[009009/22], [2022/11/15]

Certificate of Analysis

Project details

Customer Details

Customer reference:	WG1.22045
Quotation number:	Q2204-141
Company name:	WALLACE AND GREEN (PTY) LTD
Contact address:	10 CHERRON AVENUE, LA LUCIA, 4153
Contact person:	NICOLE GEOFFREY

Sampling Details

Sampled by:	CUSTOMER
Sampled date:	2022/10/18

Sample Details

Sample type(s):	WASTE STREAM SAMPLES
Date received:	2022/10/19
Delivered by:	CUSTOMER
Additional customer information:	WASTE STREAM: ILLOVO NOODSBERG: BOILER ASH 18.10.2022
Temperature at sample receipt (°C):	27.9

Report Details

Testing commenced:	2022/10/19
Report date:	2022/11/15
Our reference:	009009/22

ANALYTICAL RESULTS

Methods	Determinands	Units	W02224/22
			ILLOVO NOODSBERG: BOILER ASH 18.10.2022
XRF Metal Oxides			
-	Loss on Ignition (1000 °C)*	% g/g	8.92#
-	Total*	% g/g	99.55#
-	Sillica*	% g/g	68.00#
-	Titanium*	% g/g	0.72#
-	Aluminium*	% g/g	11.32#
-	Iron*	% g/g	4.68#
-	Manganese*	% g/g	0.04#
-	Magnesium*	% g/g	0.69#
-	Calcium*	% g/g	2.30#
-	Sodium*	% g/g	0.93#
-	Potassium*	% g/g	1.48#
-	Phosphorus*	% g/g	0.19#
-	Chromium*	% g/g	0.04#
-	Strontium*	% g/g	0.05#
-	Barium*	% g/g	0.07#
-	Vanadium*	% g/g	0.01#
-	Zirconium*	% g/g	0.09#
-	Manganese Oxide* (Mn_3O_4)	%	0.04#
XRD Results			
-	Quartz*	% g/g	72#
-	Plagioclase*	% g/g	16#
-	Mullite*	% g/g	5.4#
-	Microcline*	%	6.1#

Methods	Determinands	Units	W02224/22
			ILLOVO NOODSBERG: BOILER ASH 18.10.2022
Chemical			
200	pH (Aqueous Leach) @ 25°C*	pH units	9.3
211	Moisture*	% m/m	43

TOTAL CONCENTRATIONS

Total concentrations were determined as per the National Environmental Management Waste Act 59, 2008, for the National norms and standards for the assessment of waste for landfill disposal.

Methods	Determinands	Units	W02224/22
			ILLOVO NOODSBERG: BOILER ASH 18.10.2022
TOTAL CONCENTRATIONS			
Chemical			
89	Antimony, Sb*	mg Sb/kg	<5
88	Arsenic, As*	mg As/kg	<8
87	Barium, Ba*	mg Ba/kg	29
87	Boron, B*	mg B/kg	<16
87	Cadmium, Cd*	mg Cd/kg	<17
87	Chromium, Cr*	mg Cr/kg	<16
68G	Hexavalent Chromium, Cr6*	mg Cr/kg	<0.031
87	Cobalt, Co*	mg Co/kg	<17
87	Copper, Cu*	mg Cu/kg	<17
87	Lead, Pb*	mg Pb/kg	<8
87	Manganese, Mn*	mg Mn/kg	42
86	Mercury, Hg*	mg Hg/kg	<0.31
87	Molybdenum, Mo*	mg Mo/kg	<31
87	Nickel, Ni*	mg Ni/kg	<18
88	Selenium, Se*	mg Se/kg	<63
87	Vanadium, V*	mg V/kg	6.03
87	Zinc, Zn*	mg Zn/kg	4.01
206	Cyanide (Total)*	mg CN/kg	<10
18G	Fluoride*	mg F/kg	2.09

LEACHABLE CONCENTRATIONS

The Sample was subjected to an Australian Standard Leaching Procedure (ASLP2 Acetate pH 5.0 (P/NP)) as per National Environmental Management Waste Act 59 2008, for the National norms and Standard for the assessment for waste for landfill disposal. The resultant leachate was analyzed for various tests. The results are presented below.

Methods	Determinands	Units	W02224/22
			ILLOVO NOODSBERG: BOILER ASH 18.10.2022
LEACHABLE CONCENTRATIONS			
Chemical			
89	Antimony, Sb*	mg Sb/ℓ	<0.05
88	Arsenic, As*	mg As/ℓ	<0.08
87	Barium, Ba*	mg Ba/ℓ	0.33
87	Boron, B*	mg B/ℓ	0.19
87	Cadmium, Cd*	mg Cd/ℓ	<0.17
87	Chromium, Cr*	mg Cr/ℓ	<0.16
68G	Hexavalent Chromium, Cr6*	mg Cr/ℓ	<0.0031
87	Cobalt, Co*	mg Co/ℓ	<0.17
87	Copper, Cu*	mg Cu/ℓ	<0.17
87	Lead, Pb*	mg Pb/ℓ	<0.08
87	Manganese, Mn*	mg Mn/ℓ	**1.23**
86	Mercury, Hg*	mg Hg/ℓ	<0.0031
87	Molybdenum, Mo*	mg Mo/ℓ	**<0.31**
87	Nickel, Ni*	mg Ni/ℓ	<0.18
88	Selenium, Se*	mg Se/ℓ	<0.63
87	Vanadium, V*	mg V/ℓ	<0.02
87	Zinc, Zn*	mg Zn/ℓ	0.11
16G	Chloride*	mg Cl/ℓ	8.21
206	Cyanide (Total)*	mg CN/ℓ	0.02
18G	Fluoride*	mg F/ℓ	<0.06
65Gc	Nitrate*	mg N/ℓ	<0.25
67G	Sulphate*	mg SO_4/ℓ	41
41	Total Dissolved Solids*	mg/ℓ	**1094**

Refer to the “Notes” section at the end of this report for further explanations.

Where the laboratory report limit for a test is higher than the required specification limit, the raw data is reviewed and the detection limit highlighted in bold font if outside of specification.

Specific Observations

Bold analytical results exceed at least the lowest applicable concentration threshold per Appendix 1 of this report.

Based on the results of sample W02224/22, analysis has identified one or more elements or chemical substances that exceed the LCT 0 concentration threshold.

Note (XRD Results): Mineral names may not reflect the actual compositions of minerals identified, but rather the mineral group.

- Smectite, lizardite (serpentine), vermiculite, chlorite and kaolinite peaks overlap and further test would be necessary to distinguish. Identification is largely based on peak shapes and positions.
- Due to preferred orientation and crystallite size effects, results may not be as accurate as shown.
- Traces of additional phases may be present. Amounts below 0.5 weight % may be unreliable.
- Amorphous phases, if present, were not taken into consideration during quantification.

Quality Assurance

Technical signatories

Notes to this report

Limitations

This report shall not be reproduced except in full without prior written approval of the laboratory.
Results in this report relate only to the samples as taken, and the condition received by the laboratory.
Any opinions and interpretations expressed herein are outside the scope of SANAS accreditation.
The decision rule applicable to this laboratory is available on request.
Sample preparation may require filtration, dilution, digestion or similar. Final results are reported accordingly.
Where the laboratory has undertaken the sampling, the location of sampling and sampling plan are available on request. Talbot Laboratories is guided by the National Standards SANS 5667-3:2006 Part 3 Guidance on the Preservation and Handling of Water Samples; SANS 5667-1:2008 Part 1 Guidance on the Design of Sampling Programmes and Sampling Techniques and SANS 5667-2:1991 Part 2: Guidance on Sampling Techniques.
Customers to contact Talbot Laboratories for further information.

Uncertainty of measurement

Talbot Laboratories' Uncertainty of Measurement (UoM) values are:

- Identified for relevant tests.
- Calculated as a percentage of the respective results.
- Applicable to total, dissolved and acid soluble metals for ICP element analyses.
- Available upon request.

Analysis explanatory notes

Tests may be marked as follows:

^	Tests conducted at our Port Elizabeth satellite laboratory.
*	Tests not included in our Schedule of Accreditation and therefore that are not SANAS accredited.
#	Tests that have been sub-contracted to a peer laboratory.
NR	Not required -shown, for example, where the schedule of analysis varied between samples.
σ	Field sampling point on-site results.
a	Testing has deviated from Method.

Appendix 1: Specifications

Determinand*	Total Concentration Threshold (TCT) limits (mg/kg)			Leachable Concentration Threshold (LCT) limits (mg/ℓ)			
	TCT0	TCT1	TCT2	LCT0	LCT1	LCT2	LCT3
Chemical							
Antimony, Sb	10	75	300	0.02	1	2	8
Arsenic, As	5.8	500	2000	0.01	0.5	1	4
Barium, Ba	62.5	6250	25000	0.7	35	70	280
Boron, B	150	15000	60000	0.5	25	50	200
Cadmium, Cd	7.5	260	1040	0.003	0.15	0.3	1.2
Chromium, Cr	46000	800000	N/A	0.1	5	10	40
Hexavalent Chromium, Cr6	6.5	500	2000	0.05	2.5	5	20
Cobalt, Co	50	5000	20000	0.5	25	50	200
Copper, Cu	16	19500	78000	2	100	200	800
Lead, Pb	20	1900	7600	0.01	0.5	1	4
Manganese, Mn	1000	25000	100000	0.5	25	50	200
Mercury, Hg	0.93	160	640	0.006	0.3	0.6	2.4
Molybdenum, Mo	40	1000	4000	0.07	3.5	7	28
Nickel, Ni	91	10600	42400	0.07	3.5	7	28
Selenium, Se	10	50	200	0.01	0.5	1	4
Vanadium, V	150	2680	10720	0.2	10	20	80
Zinc, Zn	240	160000	640000	5	250	500	2000
Chloride	N/A	N/A	N/A	300	15000	30000	120000
Cyanide (Total)	14	10500	42000	0.07	3.5	7	28
Fluoride	100	10000	40000	1.5	75	150	600
Nitrate	N/A	N/A	N/A	11	550	1100	4400
Sulphate	N/A	N/A	N/A	250	12500	25000	100000
Total Dissolved Solids	N/A	N/A	N/A	1000	12500	25000	100000
pH @ 25°C	6 < pH < 12			N/A	N/A	N/A	N/A

Determinand (mg/ℓ)*	Total Concentration Threshold (TCT) limits (mg/kg)			Leachable Concentration Threshold (LCT) limits (mg/ℓ)		
	TCT0	TCT1	TCT2	LCT1	LCT2	LCT3
Organics						
Benzene	N/A	10	40	0.01	0.02	0.08
Benzo(a)pyrene	N/A	1.7	6.8	0.035	0.07	0.28
Carbon tetrachloride	N/A	4	16	0.2	0.4	1.6
Chlorobenzene	N/A	8800	35200	5	10	40
Chloroform	N/A	700	2800	15	30	120

Determinand (mg/ℓ)*	TCT0	TCT1	TCT2	LCT1	LCT2	LCT3
2-Chlorophenol	N/A	2100	8400	15	30	120
Di-(2-ethylhexyl) phthalate	N/A	40	160	0.5	1	4
1,2-Dichlorobenzene	N/A	31900	127600	5	10	40
1,4-Dichlorobenzene	N/A	18400	73600	15	30	120
1,2-Dichloroethane	N/A	3.7	14.8	1.5	3	12
1,1-Dichloroethylene	N/A	150	600	0.35	0.7	2.8
1,2-Dichloroethylene	N/A	3750	15000	2.5	5	20
Dichloromethane	N/A	16	64	0.25	0.5	2
2,4-Dichlorophenol	N/A	800	3200	10	20	80
2,4-Dinitrotoluene	N/A	5.2	20.8	0.065	0.13	0.52
Ethylbenzene	N/A	540	2160	3.5	7	28
Formaldehyde	N/A	2000	8000	25	50	200
Hexachlorobutadiene	N/A	2.8	5.4	0.03	0.06	0.24
Methyl ethyl ketone (2-Butanone)	N/A	8000	32000	100	200	800
MTBE (Methyl t-butyl ether)	N/A	1435	5740	2.5	5	20
Naphthalene	N/A	N/A	N/A	N/A	N/A	N/A
Nitrobenzene	N/A	45	180	1	2	8
PAHs (Total)	N/A	50	200	N/A	N/A	N/A
Petroleum H/Cs, C6 to C9	N/A	650	2600	N/A	N/A	N/A
Petroleum H/Cs, C10 to C36	N/A	10000	40000	N/A	N/A	N/A
Phenols Speciated (total, non-halogenated)	N/A	560	2240	7	14	56
Polychlorinated biphenyls (PCBs)	N/A	12	48	0.025	0.05	0.2
Styrene	N/A	120	480	1	2	8
1,1,1,2-Tetrachloroethane	N/A	400	1600	5	10	40
1,1,2,2-Tetrachloroethane	N/A	5	20	0.65	1.3	5.3
Tetrachloroethylene	N/A	200	800	0.25	0.5	2
Toluene	N/A	1150	4600	35	70	280
Trichlorobenzenes (total)	N/A	3300	13200	3.5	7	28
1,1,1-Trichloroethane	N/A	1200	4800	15	30	120
1,1,2-Trichloroethane	N/A	48	192	0.6	1	4
Trichloroethylene	N/A	11600	46400	0.25	2	8
2,4,6-Trichlorophenol	N/A	1770	7080	10	20	80
Vinyl chloride	N/A	1.5	6	0.015	0.03	0.12
Xylenes (Total)	N/A	890	3560	25	50	200
Aldrin + Dieldrin	0.5	1.2	4.8	0.015	0.03	0.03
DDT + DDD + DDE	0.05	50	200	1	2	2
Chlordane	0.05	4	16	0.05	0.1	0.1
Heptachlor	0.05	1.2	4.8	0.015	0.03	0.03

**********End of Report**********