

Certificate of Analysis

Project details

Customer Details

Quotation number:	Q1910-129
Order number:	2121-268605
Company name:	SAPPI SOUTHERN AFRICA - SHARED SERVICES (MANDENI)
Contact address:	TUGELA MILL, OLD MAIN ROAD, MANDENI, 4490
Contact person:	JURIE MARX

Sampling Details

Sampled by:	CUSTOMER
Sampled date:	NO SAMPLED DATE PROVIDED
Additional customer information:	WASTE STREAM: GYPSUM/FLY-ASH

Sample Details

Sample type(s):	WASTE STREAM SAMPLES
Date received:	2019/12/05
Delivered by:	COURIER SERVICE
Temperature at sample receipt (°C):	20.2

Report Details

Testing commenced:	2019/12/05
Report date:	2020/01/06
Our reference:	009237/19

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	W03456/19
			GYPSUM/FLY-ASH
TOTAL CONCENTRATIONS			
Chemical			
89	Antimony, Sb*	mg Sb/kg	<0.9
88	Arsenic, As*	mg As/kg	8.75
87	Barium, Ba*	mg Ba/kg	56
87	Boron, B*	mg B/kg	12.6
87	Cadmium, Cd*	mg Cd/kg	<2
87	Chromium, Cr*	mg Cr/kg	23
68G	Hexavalent Chromium, Cr6*	mg Cr/kg	0.0909
87	Cobalt, Co*	mg Co/kg	4.60
87	Copper, Cu*	mg Cu/kg	30
87	Lead, Pb*	mg Pb/kg	21
87	Manganese, Mn*	mg Mn/kg	1216
86	Mercury, Hg*	mg Hg/kg	0.740
87	Molybdenum, Mo*	mg Mo/kg	<11
87	Nickel, Ni*	mg Ni/kg	8.63
88	Selenium, Se*	mg Se/kg	<7
87	Vanadium, V*	mg V/kg	8.51
87	Zinc, Zn*	mg Zn/kg	30
206	Cyanide (Total)*	mg CN/kg	<0.1
18G	Fluoride*	mg F/kg	7.89
200	pH @ 25°C*	pH units	8.3

LEACHABLE CONCENTRATIONS

The Sample was subjected to an Australian Standard Leaching Procedure 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	W03456/19
			GYPSUM/FLY-ASH
LEACHABLE CONCENTRATIONS			
Chemical			
89	Antimony, Sb*	mg Sb/l	<0.009
88	Arsenic, As*	mg As/l	<0.04
87	Barium, Ba*	mg Ba/l	0.244
87	Boron, B*	mg B/l	1.42
87	Cadmium, Cd*	mg Cd/l	<0.02
87	Chromium, Cr*	mg Cr/l	<0.02
68G	Hexavalent Chromium, Cr6*	mg Cr/l	0.004
87	Cobalt, Co*	mg Co/l	<0.02
87	Copper, Cu*	mg Cu/l	<0.02
87	Lead, Pb*	mg Pb/l	<0.03
87	Manganese, Mn*	mg Mn/l	30.2
86	Mercury, Hg*	mg Hg/l	<0.002
87	Molybdenum, Mo*	mg Mo/l	<0.11
87	Nickel, Ni*	mg Ni/l	0.024
88	Selenium, Se*	mg Se/l	<0.07
87	Vanadium, V*	mg V/l	<0.02
87	Zinc, Zn*	mg Zn/l	<0.02
16G	Chloride*	mg Cl/l	11.28
206	Cyanide (Total)*	mg CN/l	0.010
18G	Fluoride*	mg F/l	4.37
65Gc	Nitrate*	mg/l	<0.04
67G	Sulphate*	mg SO ₄ /l	1478
41	Total Dissolved Solids*	mg/l	6522

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

Where the laboratory detection 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

Results that appear in bold do not meet the specification limits in Appendix 2 of this report.
The sample is considered to be a **Type 2 waste**.

“Wastes with any element or chemical substance concentration above the LCT1 Limits but below or equal to the LCT2 limits, and all Total Concentrations below or equal to the TCT1 Limits ($LCT1 < LC \leq LCT2$ and $TC \leq TCT1$) are Type 2 Wastes”

Type 2 wastes may only be disposed of at a landfill site designated in accordance with the requirements for a **Class B/ GLB+ Landfill** as specified in the Minimum Requirements for Waste Disposal by Landfill (2nd Ed., DWAf, 1998).

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. Customers to contact Talbot Laboratories for further information.

Uncertainty of measurement

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

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

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: Uncertainty of Measurement (UoM)

Determinands	Method No	Uncertainty of Measurement (%)	Determinands	Method No	Uncertainty of Measurement (%)
Alkalinity (Total)	10	± 3.49	Magnesium (OES)	85	± 5.38
Alkalinity (Total)	10G	± 4.39	Mercury (ICP-MS)	83A	± 16.32
Ammonia	64G	± 6.29	Mercury (ICP-OES)	86	± 10.54
Aluminium (ICP-MS)	83A	± 20.62	Molybdenum (ICP-MS)	83A	± 11.08
Aluminium (ICP-OES)	87	± 8.09	Molybdenum (ICP-OES)	87	± 15.20
Antimony (ICP-MS)	83A	± 17.73	Nickel (ICP-MS)	83A	± 10.00
Antimony (ICP-OES)	87	± 30.16	Nickel (ICP-OES)	87	± 8.06
Arsenic (ICP-MS)	83A	± 12.04	Nitrate/Nitrite	65Ga	± 12.55
Arsenic (ICP-OES)	87	± 20.17	Nitrite	65Gb	± 12.83
Barium (ICP-MS)	83A	± 12.29	Nitrate	65Gc	± 12.55
Barium (ICP-OES)	87	± 10.25	Oxygen Absorbed	39	± 6.37
Beryllium (ICP-MS)	83A	± 23.10	Potassium (ICP-OES)	85	± 15.20
Beryllium (ICP-OES)	87	± 7.96	Orthophosphate	66G	± 11.76
Boron (ICP-MS)	83A	± 24.83	Phosphate (Total)	90	± 9.16
Boron (ICP-OES)	87	± 17.33	pH Value 25°C	1A	± 1.22
Cadmium (ICP-MS)	83A	± 9.59	Selenium (ICP-MS)	83A	± 21.40
Cadmium (ICP-OES)	87	± 7.69	Selenium (ICP-OES)	88	± 31.56
Calcium (ICP-OES)	85	± 5.09	Silver (ICP-MS)	83A	± 11.35
Chromium (ICP-MS)	83A	± 8.45	Sodium (ICP-OES)	84	± 8.99
Chromium (ICP-OES)	87	± 8.13	Strontium (ICP-MS)	83A	± 10.55
Cobalt (ICP-MS)	83A	± 8.39	Strontium (ICP-OES)	87	± 8.29
Cobalt (ICP-OES)	87	± 7.83	Sulphate	67G	± 6.96
Copper (ICP-MS)	83A	± 8.36	Suspended Solids	5	± 3.72
Copper (ICP-OES)	87	± 7.77	Thallium (ICP-MS)	83A	± 12.51
Chemical Oxygen Demand	3	± 16.04	Thallium (ICP-OES)	87	± 8.57
Chloride	16G	± 3.56	Tin (ICP-MS)	83A	± 12.17
Electrical Conductivity	2A	± 2.87	Tin (ICP-OES)	87	± 12.39
Fluoride	18G	± 17.67	Titanium (ICP-OES)	87	± 7.20
Hexavalent Chromium	68G	± 5.36	Total Dissolved Solids	41	± 1.29
Iron (ICP-MS)	83A	± 14.03	Total Solids at 105°C	59	± 0.59
Iron (ICP-OES)	87	± 7.83	Turbidity	4	± 4.60
Lead (ICP-MS)	83A	± 10.64	Uranium (ICP-MS)	83A	± 12.13
Lead (ICP-OES)	87	± 8.18	Uranium (ICP-OES)	87	± 7.26
Lithium (ICP-MS)	83A	± 20.65	Vanadium (ICP-MS)	83A	± 10.17
Lithium (ICP-OES)	87	± 6.79	Vanadium (ICP-OES)	87	± 7.18
Manganese (ICP-MS)	83A	± 10.71	Zinc (ICP-MS)	83A	± 22.86
Manganese (ICP-OES)	87	± 8.01	Zinc (ICP-OES)	87	± 7.41

Determinands	Method No	Uncertainty of Measurement (%)	Determinands	Method No	Uncertainty of Measurement (%)
Total Hydrocarbons	101	± 22.76	Tetrachloroethylene	100	± 17.04
Vinyl Chloride	100	± 23.42	1,1,1,2-Tetrachloroethane	100	± 21.13
Bromomethane	100	± 22.89	Chlorobenzene	100	± 16.08
Ethyl Chloride	100	± 23.25	Ethylbenzene (BTEX)	100	± 20.59
1,1-Dichloroethylene	100	± 20.00	m,p-Xylene (BTEX)	100	± 24.59
Trans-1,2-Dichloroethylene	100	± 19.22	Styrene	100	± 18.91
Tert-Butylmethyl Ether (MTBE)	100	± 22.90	Bromoform (THM)	100	± 19.74
1,1-Dichloroethane	100	± 17.24	1,1,2,2-Tetrachloroethane	100	± 24.71
Cis-1,2-Dichloroethylene	100	± 22.06	o-Xylene (BTEX)	100	± 23.70
Chloroform (THM)	100	± 18.67	1,2,3-Trichloropropane	100	± 22.64
2,2-Dichloropropane	100	± 19.27	Isopropylbenzene	100	± 21.01
1,2-Dichloroethane	100	± 15.27	Bromobenzene	100	± 19.61
1,1,1-Trichloroethane	100	± 21.72	n-Propylbenzene	100	± 24.17
1,1-Dichloropropene	100	± 20.33	2-Chlorotoluene	100	± 22.92
Carbon Tetrachloride	100	± 19.86	4-Chlorotoluene	100	± 22.11
Benzene (BTEX)	100	± 22.33	1,3,5-Trimethylbenzene	100	± 18.19
Dibromomethane	100	± 18.63	Tert-Butylbenzene	100	± 18.74
1,2-Dichloropropane	100	± 18.26	1,2,4-Trimethylbenzene	100	± 24.08
Trichloroethylene	100	± 21.76	Sec-Butylbenzene	100	± 20.11
Bromodichloromethane (THM)	100	± 15.31	1,3-Dichlorobenzene	100	± 24.31
Trans-1,3-Dichloropropene	100	± 14.50	1,4-Dichlorobenzene	100	± 24.31
Cis-1,3-Dichloropropene	100	± 15.77	1,2-Dichlorobenzene	100	± 20.31
1,1,2-Trichloroethane	100	± 16.46	n-Butylbenzene	100	± 14.50
Toluene (BTEX)	100	± 24.36	1,2,4-Trichlorobenzene	100	± 18.90
1,3-Dichloropropane	100	± 15.78	Naphthalene	100	± 23.66
Dibromochloromethane (THM)	100	± 18.00	Hexachlorobutadiene	100	± 18.39
1,2-Dibromoethane	100	± 14.72	1,2,3-Trichlorobenzene	100	± 24.70

Appendix 2: 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
2-Chlorophenol	N/A	2100	8400	15	30	120

Determinand*	TCT0	TCT1	TCT2	LCT1	LCT2	LCT3
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

Determinand*	TCT0	TCT1	TCT2	LCT1	LCT2	LCT3
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*****