with air and without energy supply are liable to self heating. These substances will ignite only in large amounts (several kilograms) and after a long time. Substances are assigned to two packing groups:	Complies with GHS
19. *Substances which on contact with water release flammable gases:* Solid or liquid substances or mixtures which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.	SABS 0228 Class 4: Flammable solids, substances liable to spontaneous combustion, substances that on contact with water emit flammable gases, Division 4.3: Substances that on contact with water, emit flammable gases. Substances that emit flammable gases that can form explosive mixtures with air. Such mixtures are easily ignited by all ordinary sources of ignition. SABS 0265 Extremely flammable, highly flammable substances and preparations. A substance that on contact with water emits flammable gases.	Complies with GHS
20. *Oxidising liquids*: A liquid which while in itself is not necessarily combustible, may generally by yielding oxygen, cause or contribute to the combustion of other material.	SABS 0228 Class 5: Oxidising substances and organic peroxides, Division 5.1: Oxidising substances. Oxidising liquids are classified on the basis of its potential to increase the burning rate of burning intensity of a combustible substance or for spontaneous ignition to occur when the two are thoroughly mixed. SABS 0265 Oxidising substances and preparations. An oxidising substance or preparation, although not necessarily combustible, can either by yielding oxygen or by similar processes, increase the risk and intensity of fire in other materials with which it	Complies with GHS

GHS	Current Practice	Compliance or Gap
	comes into contact.	
21. *Oxidising solids*: A solid which while in itself is not necessarily combustible, may generally by yielding oxygen, cause or contribute to the combustion of other material.	SABS 0228 Class 5: Oxidising substances and organic peroxides, Division 5.1: Oxidising substances. Oxidising solids are classified on the basis of its potential to increase the burning rate or burning intensity of a combustible substance when the two are thoroughly mixed. SABS 0265 Oxidising substances and preparations. Exhibits a burning time that is equal to or greater than that of reference mixture when tested in the case of solids.	Complies with GHS
22. *Organic peroxides*: Liquid or solid organic substances, which contain the bivalent –0-0- structure and may be considered derivatives of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals. The term also includes organic peroxide formulations (mixtures). Organic peroxides are thermally unstable substances or mixtures, which may undergo exothermic accelerating decomposition. Considered for classification when not more than 1% available oxygen from the organic peroxide when containing not more than 1% hydrogen peroxide; Not more than 0.5% available oxygen from the organic peroxide when containing more than 1% but not more than 7% hydrogen peroxide	SABS 0228 Class 5: Oxidising substances and organic peroxides, Division 5.2: Organic peroxides. Organic substances that contain the bivalent –O-O- structure can be considered derivatives of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by organic radicals. Organic peroxides arte thermally unstable substances that can undergo exothermic decomposition at normal or elevated temperatures. The rate of decomposition increases with a rise in temperature and can vary with different formulations of the same organic peroxide. An organic peroxide is considered for classification if it contains ≤ 1% of available oxygen derived from organic peroxide and ≤1% of hydrogen peroxide or ≤ 0.5% of available oxygen from organic peroxide and > 1% but ≤ 7% of hydrogen peroxide. SABS 0265 Oxidising substance and preparation. An organic substance that contains the bivalent –O-O- structure can	Complies with GHS

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	be considered derivatives of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by organic radicals. A thermally unstable substance that undergoes exothermic self accelerating decomposition. Decomposition can result in the emission of toxic and flammable gases. Contains more than 5% (by mass) of organic peroxide or contains more than 0.5% (by mass) of available oxygen from the organic peroxide.	
23. Corrosive to metals: A substance or mixture, which by chemical action will materially damage or even destroy metals.	SABS 0228 Class 8: Corrosives. Substances that have a destructive effect on materials such as metals and textiles.	Complies with GHS
Environmental and health hazards		
24. *Acute toxicity*: Refers to those adverse effects occurring following oral or dermal administration of a single dose of a substance, or multiple doses given within 24 hours, or an inhalation exposure of 4 hours.	SABS 0228 Class 6: Toxic and infectious substances, Division 6.1: Toxic substances and SABS 0265 Acute Toxicity and SABS 0304. Substances that are liable to cause death or injury or to harm human health if they are swallowed, inhaled or come into contact with the skin. Inhalation exposure is for a 4 hour duration, dermal toxicity is continuous contact for 24 hours and oral toxicity is the does most likely to cause death within 14 days. Inhalation toxicity is not taken into account in SABS 0304	SABS 0304 does not include inhalation as a route of exposure for toxicity
25. *Skin corrosion/irritation:* Skin corrosion is the production of irreversible damage to the skin (visible necrosis through the epidermis and into the dermis) following the application of a test substance for up to 4 hours. Skin irritation is the production of reversible damage to the skin following the application of a test substance for up to 4 hours. One category for skin corrosion is provided by GHS. Where authorities want to use more than one designation, three sub-categories are provided	SABS 0228: Class 8: Corrosives. Substances that by chemical action severely damage living tissue. Three packing groups are allocated for skin corrosion. SABS 0265 Corrosive. Substances that causes full thickness destruction of healthy intact animal skin or tissue on at least one animal during the test for skin irritation.	SABS 0228 compliant with GHS for skin corrosion. Irritation not currently included. SABS 0265 compliant with GHS. Category for mild

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categories are provided. One category for irritation is provided by GHS. Authorities, e.g. pesticides, also have available a less severe mild irritant category.	SABS 0265 Skin Irritants. A substance is irritating to the skin when applied to healthy intact animal skin for up to 4 hours causes significant inflammation that is still present 24 hour or more after the end of the exposure period.	irritants is not currently provided.
26. *Serous eye damage/eye irritation*: Serious eye damage is the production of tissue damage in the eye, or serious physical decay of vision, following application of a test substance to the anterior surface of the eye, which is not fully reversible within 21 days of application. Eye irritation is the production of changes in the eye following the application of test substance to the anterior surface of the eye, which are fully reversible within 21 days of application. A single category is adopted for substances that have the potential to cause irreversible damage. Reversible effects on the eye are allocated to a single category. Some authorities may want to distinguish between irritating to the eye and mildly irritating to the eye.	SABS 0265 Eye Irritants. A substance that causes ocular lesions in the eye of the test animal within 72 hour after exposure and persist for at least 24 hours. Categories include serious damage to the eyes and irritating to the eyes.	Not compliant with GHS. Duration of observation period is 21 days for GHS and 72 hours for SABS 0265. Mildly irritating to the eyes is currently not adopted.
27. *Respiratory or dermal sensitivity:* A respiratory sensitiser is a substance that will induce hypersensitivity of the airways following inhalation of the substance. A skin sensitiser is a substance that will induce an allergic reaction response following skin contact.	SABS 0265 Sensitising substances and preparations. A skin sensitiser is capable of inducing a sensitising skin reaction. A respiratory sensitiser is capable of inducing a sensitising reaction in humans by inhalation at a greater frequency than would be expected.	Complies with GHS
28. *Germ cell mutagenicity*: Mutations in the germ cells of humans that can be transmitted to the progeny. A mutation is defined as a permanent change in the amount or structure of the genetic material in a cell. Mutation applies to both heritable genetic changes that may be manifested at the phenotypic level and the underlying DNA modifications.	SABS 0265 Mutagenic substances and preparations. A mutagenic substance causes an increase in the occurrence of mutations. A mutation is a permanent change in the genetic material of an organism, which causes changes in the phenotypic characteristic of the organism.	Complies with GHS

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29. *Carcinogenecity*: A substance or mixture which induces cancer or increase its incidence. Substances which have induced benign and malignant tumours in well performed experimental studies on animals are also presumed or suspected human carcinogens unless there is strong evidence that the mechanism of tumour formation is not relevant fro humans. Classification is based on the inherent properties of the substance and does not provide information on the level of human cancer risk.	SABS 0265 Carcinogenic substances and preparations. A substance or preparation that if inhaled or ingested or absorbed through the skin can either induce cancer or increase its incidence.	Complies with GHS
30. *Toxic to reproduction:* Adverse effects on sexual function and fertility in adult males and females, as well as developmental toxicity in the offspring.	SABS 0265 Toxic to reproduction. A substance or preparation that has intrinsic or specific properties that impair the male and female reproductive functions or capacity (fertility) and induce non-heritable harmful effects on the progeny (developmental toxicity).	Complies with GHS
31. *Target organ systemic toxicity – single exposure:* Produce specific, non-lethal target organ/systemic toxicity arising from a single exposure. All significant health effects that can impair function, both reversible and irreversible, immediate and/or delayed are included.	Currently not a specific hazard category	Not compliant with GHS
32. *Target organ systemic toxicity – repeated exposure:* Produce specific, non-lethal target organ/systemic toxicity arising from a repeated exposure. All significant health effects that can impair function, both reversible and irreversible, immediate and/or delayed are included.	Currently not a specific hazard category	Not compliant with GHS

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33. *Hazardous to the aquatic environment*: Classification based on the hazards to the aquatic environment. Four basic elements are used within the harmonised system: • Acute aquatic toxicity – the intrinsic property of a substance to be injurious to an organism in a short-term exposure to that substance. • Potential for or actual bioaccumulation – net result of uptake, transformation and elimination of a substance in an organism due to all routes of exposure. • Degradation (biotic or abiotic) for organic chemicals – the decomposition of organic molecules to smaller molecules and eventually to carbon dioxide, water and salts. • Chronic aquatic toxicity – Potential or actual properties of a substance to cause adverse effects to aquatic organisms during exposures which are determined in relation to the life cycle of the organism.	SABS 0265 Environmental effects. The criteria refer mainly to aquatic ecosystems although it is acknowledged that substances can simultaneously or alternatively affect other ecosystems, the constituents of which range from soil micro-flora and micro-fauna to primates. Classification is divided into substances that hazardous to the aquatic environment and those that are dangerous to the non-aquatic environment.	Hazardous to the aquatic environment compliant with GHS. GHS does not make provision for non-aquatic environmental hazards.