

NSOVO ENVIRONMENTAL CONSULTING

SANS 10234

Classification Report

Transnet, Evaporation Pond Sludge

Interwaste (PTY) Ltd.
November 2017

[Classification of Transnet Port Terminal, Evaporation Pond Sludge, in terms of SANS 10234 (the Globally Harmonized System of Classification and Labelling of Chemicals) as mandated by GN R 634 of 2013 under the National Environmental Management: Waste Act, 2008]

NSOVO ENVIRONMENTAL CONSULTING

Transnet, Evaporation Pond Sludge – SANS 10234 Classification Report

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EXECUTIVE SUMMARY:

Summary of SANS 10234 Classification – Evaporation Pond Sludge

Hazard Classes & Categories Hazard Classes & Categories	Not classified hazardous under SANS 10234
GHS Pictogram	N/A
Signal Word	N/A
Hazard Statements	N/A
Landfill Assessment	Assessed as, "Type 3"

Waste Profile and classification

Item	Description	Classified / Included
General Waste	A waste that does not pose an immediate hazard or threat to health or to the environment, and includes domestic, building and demolition waste, business waste and inert waste.	✓
Hazardous Waste	Means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.	✗
Safety Data Sheet	Preparation of a Safety Data Sheet (SDS). A SDS is required for all hazardous wastes (excluding Health Care Risk Waste (HCRW) in terms of Regulation 5(1) of GN. R. 634 of 2013.	✗
SANS 10234 Classification	Classification as hazardous or non-hazardous in accordance with SANS 10234 (Regulation 4(2) of GN 634 of 2013). This is not a requirement where a waste can categorically be defined under Annexure 1 to GN. R. 634 of 2013.	✓

DISCLAIMER: The information in this Waste Classification Report and associated Safety Data Sheet (SDS), where relevant, has been developed on the basis of the information available to Interwaste at the time of submission, and provides Interwaste's best reasonable and professional assessment of the intrinsic hazards posed by the subject waste streams. INTERWASTE MAKES NO

WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR COURSE OF MANAGEMENT OR USAGE OF TRADE. It remains the waste generator's responsibility for determining whether their waste is fit for a particular purpose and suitable for user's/waste manager's method of use, management or application. Given the variety of factors that can affect the management, transport, storage and handling of the waste, some of which are uniquely within the generator's knowledge and control, it is essential that the generator evaluate the subject Report and SDS to determine whether they are fit for the particular purpose and suitable for third party user's / manager's method of use or application. Interwaste cannot be held liable for changes in the waste's constituents caused by a change in process, or raw material input into the process. The make up of waste is, by its very nature, variable. The manner in which the waste is to be handled may vary depending on its constituents.

DEFINITIONS:

- Dermal corrosion:** See skin corrosion.
- Dermal irritation:** See skin irritation.
- Eye irritation:** 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.
- Flash point:** The lowest temperature (corrected to a standard pressure of 101.3 kPa) at which the application of an ignition source causes the vapours of a liquid to ignite under specified test conditions.
- Hazard statement:** A statement assigned to a hazard class and category that describes the nature of the hazards of a hazardous product, including, where appropriate, the degree of hazard.
- Hazard category:** The division of criteria within each hazard class, e.g. oral acute toxicity includes five hazard categories and flammable liquids includes four hazard categories. These categories compare hazard severity within a hazard class and should not be taken as a comparison of hazard categories more generally; Hazard class means the nature of the physical, health or environmental hazard, e.g. flammable solid, carcinogen, oral acute toxicity.
- Label means:** 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.
- Mixture:** A mixture or a solution composed of two or more substances in which they do not react.
- Mutagen:** An agent giving rise to an increased occurrence of mutations in populations of cells and /or organisms.
- Pictogram:** A graphical composition that may include a symbol plus other graphic elements, such as a border, background pattern or colour that is intended to convey specific information.
- Precautionary Statements:** phrase or pictogram (or both) that describes recommended measures that should be taken into account to minimize or prevent adverse effects resulting from exposure to a hazardous product, or improper storage or handling of a hazardous product.
- Regulations:** The Waste Classification and Management Regulations under the NEM:WA.
- Serious eye damage:** 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.

- Signal word:** A word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The GHS uses “Danger” and “Warning” as signal words.
- Skin corrosion:** The production of irreversible damage to the skin following the application of a test substance for up to 4 hours.
- Skin irritation:** The production of reversible damage to the skin following the application of a test substance for up to 4 hours.
- Substance:** Chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve the stability of the product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.
- Symbol:** A graphical element intended to succinctly convey information.

ABBREVIATIONS:

CDC:	Centres for Disease Control & Prevention
DEA:	Department of Environmental Affairs
GHS:	Globally Harmonized System of Classification and Labelling of Chemicals.
IARC:	International Agency for Research on Cancer
MSDS:	Material Safety Data Sheet
NEM:WA:	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)[NEM:WA]
NEM:WAA:	National Environmental Management: Waste Amendment Act, 2014 (Act No. 26 of 2014)[NEM:WAA]
SANS:	South African National Standard
SDS:	Safety Data Sheet
STOT:	Specific Target Organ Toxicity
USEPA:	United States Environmental Protection Agency

1. BACKGROUND AND INTRODUCTION

Nsovo Environmental Consulting, commissioned Interwaste (Pty) Ltd. (hereinafter referred to as 'Interwaste') to classify Transnet's evaporation pond sludge within the Port of Saldanha, in terms of SANS 10234 (Globally Harmonised System of Classification and Labelling of Chemicals, GHS). The above mentioned material falls within the ambit of the definition of 'waste' provided for in the National Environmental Management: Waste Amendment Act, 2014 (Act 26 of 2014)[NEM:WAA], and thus need to be managed in accordance with the relevant provisions of the Act, as well as any relevant Regulations promulgated thereunder.



Figure 1: One of the sludge samples from Transnet ponds

Interwaste has adopted a hierarchical approach toward classifying the subject waste stream. The approach is intended to inform the classification of the subject waste stream according to SANS 10234 in an efficient, cost effective and orderly manner, without compromising on the quality of the classification or the need to adhere to applicable legal requirements. Key to this approach is to use available laboratory analysis on the subject waste stream in conjunction with existing hazard information on the waste as a whole, or key ingredients/components thereof, thereby avoiding the need for potentially costly 'duplicate' testing and the unnecessary use of test animals.

Regulation 4 (2) of the Department of Environmental Affairs' (DEA) *Waste Classification and Management Regulations* (GN. R. 634 of 23 August 2013), hereinafter referred to as

'the Regulations', have been used as the legal trigger toward the requisite classification of this waste stream. Accordingly, in terms of Regulation 4 (2), Interwaste has classified the waste according to the relevant provisions of SANS 10234 (Globally Harmonised System of Classification and Labelling of Chemicals, GHS).

1.1 WASTE GENERATION PROCESS OVERVIEW

Transnet Port Terminal channels storm water as well as dust suppression run-off water into various ponds on their site. The subject waste stream is the sludge/liquid residue found at these ponds. This site has 14 ponds which receive water as described above and shown in below map.



Figure 2: The applicable area of study with indicated pond locations

Defined or 'Pre-classified' Waste.	
Waste listed in Schedule 3 of NEM:WAA (Act 26 of 2014)	x
Not listed	
Waste listed as pre-classified in Annexure 1 to GN.R. 634, 23 August 2013)	x
Not listed	

1.2 OVERVIEW OF SANS 10234, GHS

The SANS 10234, GHS, standard covers the harmonized criteria for the classification of hazardous substances and mixtures, including waste, for their safe transport, storage and handling, according to their intrinsic health, environmental and physical hazards. It gives the harmonized communication elements for labelling and Safety Data Sheets (SDS). The standard accordingly provides detail on classification criteria (including tests methods, for physical hazard classes, often with reference to SANS 10228), labelling, hazard identification symbols (pictograms), packaging and the minimum information required for a Safety Data Sheet (SDS).

The promulgation of the National Waste Classification and Management Regulations under the National Environmental Management: Waste Act, 2008 (Act 59 of 2008)[NEM:WA] has significantly altered the regulatory environment in South Africa in respect of the classification of waste; where until now the comprehensive classification of waste has not been a clear legal requirement.

Importantly, the classification of a waste has little bearing on the disposal or management requirements thereof, but is used primarily to inform

- i) appropriate handling and storage of hazardous waste, as well as
- ii) the development of an associated Safety Data Sheet (SDS) for the waste in terms of SANS10234, as is required in terms of Regulation 5 (1).

The classification of the waste, in terms of SANS 10234, does not necessarily inform the disposal requirements thereof, but may be used to a degree to inform the potential applicability of landfill restrictions imposed under section 5 (1) of the Standard for the Disposal of Waste to Landfill, GN. R. 635 of 23 August 2013.

2. SAMPLING AND ANALYSIS

Sampler	Date	Method	
Interwaste	2017/10/12	Samples of the subject waste stream was obtained from Transnet Port Terminal and submitted to Interwaste laboratory for subsequent analysis.	
Laboratory Analysis—Elemental (XRF)			
Compositional characterisation	Laboratory	Total Concentration	Leachable Concentration
<ul style="list-style-type: none"> Metals and metalloids, as listed in GN. R. 635 Other detectable metals 	Interwaste Laboratory	✓	✓
Inorganic anions, as listed in GN.R. 635: (Cl, F, NO ₃ , SO ₄ , CN)		✓	x
<ul style="list-style-type: none"> Organics, as listed in GN.R. 635 Other detectable organic substances 		✓	N/A
		✓	N/A
Physical and chemical properties			
Physical and chemical properties	Laboratory	Range	
<ul style="list-style-type: none"> pH Flash point 	Interwaste Laboratory	✓	
		✓	

N/A = not applicable

Raw data from the laboratory analysis are attached hereto in [Annexure B](#)

2.1 RESULTS AND DISCUSSION

All analytical results received were converted to a percentage by mass basis, in order to assess the contaminant concentrations against the prescribed cut-off values / concentration limits (Table 1 & Table 2) to be applied for human health and environmental hazard classes as per SANS 10234.

Hazard Class		Cut-off Value (concentration limit); %
Acute toxicity		≥ 1.0%
Skin corrosion		≥ 1.0%
Skin irritation		≥ 1.0%
Serious eye damage		≥ 1.0%
Eye irritation		≥ 1.0%
Respiratory sensitisation		≥ 1.0%
Skin sensitisation		≥ 1.0%
Mutagenicity	Category 1	≥ 0.1%
	Category 2	≥ 1.0%
Carcinogenicity		≥ 0.1%
Reproductive toxicity		≥ 0.1%
Target organ systemic toxicity	Single exposure	≥ 1.0%
	Repeat exposure	≥ 1.0%
Hazardous to the aquatic environment		≥ 1.0%

The application of the cut-off values, as per Table 1, shows no contaminant in the waste to be considered potentially relevant to the classification thereof in terms of SANS 10234; with reasons for 'relevance' indicated where applicable.

Compound Form	Concentration (ppm)	Relevant to classification	Reason
Calcium	23.99	x	<0.1%
Magnesium	9.5	x	<0.1%
Manganese	3.52	x	<0.1%
Iron	3.26	x	<0.1%
Aluminium	0.28	x	<0.1%
Sulphur	16.45	x	<0.1%
Phosphorus	4.31	x	<0.1%

* C = Carcinogenic, M = Mutagenic or R = Reproductive Toxin (with cut-off values of 0.1% relevant to these hazard classes, as opposed to 1% for all remaining human health and aquatic hazard classes)

^A Crystalline form as per XRD analysis.

^B Chemical form assumed based on literature, or associated elemental concentrations in the waste.

3. SANS 10234 CLASSIFICATION – ‘INGREDIENT’ HAZARD DATA

SANS 10234 makes a general allowance for the use of existing hazard data on classified ‘ingredients’ in a mixture toward the classification of that mixture. This is primarily aimed at avoiding unnecessary testing in the laboratory on the mixture (i.e. the waste in this instance) as a whole, particularly as it pertains to animal testing in respect of human health and environmental hazard groups. This process (in general terms) relies on knowing the intrinsic hazards or hazardous properties of the ingredients in a mixture, in combination with knowledge of the contribution thereof (by mass) to the overall mixture / waste.

The following phased approach was adopted by Interwaste toward classifying the subject waste stream, so that the outcomes are scientifically correct and the output thereof defensible:

1. Waste generator discussions and review of the process(es) generating the waste, as well as any existing/relevant SDS's;
2. Laboratory analysis, focused on relevant contaminants of concern;
3. Literature review / assimilation of hazard data and existing GHS classifications on the waste / mixture as a whole, or similar waste streams; where... *“test data already generated for the classification of a chemical under existing systems shall be accepted when classifying a waste under the harmonised system, thereby avoiding duplicate testing and the unnecessary use of test animals”* (SANS 10234);
4. A) Application of bridging principles prescribed under SANS 10234 towards hazard class classification, given the lack of availability of existing hazard information on similar waste streams (Annexure A has reference);
↓
B) Application of additivity principles under the GHS where bridging principles inadequate towards hazard class classification; given that no hazard data is available on the waste/mixture as a whole, but where there is sufficient existing hazard data on the ingredients/constituents of the waste to allow for such.

To this end, the available knowledge on the ingredient composition for the subject waste stream has been used to source available hazard data for each of the relevant ingredients. The term ‘relevant ingredients’ is used to describe those ingredients in the waste that were measured at a concentration of >0.1% (by mass); where Table 2 refers.

SANS 10234 (GHS) Detailed Waste Classification

Waste appearance	Red liquid sludge
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Classification Summary

Not classified under SANS 10234.

Assumptions and limitations

- The measured metal substances were assumed to be present in oxide form as found in literature for waste similar to the subject waste stream.
- Hazard information for substances is sourced from:
 - Analytical results
 - Hazardous relevant ingredients, SDS (where relevant).
 - Supplement to SANS 10234:2008 Edition 1.
 - European Chemicals Agency, Classification & Labelling Inventory Database.
 - US Centre for Disease Control (CDC).
- The mixture has a pH of 6.84

Hazard Class	Hazard Category	Classification Criteria	Assessed Concentration wt. %	Waste Hazard Category
Physical Hazards				
Explosives	Division 1.1 – 1.6	According to the results of the tests in Part I of the UN Manual of tests and criteria	No substance identified	
Flammable Gases	1	Gases and gas mixtures that, at 20°C and a standard pressure of 101.3 kPa: <ul style="list-style-type: none"> a) Are ignitable when in a mixture of 13% or less by volume in air, or b) Have a flammable range with air of at least 12 percentage points regardless of the lower flammable limit 	No substance identified	
	2	Gases or gas mixtures, other than those of category 1, which, at 20°C and a standard pressure of 101.3 kPa, have a flammable range while mixed in air	No substance identified	
Flammable Aerosols	1 - 2	On the basis of its components, of its chemical heat of combustion and, if applicable, of the results of the foam test, for foam aerosols, and of the ignition distance test and enclosed space test, for spray aerosols (see Part III, section 31 of the UN Manual of tests and criteria)	No substance identified	
Oxidizing Gases	1	Any gas that may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does	No substance identified	
Gases Under Pressure	Compressed Gas	A gas that, when packaged under pressure, is entirely gaseous at -50°C, including all gases with a critical temperature ≤ -50°C	No substance identified	

Hazard Class	Hazard Category	Classification Criteria	Assessed Concentration wt. %	Waste Hazard Category
	Liquefied Gas	<p>A gas that, when packaged under pressure, is partially liquid at temperatures above -50°C</p> <p>A distinction is made between:</p> <p>a) High pressure liquefied gas, a gas with a critical temperature between -50°C and $+65^{\circ}\text{C}$, and</p> <p>b) Low pressure liquefied gas, a gas with a critical temperature above $+65^{\circ}\text{C}$</p>	No substance identified	
	Refrigerated Liquefied Gas	A gas that, when packaged, is made partially liquid because of its low temperature	No substance identified	
	Dissolved Gas	A gas that, when packaged under pressure, is dissolved in a liquid phase solvent	No substance identified	
Flammable Liquids	1	Flash point $< 23^{\circ}\text{C}$ and initial boiling point $\leq 35^{\circ}\text{C}$	No substance identified	
	2	Flash point $< 23^{\circ}\text{C}$ and initial boiling point $> 35^{\circ}\text{C}$	No substance identified	
	3	Flash point $< 23^{\circ}\text{C}$ and $\leq 60^{\circ}\text{C}$	No substance identified	
	4	Flash point $> 60^{\circ}\text{C}$ and $\leq 93^{\circ}\text{C}$	No substance identified	
Flammable Solids	1	<p>a) substance and mixtures other than metal powders</p> <p>The wetted zone does not stop the fire and the burning time is $< 45\text{s}$, or the burning rate is $> 2,2\text{mm/s}$</p> <p>b) The burning time is $\leq 5\text{ min}$</p>	No substance identified	
	2	<p>a) substance and mixtures other than metal powders</p> <p>The wetted zone does not stop the fire for at least 4 minutes and the burning time is $< 45\text{s}$, or the burning rate is $> 2,2\text{mm/s}$</p> <p>b) The burning time is $> 5\text{ min}$ and $\leq 10\text{min}$</p>	No substance identified	

Hazard Class	Hazard Category	Classification Criteria	Assessed Concentration wt. %	Waste Hazard Category
Self-Reactive Substances	Type A	According to the results of the tests in Part II, section 20.4.2 of the UN Manual of tests and criteria	No substance identified	
	Type B	According to the results of the tests in Part II, section 20.4.2 of the UN Manual of tests and criteria	No substance identified	
	Types C and D	According to the results of the tests in Part II, section 20.4.2 of the UN Manual of tests and criteria	No substance identified	
	Types E and F	According to the results of the tests in Part II, section 20.4.2 of the UN Manual of tests and criteria	No substance identified	
	Type G	According to the results of the tests in Part II, section 20.4.2 of the UN Manual of tests and criteria	No substance identified	
Pyrophoric Liquids	1	The liquid ignites within 5 min when added to an inert carrier and exposed to air, or it ignites or chars a filter paper on contact with air within 5 min	No substance identified	
Pyrophoric Solids	1	The solid ignites within 5 min of coming into contact with air	No substance identified	
Self-Heating Substances	1	A positive result is obtained in a test using a cubical container of sides 25 mm at 140°C	No substance identified	
	2	<p>a) A positive result is obtained in a test using a cubical container of sides 100 mm at 140°C and a negative result is obtained in a test using a cubical container of sides 25 mm at 140°C <u>and</u> the substance is to be packed in the packages with a volume of more than 3 m³, or</p> <p>b) A positive result is obtained in a test using a cubical container of sides 100 mm at 140°C and a negative result is obtained in a test using a cubical container of sides 25 mm at 140°C, a positive result is obtained in a test using a cubical container of sides 100mm at 120°C <u>and</u> the substance is to be packed in packages with a volume of more than 450litres, or</p> <p>c) A positive result is obtained</p>	No substance identified	

Hazard Class	Hazard Category	Classification Criteria	Assessed Concentration wt. %	Waste Hazard Category
		in a test using a cubical container of sides 100 mm at 140°C and a negative result is obtained in a test using a cubical container of sides 25 mm at 140°C <u>and</u> a positive result is obtained in a test using a cubical container of sides 100 mm at 100°C		
Substances that, on contact with water, emit flammable gases	1	Any substance that reacts vigorously with water at ambient temperatures and demonstrates a tendency for the gas produced to ignite spontaneously, or that reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 10L/kg of substance over any 1min	No substance identified	
	2	Any substance that reacts vigorously with water at ambient temperatures and demonstrates a tendency for the gas produced to ignite spontaneously, or that reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 10L/kg of substance over any 1min	No substance identified	
	3	Any substance that reacts slowly with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 1L/kg of substance per hour, and that does not meet the criteria for the categories 1 and 2	No substance identified	
Oxidizing Liquids	1	Any substance that, in the 1 : 1 mixture, by mass, of substance and cellulose tested, spontaneously ignites, or the mean pressure rise time of a 1 : 1 mixture, by mass, of 50% perchloric acid and cellulose	No substance identified	
	2	Any substance that, in the 1 : 1 mixture, by mass, of substance and cellulose tested, exhibits a mean pressure rise time less than or to the mean pressure rise time of a 1 : 1 mixture, by mass, of 40% aqueous sodium chlorate solution and cellulose, and the criteria for category 1 are not met	No substance identified	
	3	Any substance that, in the 1 : 1 mixture by mass, of substance and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1 : 1 mixture, by mass, of 65% aqueous nitric acid and cellulose, and the	No substance identified	

Hazard Class	Hazard Category	Classification Criteria	Assessed Concentration wt. %	Waste Hazard Category
		criteria for categories 1 and 2 are not met		
Oxidizing Solids	1	Any substance that, in the 4 : 1 or 1: 1 sample-to-cellulose ratio, by mass, exhibits a mean burning time less than the mean burning time of a 3 : 2 mixture, by mass, of potassium bromate and cellulose	No substance identified	
	2	Any substance that, in the 4 : 1 or 1: 1 sample-to-cellulose ratio, by mass, exhibits a mean burning time equal to or less than the mean burning time of a 2 : 3 mixture, by mass, of potassium bromate and cellulose and the criteria for category 1 are not met	No substance identified	
	3	Any substance that, in the 4 : 1 or 1: 1 sample-to-cellulose ratio, by mass, exhibits a mean burning time equal to or less than the mean burning time of a 3 : 7 mixture, by mass, of potassium bromate and cellulose and the criteria for categories 1 and 2 are not met	No substance identified	
Organic Peroxides	Type A	According to the results of test series A to H in the Part II, Section 20.4.3 of the UN manual of tests and criteria	No substance identified	
	Type B	According to the results of test series A to H in the Part II, Section 20.4.3 of the UN manual of tests and criteria	No substance identified	
	Type C and D	According to the results of test series A to H in the Part II, Section 20.4.3 of the UN manual of tests and criteria	No substance identified	
	Type E and F	According to the results of test series A to H in the Part II, Section 20.4.3 of the UN manual of tests and criteria	No substance identified	
	Type G	According to the results of test series A to H in the Part II, Section 20.4.3 of the UN manual of tests and criteria	No substance identified	
Corrosive to Metals	1	Corrosion rate on steel or aluminium surfaces exceeding 6,25mm/year at 55°C	No substance identified	
Health Hazards				
Acute toxicity	1, 2, 3, 4 & 5	If a mixture acute toxicity estimate (ATE) is within a specified range specific to routes of exposure.	No substance identified	
Skin Corrosion/Irritation	1	If an individual substance $\geq 5\%$ and is classified under category 1, or if a mixture $\text{pH} \geq 11.5$ or ≤ 2 , or if an individual substance $\geq 1\%$ has $\text{pH} \geq 11.5$ or ≤ 2 , or if an individual	No substance identified	

Hazard Class	Hazard Category	Classification Criteria	Assessed Concentration wt. %	Waste Hazard Category
		substance $\geq 1\%$ for which additivity does not apply is corrosive (category 1).		
	2	If an individual substance $\geq 1\%$ but $\leq 5\%$ and is classified under category 1, or if an individual substance $\geq 10\%$ and is classified under category 2, or if $(10 \times \text{skin category 1}) + \text{skin category 2} \geq 10\%$, or if an individual substance $\geq 3\%$ for which additivity does not apply and is classified skin irritant category 2.	No substance identified	
	3	If an individual substance $< 10\%$ but $\geq 1\%$ and is classified under category 2, or if an individual substance $\geq 10\%$ and is classified under category 3, or if $(10 \times \text{skin category 1}) + \text{skin category 2} < 10\%$ but $\geq 1\%$, or if $(10 \times \text{skin category 1} + \text{skin category 2} + \text{skin category 3}) \geq 10\%$	No substance identified	
Serious Eye Damage/Eye irritation	1	If an individual substance $\geq 3\%$ and is classified skin/eye category 1, or if a mixture $\text{pH} \geq 11.5$ or ≤ 2 , or if $(\text{skin category 1} + \text{eye category 1}) \geq 3\%$, or if an individual substance $\geq 1\%$ has $\text{pH} \geq 11.5$ or ≤ 2 , or if an individual substance $\geq 1\%$ for which additivity does not apply is corrosive (category 1)..	No substance identified	
	2	If an individual substance $\geq 1\%$ but $< 3\%$ and is classified skin/eye category 1, or if an individual substance $\geq 10\%$ and is classified under category 2A, or if $(10 \times \text{eye category 1} + \text{eye category 2A}) \geq 10\%$, or if $(\text{skin category 1} + \text{eye category 1}) \geq 1\%$ but $< 3\%$, or if an individual substance $\geq 3\%$ for which additivity does not apply and is classified skin/eye irritant category 2, or if $(10 \times \text{eye category 1} + 10 \times \text{skin category 1} + \text{eye category 2A/2B}) \geq 10\%$.	No substance identified	
Respiratory sensitization and skin sensitization	Skin sensitization Category 1	If an individual substance $\geq 0.1\%$ and is classified skin sensitization category 1	No substance identified	
	Respiratory sensitization Category 1	If an individual solid or liquid or gaseous substance $\geq 0.1\%$ and is classified respiratory sensitization category 1	No substance identified	
Germ Cell Mutagenicity	1	If an individual substance $\geq 0.1\%$ and is classified under category 1	No substance identified	
	2	If an individual substance $\geq 0.1\%$ and is classified under category 2	No substance identified	
Carcinogenicity	1A	If an individual substance $\geq 0.1\%$ and is classified category 1 carcinogen	No substance identified	

Hazard Class	Hazard Category	Classification Criteria	Assessed Concentration wt. %	Waste Hazard Category
		(known)		
	1B	If an individual substance $\geq 0.1\%$ and is classified category 1 carcinogen (presumed)	No substance identified.	
	2	If an individual substance $\geq 0.1\%$ and is classified category 2 carcinogen.	No substance identified	
Reproductive Toxicity	1A	If an individual substance $\geq 0.1\%$ and is classified reproductive toxicant category 1 (known).	No substance identified	
	1B	If an individual substance $\geq 0.1\%$ and is classified reproductive toxicant category 1 (presumed).	No substance identified	
	2	If an individual substance $\geq 0.1\%$ and is classified reproductive toxicant category 2.	No substance identified.	
	Category for effects on, or via lactation	If an individual substance $\geq 0.1\%$ and is classified reproductive toxicant for effects on, or via lactation.	No substance identified	
Specific Target Organ Toxicity – Single Exposure	1	If an individual substance $\geq 1\%$ and is classified STOT – single exposure category 1.	No substance identified	
	2	If an individual substance $\geq 1\%$ and is classified STOT – single exposure category 2.	No substance identified	
	3	If an individual substance $\geq 20\%$ and is classified STOT – single exposure category 3.	No substance identified	
Specific Target Organ Toxicity – Repeated Exposure	1	If an individual substance $\geq 1\%$ and is classified STOT – repeated exposure category 1.	No substance identified	
	2	If an individual substance $\geq 1\%$ and is classified STOT – Repeated exposure category 2	No substance identified	
Aspiration Hazards	1	If an individual substance $\geq 10\%$ and is classified as aspiration toxicant category 1 and has a kinematic viscosity $\leq 20.5 \text{ mm}^2/\text{s}$, at $40 \text{ }^\circ\text{C}$	No substance identified	
	2	If an individual substance $\geq 10\%$ and is classified as aspiration toxicant category 2 and has a kinematic viscosity $\leq 14 \text{ mm}^2/\text{s}$, at $40 \text{ }^\circ\text{C}$	No substance identified	
Hazards to the Aquatic Environment				
Acute Aquatic Toxicity	1	If (Multiplication factor as determined in the GHS \times Acute 1) $> 25\%$.	No substance identified	
	2	If (Multiplication factor as determined in the GHS $\times 10 \times$ Acute 1 + Acute 2) $> 25\%$.	No substance identified	
	3	If (Multiplication factor as determined in the GHS $\times 100 \times$ Acute 1 + $10 \times$ Acute 2 + Acute 3) $> 25\%$.	No substance identified	
Chronic Aquatic Toxicity	1	If (Multiplication factor as determined in the GHS \times Chronic 1)	No substance identified	

Hazard Class	Hazard Category	Classification Criteria	Assessed Concentration wt. %	Waste Hazard Category
		> 25%.		
	2	If (Multiplication factor as determined in the GHS $\times 10 \times$ Chronic 1 + Chronic 2) > 25%.	No substance identified	
	3	If (Multiplication factor as determined in the GHS $\times 100 \times$	No substance identified	
	4	If (Chronic 1 + Chronic 2 + Chronic 3 + Chronic 4) > 25%	No substance identified	

4. DISCUSSION

The evaporation pond sludge waste stream classifies as non-hazardous when applying the criteria prescribed under SANS 10234.

As per the 'Waste Classification and Management Regulations, 2013 (GNR634)', a safety data sheet (SDS) is not required for the subject waste.

ANNEXURE A: GHS CLASSIFICATION CRITERIA

Skin Corrosion/Irritation

SANS10234, Table 26 – Cut-off values/concentration limits of the ingredients of a mixture classified as skin category 1, 2 or 3 that trigger classification of the mixture as hazardous to skin			
Sum of ingredients classified as:	Cut-off values/concentration limits of the ingredients that trigger the classification of a mixture		
	%		
	Skin corrosive	Skin irritant	
	Category 1	Category 2	Category 3
Skin category 1	≥ 5	≥1 but < 5	
Skin category 2		≥10	10 > C ≥ 1
Skin category 3			≥10
(10 X skin category 1) + skin category 2		≥10	10 > C ≥ 1
(10 X skin category 1) + skin category 2 + skin category 3			≥10

Serious Eye Damage/Eye Irritation

SANS 10234 Table 30 – Cut-off values/concentration limits of the ingredients of a mixture classified as category for skin effects and/or category 1 or 2 for eye effects that trigger classification of the mixture as hazardous to the eye		
Sum of ingredients classified as:	Cut-off values/concentration limits of the ingredients that trigger the classification of a mixture	
	%	
	Irreversible eye effects	Reversible eye effects
	Category 1	Category 2
Eye or skin category 1	≥ 3	3 > C ≥ 1
Eye category 2A		≥10
(10 X eye category 1) + eye category 2A		≥10
Skin category 1 + eye category 1	≥ 3	3 > C ≥ 1
10 X (skin category 1 + eye category 1) + eye category 2A or 2B		≥10

Carcinogenicity

SANS10234, Table 39 - Cut-off values/concentration limits of ingredients classified as carcinogens that trigger classification of a mixture.		
Ingredient classified as:	Cut-off values/concentration limits of the ingredients that trigger the classification of a mixture	
	%	
	Category 1 carcinogen	Category 2 carcinogen
Category 1 carcinogen	≥ 0.1%	
Category 2 carcinogen	-	≥ 0.1%
		≥ 1.0%

Reproductive Toxicity—Fertility

SANS10234, Table 42 – Cut-off values/concentration limits of the ingredients of a mixture classified as reproductive toxicants that trigger classification of the mixture			
Sum of ingredients classified as:	Cut-off values/concentration limits of the ingredients that trigger the classification of a mixture		
	%		
	Category 1	Category 2	Additional category for effects on, or via lactation
Category 1 reproductive toxicant	≥0.1		
Category 2 reproductive toxicant		≥0.1	
Additional category for effects on, or via lactation			≥0.1

Germ Cell Mutagenicity

SANS 12034, Table 36 - Cut-off values/concentration limits of ingredients of a mixture that trigger classification as germ cell mutagens		
Hazard category of the ingredient(s)	Cut-off values/concentration limits of the ingredients that trigger the classification of a mixture	
	%	
	Category 1	Category 2
Category 1	≥ 0.1%	
Category 2		≥ 1%

Specific Target Organ Toxicity (STOT)—Single Exposure

SANS 12034, Table 46 - Cut-off values/concentration limits of ingredients of a mixture that trigger classification as a specific target organ toxicant – single exposures		
Hazard category of the ingredient(s)	Cut-off values/concentration limits of the ingredients that trigger the classification of a mixture	
	%	
	Category 1	Category 2
Category 1	≥ 1%	
Category 2		≥ 1%

Specific Target Organ Toxicity (STOT)—Repeated Exposure

SANS 12034, Table 51 - Cut-off values/concentration limits of ingredients of a mixture that trigger classification as a specific target organ toxicant – repeated exposures		
Hazard category of the ingredient(s)	Cut-off values/concentration limits of the ingredients that trigger the classification of a mixture	
	%	
	Category 1	Category 2
Category 1	≥ 1%	
Category 2		≥ 1%

Hazards to the Aquatic Environment

SANS 10234, Table 58 – Classification of Mixtures for Acute Hazards to the Aquatic Environment, based on the summation of classified components	
Sum of the components/ingredients classified as:	Acute hazard category of the mixture
Acute 1 X M >25%	1
(M X 10 X Acute 1) + Acute 2 >25%	2
(M X 100 X Acute 1) + (10 X Acute 2) + Acute 3 >25%	3

* LC50 KMnO4 ≥ 0.1 ≤ 1.0 mg/l; therefore M = 1

SANS 10234, Table 59 – Classification of Mixtures for Chronic Hazards to the Aquatic Environment, based on the summation of classified components	
Sum of the components/ingredients classified as:	Chronic hazard category of the mixture
Chronic 1 X M >25%	1
(M X 10 X Chronic 1) + Chronic 2 >25%	2
(M X 100 X Chronic 1) + (10 X Chronic 2) + Chronic 3 >25%	3
Chronic 1 + Chronic 2 + Chronic 3 + Chronic 4 >25%	4

* NOEC KMnO4 > 0.01mg/l ≤ 0.1mg/l; therefore M = 1

ANNEXURE B: LABORATORY RESULTS

Sample Identification Number: **IW2017-0691**

Laboratory Analysis Report for Landfill Assessment			
Requested By:	Sintu	Waste Name:	Pond water
Generator:	Transnet	Received Date:	24/10/2017
Lab Reference:	IW2017-0691	Analysis Date:	27/10/2017
No. of Samples:	1	Report Date:	19/11/2017
Sample Description:	Red oxide liquid with bubbles		

Table 1: Miscellaneous tests for sample: IW2017-0691 *

Parameter Tested	Unit	IW2017-0691
Sample Moisture Content	% (w/w)	Liquid
Conductivity	uS/cm	907
Initial Sample pH	pH Units	6.84
Sample pH after HCl Addition	pH Units	NT
Leach Solution Applied	Solution Type	Water
Final Leach Solution pH	pH Units	NT
Physical State	NA	Liquid
Water Miscibility	NA	Miscible
Calorific Value	MJ/kg	NT
Additional Information	NA	Moderate odour

* UTD = Unable to determine; NT = Not tested; Conductivity and pH measured by electronic conductivity and pH meter at ~22C (10% H2O extracts of solids). Moisture by mass loss on heating at ~103C for 30 mins.

Table 2: ICP-OES metals analysis for sample: IW2017-0691, solution Water *

Contaminant Name	Symbol	Detection Limit (mg/L)	Concentration (mg/L)
Arsenic	As	0.016	BDL
Boron	B	0.045	BDL
Barium	Ba	0.013	BDL
Cadmium	Cd	0.013	BDL
Cobalt	Co	0.014	BDL
Chromium	Cr	0.011	BDL
Chromium(VI)	Cr(VI)	UTD	UTD
Copper	Cu	0.013	BDL

Mercury	Hg	0.016	BDL
Manganese	Mn	0.013	3.525
Molybdenum	Mo	0.016	BDL
Nickel	Ni	0.014	BDL
Lead	Pb	0.013	BDL
Antimony	Sb	0.024	BDL
Selenium	Se	0.038	BDL
Vanadium	V	0.026	BDL
Zinc	Zn	0.022	BDL

* UTD = Unable to determine; NT = Not tested; BDL = Element below indicated detection limit; All elements measured by ICP-OES; Only tested contaminants listed under section 6 of GNR635 are indicated.

Table 3: GC-MS total and leachable organics for sample: IW2017-0691 *

Contaminant Name	Detection Limit (mg/kg)	Concentration (mg/kg)	Theoretical Max. Leach Concentration (mg/L)
Nonane	2.000	BDL	BDL
Decane	2.000	2.927	0.146
Dodecane	2.000	2.995	0.150
Tetradecane	2.000	BDL	BDL
Hexadecane	2.000	2.124	0.106
Octadecane	2.000	BDL	BDL
Nonadecane	2.000	BDL	BDL
Eicosane	2.000	BDL	BDL
Docosane	2.000	BDL	BDL
Tetracosane	2.000	BDL	BDL
Hexacosane	2.000	2.487	0.124
Octacosane	2.000	2.730	0.137
Hentriacontane	2.000	BDL	BDL
n-Hexane	0.002	0.008	0.000
Heptane	0.002	BDL	BDL
Octane	0.002	0.005	0.000
Nonane2	0.002	BDL	BDL
Decane3	0.002	0.032	0.002
1,2-Dichloroethylene	0.002	BDL	BDL
Chloroform	0.002	BDL	BDL

1,1,1-Trichloroethane	0.002	BDL	BDL
1,2-Dichloroethane	0.002	BDL	BDL
1,1-Dichloropropene	0.002	BDL	BDL
Benzene	0.002	0.009	0.000
Carbon Tetrachloride	0.002	BDL	BDL
Trichloroethylene	0.002	BDL	BDL
Bromodichloromethane	0.002	BDL	BDL
cis-1,3-Dichloropropene	0.002	BDL	BDL
Toluene	0.002	BDL	BDL
1,1,2 Trichloroethane	0.002	BDL	BDL
1,3-Dichloropropane	0.002	BDL	BDL
Dibromochloromethane	0.002	BDL	BDL
1,2 Dibromoethane	0.002	BDL	BDL
Tetrachloroethylene	0.002	BDL	BDL
Chlorobenzene	0.002	BDL	BDL
1,1,1,2-Tetrachloroethane	0.002	BDL	BDL
Ethylbenzene	0.002	BDL	BDL
o-Xylene	0.002	BDL	BDL
Styrene	0.002	BDL	BDL
1,1,2,2-Tetrachloroethane	0.002	BDL	BDL
1,2,3-Trichloropropane	0.002	0.005	0.000
Bromobenzene	0.002	0.007	0.000
Propylbenzene	0.002	BDL	BDL
4-Chlorotoluene	0.002	BDL	BDL
1,2,3-Trimethylbenzene	0.002	BDL	BDL
tert-Butylbenzene	0.002	BDL	BDL
1,4-Dichlorobenzene	0.002	BDL	BDL
sec-Butylbenzene	0.002	BDL	BDL
1,2-Dichlorobenzene	0.002	BDL	BDL
n-Butylbenzene	0.002	BDL	BDL
Hexachloroethane	0.002	BDL	BDL
1,2 Dibromo-3-chloropropane	0.002	BDL	BDL
1,3,5-Trichlorobenzene	0.002	BDL	BDL
Naphthalene	0.002	BDL	BDL
Hexachlorobutadiene	0.002	BDL	BDL
Phenol	2.000	BDL	BDL
Bis(2-chloroethyl) ether	2.000	2.548	0.127

2-Chlorophenol	2.000	2.689	0.134
1,4-Dichlorobenzene	2.000	BDL	BDL
1,2-Dichlorobenzene	2.000	BDL	BDL
2-Methylphenol (o-Cresol)	2.000	BDL	BDL
Bis(2-chloro-1-methylethyl) ether	2.000	BDL	BDL
4-Methylphenol (p-Cresol)	2.000	BDL	BDL
Hexachloroethane	2.000	BDL	BDL
Nitrobenzene	2.000	5.610	0.280
Isophorone	2.000	BDL	BDL
2-Nitrophenol	2.000	BDL	BDL
2,4-Dimethylphenol	2.000	BDL	BDL
Bis(2-chloroethoxy) methane	2.000	0.010	0.000
2,4-Dichlorophenol	2.000	BDL	BDL
1,3,5-Trichlorobenzene	2.000	BDL	BDL
Naphthalene	2.000	BDL	BDL
p-Chloroaniline	2.000	BDL	BDL
4-Chloro-3-methylphenol	2.000	BDL	BDL
2-Methylnaphthalene	2.000	BDL	BDL
Hexachlorocyclopentadiene	2.000	BDL	BDL
2,4,6-Trichlorophenol	2.000	BDL	BDL
2,4,5-Trichlorophenol	2.000	3.739	0.187
1-Chloronaphthalene	2.000	BDL	BDL
Diphenyl ether	2.000	BDL	BDL
2-Nitroaniline	2.000	BDL	BDL
Dimethyl phthalate	2.000	BDL	BDL
2-methyl-1,3-dinitro-Benzene	2.000	BDL	BDL
Acenaphthylene	2.000	BDL	BDL
Acenaphthene	2.000	BDL	BDL
Dibenzofuran	2.000	BDL	BDL
1-Methyl-2,4-dinitrobenzene	2.000	BDL	BDL
Diethylphthalate	2.000	BDL	BDL
1-chloro-4-phenoxybenzene	2.000	BDL	BDL
dimethyl-Cyanamide	2.000	BDL	BDL
Fluorene	2.000	BDL	BDL
3-Methyl-2-phenylpyridine	2.000	BDL	BDL
Azobenzene	2.000	BDL	BDL

1-Bromo-4-phenoxybenzene	2.000	BDL	BDL
Hexachlorobenzene	2.000	BDL	BDL
Pentachlorophenol	2.000	BDL	BDL
Phenanthrene	2.000	BDL	BDL
5H-Indeno[1,2-b]pyridine	2.000	BDL	BDL
Dibutyl phthalate	2.000	BDL	BDL
Fluoranthene	2.000	BDL	BDL
Benzyl butyl phthalate	2.000	BDL	BDL
Triphenylene	2.000	BDL	BDL
Benz[a]anthracene	2.000	BDL	BDL
Bis(2-ethylhexyl) phthalate	2.000	BDL	BDL
Di-n-octyl phthalate	2.000	BDL	BDL
Benzo[b]fluoranthene	2.000	BDL	BDL
Indenol[1,2,3-cd]pyrene	2.000	BDL	BDL
Benzo[b]triphenylene	2.000	0.004	0.000
Benzo[ghi]perylene	2.000	BDL	BDL

* UTD = Unable to determine; NT = Not tested; BDL = Element below indicated detection limit; All elements measured by GC-MS analysis

Table 4: Semi-quantitative analysis for sample: IW2017-0691 *

Contaminant Name	Detection Limit (mg/kg)	Concentration (mg/kg)	Leachable (mg/L)
Chromium (VI)	3	BDL	NT
Chloride	500	500	NT
Sulphate	200	BDL	NT
Nitrate-N	10	BDL	NT
Fluoride	2	BDL	NT
Cyanide Total	1	BDL	NT

*UTD = Unable to determine; NT = Not tested; BDL = Element below indicated detection limit; All elements measured by semi-quantitative analysis

Table 5: Landfill assessment for: IW2017-0691 *

Contaminant Name	Total (mg/kg)	Total (mg/L)	Waste Type
Metal Ions			
Arsenic	NT	0.016	Type 3
Boron	NT	0.045	Type 4
Barium	NT	0.013	Type 4
Cadmium	NT	0.013	Type 3
Cobalt	NT	0.014	Type 4
Chromium	NT	0.011	Type 4
Chromium(VI)	NT	UTD	UTD
Copper	NT	0.013	Type 4
Mercury	NT	0.016	Type 3
Manganese	NT	3.525	Type 3
Molybdenum	NT	0.016	Type 4
Nickel	NT	0.014	Type 4
Lead	NT	0.013	Type 3
Antimony	NT	0.024	Type 3
Selenium	NT	0.038	Type 3
Vanadium	NT	0.026	Type 4
Zinc	NT	0.022	Type 4
Chloride	NT	NT	UTD
Contaminant Name	Total (mg/kg)	Leachable (mg/L)	Waste Type
Inorganic Anions			
TDS	589.55	29.4775	Type 4
Sulphate	BDL	NT	Type 4
Nitrate	BDL	NT	Type 4
Fluoride	BDL	NT	Type 4
Cyanide	BDL	NT	Type 3
Organic Compounds			
Benzene	0.009	0.000	Type 3
Benzo(a)pyrene	NT	NT	UTD
Carbon tetrachloride	BDL	BDL	Type 3
Chlorobenzene	BDL	BDL	Type 3
Chloroform	BDL	BDL	Type 3
2-Chlorophenol	2.689	0.134	Type 3
Di (2 ethylhexyl) phthalate	BDL	BDL	Type 3
1,2-Dichlorobenzene	BDL	BDL	Type 3

1,4-Dichlorobenzene	BDL	BDL	Type 3
1,2-Dichloroethane	BDL	BDL	Type 3
1,1-Dichloroethylene	NT	NT	UTD
1,2-Dichloroethylene	NT	NT	UTD
Dichloromethane	NT	NT	UTD
2,4-Dichlorophenol	BDL	BDL	Type 3
2,4-Dinitrotoluene	NT	NT	UTD
Ethylbenzene	BDL	BDL	Type 3
Formaldehyde	NT	NT	UTD
Hexachlorobutadiene	BDL	BDL	Type 3
Methyl ethyl ketone	NT	NT	UTD
MTBE (Methyl t-butyl ether)	NT	NT	UTD
Nitrobenzene	5.610	0.280	Type 3
PAHs (total)	BDL	N/A	Type 3
Petroleum H/Cs, C6 to C9	BDL	N/A	Type 3
Petroleum H/Cs, C10 to C36	13.000	N/A	Type 3
Phenols (total, non-halogenated)	BDL	BDL	Type 3
Polychlorinated biphenyls	NT	NT	UTD
Styrene	BDL	BDL	Type 3
1,1,1-Tetrachloroethane	BDL	BDL	Type 3
1,1,2-Tetrachloroethane	BDL	BDL	Type 3
Tetrachloroethylene	NT	NT	UTD
Toluene	BDL	BDL	Type 3
Trichlorobenzenes (Total)	BDL	BDL	Type 3
1,1,1-Trichloroethane	BDL	BDL	Type 3
1,1,2-Trichloroethane	BDL	BDL	Type 3
Trichlorophenol	NT	NT	UTD
2,4,6-Trichlorophenol	BDL	BDL	Type 3
Vinyl Chloride	NT	NT	UTD
Xylene	BDL	BDL	Type 3

*UTD = Unable to determine; NT = Not tested; BDL = Element below indicated detection limit;

Determining the landfill site class for disposal:

The assigned waste type determines the class of landfill site where a particular waste stream may be disposed. A waste type of one (Type 1) is assigned to waste that presents the most risk to the environment when disposed of at a landfill site and therefore requires disposal at a site with stringent engineering controls corresponding to a so called "Class A" site. Type four (Type 4) waste presents a low risk to the environment when disposed of to a landfill site and therefore may be disposed of at a less stringently engineered, "Class D" site. Type zero waste (Type 0) may not be disposed of to any landfill site in South Africa without prior treatment. The *National Waste Classification and Management Regulations* detail specific requirements surrounding the classification and assessment of waste for disposal to landfill (See references). Note that a GHS (SANS10234) compliant classification and safety data sheet is required before a final waste management decision should be taken and should be read in conjunction with this assessment.

Standard Operational Procedure:

Identification of analysis methods:

IW-S-1: Determination of Metals in Liquids and solids using ICP-OES Optima 8300; IW-S-2: Determination of the VOC content of liquid and solids using GC6850, MS5976C; IW-S-3: pH Measurement; IW-S-4: EC Measurement; IW-S-5: Calibration and measurement of samples using Supercal Modular calorimeter; IW-S-6: Toxicity characteristic leaching procedure – TCLP; IW-S-7: Field Portable X-ray Fluorescence FTXRF; AS 4439.1-1999: Wastes, sediments and contaminated soils - Preparation of leachates - Preliminary assessment; AS 4439.3-1997: Wastes, sediments and contaminated soils - Preparation of leachates - Bottle leaching procedures.

Scope of Accreditation:

Materials/Products Tested	Types of Tests	Standard Specifications, Equipment/Techniques Used
1- Waste (Solid, sludge and liquid)	Quantification of metals by ICP-OES following ASLP, reagent water (Ag, Al, As, B, Ba, Be, Bi, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Rb, P, Pb, Sb, Se, Sn, Sr, Ti, Tl, U, V, Zn)	IW-M-01 - Based on method 6010C
2- Solids & Liquids	Determination of VOC; BTEX by GC/MS Headspace	IW-M-02 - Based on method EPA 8260B; EPA 5030B(Liquid) and EPA 5035 (solid)
3- Potable water & leachates	pH at 25 °C	IW-M-03
4- Potable water & leachates	Electrical Conductivity at 25°C	IW-M-04

Disclaimer:

Analysis results relate only to the samples submitted. The laboratory has no control over the sampling protocol, the representivity of the samples and the manner in which the samples were collected, transported, stored, preserved or otherwise handled outside of the laboratory facility and therefore takes no responsibility whatsoever for these activities. Third parties using INTERWASTE results can verify the results by contacting the laboratory. INTERWASTE are not liable or responsible for the customer use and/or interpretation of test results. This certificate cannot be reproduced without the written consent of INTERWASTE laboratory.

References

- 1.) Government Notice R.365, National Environmental Management: Waste Act (59/2008): National norms and standards for the assessment of waste for landfill disposal, Gazette No. 36

**ANNEXURE C: GENERATOR SANS 10234 SAFETY DATA SHEET (SDS)
FOR EVAPORATION POND SLUDGE**

SANS10234 Safety Data Sheet
Transnet
 Evaporation Pond Sludge



Section 1: Waste & Generator Identification			
Waste Type	Evaporation Pond Sludge	Synonym(s)	-
Waste Generator	Transnet 7395		+27 (0) 22 703 4908
		Emergency Contact Person	Marleandra Farmer
		Emergency No.	+27 (0) 22 703 4903
Waste Origin	Transnet Port Terminal channels storm water as well as dust suppression run-off water into various ponds on their site. The subject waste stream is the sludge/liquid residue found at these ponds.		
Section 2: Hazards Identification			
Physical	Health	Environmental	
-	-	-	
GHS Hazard Symbol(s)			
*Not classified as hazardous as per SANS 10234			
Signal Word	N/A		
Hazard Statement(s)	N/A		
Precautionary Statement(s)	<p>*Precautionary statements provided to assist with safe handling and use.</p> <p>P260: Do not breathe vapours P264: Wash eyes thoroughly after handling P270: Do not eat, drink or smoke when using this product P281: Use personal protective equipment as required P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing P391: Collect spillage P501: Dispose of contents/container in appropriate waste skips</p>		
Section 3: Composition / Information on Ingredients			
Common Chemical Name	Synonym(s)	CAS#	Concentration (ppm)
Calcium	-	7440-70-2	23.99
Magnesium	-	7439-95-4	9.5
Manganese	-	7439-96-5	3.52
Iron	-	7439-89-6	3.26
Aluminium	-	7429-90-5	0.28
Sulphur	-	7704-34-9	16.45
Phosphorus	-	7723-14-0	4.31
*The above mentioned contaminants are expected to occupy approximately 0.0061% of the overall concentration of the subject waste stream. The remaining concentration of approximately 99.9939% is assumed to be water.			

Section 4: First Aid Measures			
General advice	When consulting a physician. Show this safety data sheet to the doctor in attendance.		
Contact with Skin	Take off contaminated clothing and shoes immediately. Wash off with plenty of soap and water. Obtain medical advice if irritation persists or later develops..		
Contact with Eyes	Check for and remove contact lenses. Hold eyelids open and rinse thoroughly with plenty of water for at least 15 minutes. Obtain medical advice.		
Inhalation	If irritation develops or persist, call for medical assistance.		
Ingestion	Never give anything by mouth to an unconscious person. Rinse mouth with water. DO NOT induce vomiting.		
PPE for First Aid Responders	Wear protective clothing, gloves, and eye protection.		
Section 5: Fire-fighting Measures			
Extinguishing Media	Extinguish as surrounding fire.		
Potential Products of Combustion	Non-known		
Protective equipment / precautions for fire-fighters	Wear self-contained breathing apparatus for firefighting if necessary.		
Section 6: Accidental Release Measures			
Personal Precautions / PPE	Response and clean-up crews must be properly trained.		
Environmental Precautions	Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment if permitted.		
Clean-up Method / Materials & Containment	SMALL SPILL	LARGE SPILL	
	As per large spill →	Dike spilled material with unreactive absorbent material to prevent further run-off/dispersion of all liquid fractions.	
Materials/containers NOT to be Used for Clean-up	None.		
Section 7: Handling and Storage			
Precautions for Safe Handling	Handle in accordance with good industrial hygiene and safety practice. The personal protection and controls identified in Section 8 of the SDS should be used as appropriate.		
Precautions for Safe Storage	Apply relevant license conditions and or National Waste Storage Standards, as relevant.		
Compatibility Issues	Non-known		
Section 8: Exposure Controls / Personal Protection			
Exposure Limits	Component	Source	Limit
	*No reportable exposure limits		
Engineering Controls	Clean up contaminated areas		
Personal Protective Equipment	Eye Protection	Safety glasses or goggles.	
	Skin Protection	Gloves and clothing covering body as determined by a risk assessment	
	Respiratory Protection	-	

Section 9: Physical and Chemical Properties			
Appearance		Physical Characteristics (continued)	
Physical state	Liquid sludge	Initial boiling point	Not determined
Colour	Red brown	Flash point	Not determined
Odour		Auto ignition temperature	Not determined
Odour	Not determined	Decomposition temperature	Not determined
Odour threshold	Not determined	Solubility	Not determined
Physical Characteristics		Partition coefficient: n-octanol/water	Not determined
pH	6.84	Viscosity	Not determined
Melting point	Not determined	% volatile(s)	Not determined
Flammability	Not flammable	Evaporation rate	Not determined
Section 10: Stability and Reactivity			
Chemical stability	This is a stable material		
Possibility of Hazardous Reactions	Not subject to polymerisation under normal conditions.		
Hazardous Decomposition Products	Non-known.		
Incompatible Substances / Materials	-		
Conditions to Avoid	Incompatible materials		
Section 11: Toxicological Information			
Likely Routes of Exposure	Dermal and eye contact		
Acute Symptoms and Effects	Skin/eye Contact	-	
	Inhalation	-	
	Ingestion / Oral exposure	-	
Constituent / Ingredient Toxicity	LD₅₀		LC₅₀
	Oral	Dermal	Inhalation
Evaporation pond sludge	>5000 mg/kg	>5 000 mg/kg	>20 mg/l
Specific Target Organ Toxicity	-		
Chronic Toxicity	-		
Carcinogenicity	-		
Reproductive toxicity	-		
Irritancy of the waste	-		
Sensitization to the waste	-		
Section 12: Ecological Information			
Constituent Ecotoxicity	LC₅₀		EC₅₀
Evaporation pond sludge	> 100 mg/L		>100 mg/L
Persistence and Degradability	Not determined		
Bioaccumulation Potential	Not determined		
Mobility in Soil	Not determined		
Other Adverse Effects	None		

Section 13: Disposal Considerations			
Assessed in terms of the South African National Standard for the Assessment of Waste for Landfill Disposal (GN R 635 of 23 August 2013) – Type 3			
Potential Landfill Prohibition / Restrictions	As assessed under GN R 635 of August 2013		
Treatment Prior to Disposal	No foreseeable treatment required		
Section 14: Transport Information			
Waste Classification	Not classified	Labelling Required	*Not required under SANS 10228
UN number	-		
Shipping Name	-		
Packing Group	-		
SANS10228 / Transport Hazard Class(es)	-		
Marine Pollutant	-		
Special Instruction(s)	-		
Section 15: Regulatory Information			
Safety, Health and Environmental Legislation / Standards / Guideline	Comments / Applicability		
National Environmental Management Act, 1998 (Act 107 of 1998)[NEMA]	Principles, aims and objectives from environmental management in South Africa.		
National Environmental Management: Waste Act, 2008 (Act 59 of 2008)[NEM:WA]	Principles, aims and objectives for sound waste management practices in South Africa. Provides for, <i>inter alia</i> , the definition of 'waste'		
National Waste Classification and Management Regulations (GN R 634 of 23 August 2013)	Covers the requirements for waste management, classification and assessment for disposal to landfill of waste in South Africa.		
National Standard for the Assessment of Waste for Disposal to Landfill (GN R 635 of 23 August 2013)	Covers the requirements for the assessment of waste for disposal to landfill; where disposal is relevant.		
National Standard for the Disposal of Waste to Landfill (GN R 636 of 23 August 2013)	Covers the requirements (incl. prohibitions) for the disposal of waste to landfill; where disposal is relevant.		
SANS 10228 (The identification and classification of dangerous goods for transport)	Standard cover the identification of dangerous goods that are capable of posing significant risk to health and safety or to property and the environment; where such is linked to transport requirements for the transport of such goods.		
SANS 10232 (Transport of Dangerous Goods – Emergency Information Systems)	Covers the requirements for emergency information systems, placards and emergency information documents relevant to incidents involving dangerous goods.		
SANS 10234 (Globally Harmonised System of	Covers the classification of hazardous substances, including waste, for their safe transport, use at the workplace or in the home according to their health, environmental and physical hazards, for example, acute toxicity and flammability.		

Classification and Labelling of Chemicals)	
National Water Act, 1998 (Act 36 of 1998)[NWA]	Promotes the protection of water resources in the National interest.
Occupational Health and Safety Act, 1993 (Act 85 of 1993)[OHSA], as amended	Provides for the health and safety of persons at work.

Section 16: Other Information

Physical Hazards		Health Hazards		Environmental Hazards	
Explosives	X	Acute Toxicity: Oral	X	Acute Toxicity – Acute	X
Flammable Gases	X	Acute Toxicity: Skin	X	Acute Toxicity – Chronic	X
Flammable Aerosols	X	Acute Toxicity: Inhalation	X		
Oxidizing Gases	X	Skin Corrosion/Irritation	X		
Gases Under Pressure	X	Serious Eye Damage/Eye Irritation	X		
Flammable Liquids	X	Respiratory Sensitization	X		
Flammable Solids	X	Skin Sensitization	X		
Self-Reactive Substances	X	Germ Cell Mutagenicity	X		
Pyrophoric Liquids	X	Carcinogenicity	X		
Pyrophoric Solids	X	Toxic To Reproduction	X		
Self-Heating Substances	X	Specific Target Organ Toxicity – Single Exposure	X		
Substances That, On Contact With Water, Emit Flammable Gases	X	Specific Target Organ Toxicity – Repeated Exposure	X		
Oxidizing Liquids	X	Aspiration Hazard	X		
Oxidizing Solids	X				
Organic Peroxides	X				
Corrosive To Metals	X				

KEY	
Applicable	✓
Not applicable	X