

26th AUGUST 2016

ANALYTICAL REPORT

OUR REF: W1237Y16.REP.R1
This report replaces W1237Y16.REP
COMPANY NAME: ASSOCIATED ENERGY SERVICES
COMPANY ADDRESS: P O BOX 2202, PINETOWN, 3600
CONTACT PERSON: CUAN WATKINS
QUOTATION NUMBER: QU103862
ORDER NUMBER: POA57443
SAMPLE ID: BOILER ASH – GAUTENG REGION
DATE SUBMITTED: 04/08/2016

SUMMARY

From the results outlined below in the assessment, the waste can be assessed as follows:

The Boiler Ash is considered to be a Type 3 waste.

From the results outlined below for the Total Concentrations, Boron, Mercury and Barium are greater than Total Concentration Threshold >TCT0 but less than <TCT1. For the Leachable Concentrations, Barium, Manganese and Total Dissolved Solids are greater than Leachable Concentration Threshold >LCT0 but less than <LCT1

“Wastes with any element or chemical substance concentration above Leachable Concentration Threshold Limits, LCT0, but below or equal to LCT1 Limits and all Total Concentration Threshold Limits below or equal to TCT1 Limits, LCT0<LC<LCT1 and TC<TCT1) are Type 3 Wastes”.

Type 3 waste's may only be disposed of at a Class C/ GLB+ Landfill.

One [1] sample was submitted to the laboratory for various analyses. **The results are presented below.**

MAJOR ANALYSIS BY XRF

DETERMINAND	ANALYTE	UNITS	RESULTS
			W1237/16
			BOILER ASH – GAUTENG REGION
Silica	SiO ₂	% g/g	42.67
Titanium	TiO ₂	% g/g	1.60
Aluminium	Al ₂ O ₃	% g/g	28.67
Iron	Fe ₂ O ₃	% g/g	4.51
Manganese	MnO	% g/g	0.02
Magnesium	MgO	% g/g	1.62
Calcium	CaO	% g/g	13.24
Sodium	Na ₂ O	% g/g	0.06
Potassium	K ₂ O	% g/g	0.80
Phosphorous	P ₂ O ₅	% g/g	1.61
Chromium	Cr ₂ O ₃	% g/g	<0.01
Sulphur	SO ₃	% g/g	0.02
Loss on Ignition (1000 °C)	LOI	% g/g	5.01
Total	Total	% g/g	99.91
Loss of moisture (105 °C)	H ₂ O	% g/g	0.13

Comment: % g/g is equivalent to wt %

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.

DETERMINAND	UNITS	RESULTS	Total Concentration Threshold (TCT) limits		
		W1237/16	mg/kg		
		BOILER ASH – GAUTENG REGION	TCT0	TCT1	TCT2
# pH at 25°C	pH units	11.42			
* Hexavalent Chromium	mg/kg	<0.10	6.5	500	2000
Total Cyanide	mg/kg	0.83	14	10500	42000
* Total Fluoride	mg/kg	2.00	100	10000	40000

Comments:

- # pH was done on a 1:10 slurry.
- * The sample was prepared by a 1:10 aqueous extraction where the resultant filtrate was analysed. These results were calculated back with mass and volume used in the extraction.
- Hexavalent Chromium, Total Cyanide and Fluoride fall below the Total Concentration Threshold (TCT0) limits (<TCT0).

METALS BY ICP-MS

The sample was prepared by an aqua-regia digestion where the resultant digest was analysed for metals by ICP-MS. These results were calculated back with mass and volume used in the digestion.

DETERMINAND	UNITS	RESULTS	Total Concentration Threshold (TCT) limits (mg/kg)		
		W1237/16	TCT0	TCT1	TCT2
		BOILER ASH – GAUTENG REGION [Aqua-Regia]			
Boron, B	mg/kg	817	150	15000	60000
Molybdenum, Mo	mg/kg	3.67	40	1000	4000
Cadmium, Cd	mg/kg	0.01	7.5	260	1040
Antimony, Sb	mg/kg	0.02	10	75	300
Barium, Ba	mg/kg	164	62.5	6250	25000
Mercury, Hg	mg/kg	8.14	0.93	160	640
Lead, Pb	mg/kg	0.63	20	1900	7600
Vanadium, V	mg/kg	17.37	150	2680	10720
Chromium, Cr	mg/kg	14.59	46000	800000	N/A
Manganese, Mn	mg/kg	89	1000	25000	100000
Cobalt, Co	mg/kg	3.47	50	5000	20000
Nickel, Ni	mg/kg	11.41	91	10600	42400
Copper, Cu	mg/kg	5.06	16	19500	78000
Zinc, Zn	mg/kg	2.28	240	160000	640000
Arsenic, As	mg/kg	0.26	5.8	500	2000
Selenium, Se	mg/kg	0.48	10	50	200

Comment: All metals fall below the Total Concentration Threshold (TCT0) limits (<TCT0), with the exception of Boron, Mercury and Barium which are greater than TCT0 but less than TCT1 (TCT0<TC<TCT1).

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 analysed for various tests. **The results are presented below.**

DETERMINAND	UNITS	RESULTS	Leachable Concentration Threshold (LCT) limits			
		W1223/16	mg/ℓ			
		BOILER ASH – GAUTENG REGION [ASLP Leachate]	LCT0	LCT1	LCT2	LCT3
pH at 25°C	pH units	4.6				
Total Dissolved Solids (TDS)	mg/ℓ	1567	1000	12 500	25 000	100 000
Chloride	mg/ℓ	102	300	15 000	30 000	120 000
Sulphate	mg/ℓ	15.03	250	12 500	25 000	100 000
Nitrate	mg/ℓ	0.03	11	550	1100	4400
Fluoride	mg/ℓ	0.07	1.5	75	150	600
Total Cyanide	mg/ℓ	0.19	0.07	3.5	7	28
Hexavalent Chromium	mg/ℓ	<0.01	0.1	5	10	40

Comment: All determinands fall below the Leachable Concentration Threshold (LCT0) limits (<LCT0), with the exception of Total Dissolved Solids (TDS) which is greater than LCT0 but less than LCT1 (LCT0<LC<LCT1)..

METALS BY ICP-MS

DETERMINAND	UNITS	RESULTS	Leachable Concentration Threshold (LCT) limits			
		W1237/16	mg/ℓ			
		BOILER ASH – GAUTENG REGION [ASLP Leachate]	LCT0	LCT1	LCT2	LCT3
Boron, B	mg/ℓ	0.282	0.5	25	50	200
Molybdenum, Mo	mg/ℓ	0.017	0.07	3.5	7	28
Cadmium, Cd	mg/ℓ	<0.001	0.003	0.15	0.3	1.2
Antimony, Sb	mg/ℓ	0.001	0.02	1.0	2	8
Barium, Ba	mg/ℓ	0.729	0.7	35	70	280
Mercury, Hg	mg/ℓ	0.002	0.006	0.3	0.6	2.4
Lead, Pb	mg/ℓ	0.001	0.01	0.5	1	4
Vanadium, V	mg/ℓ	0.035	0.2	10	20	80
Chromium, Cr	mg/ℓ	0.025	0.1	5	10	40
Manganese, Mn	mg/ℓ	0.658	0.5	25	50	200
Cobalt, Co	mg/ℓ	0.018	0.5	25	50	200
Nickel, Ni	mg/ℓ	0.037	0.07	3.5	7	28
Copper, Cu	mg/ℓ	0.010	2.0	100	200	800
Zinc, Zn	mg/ℓ	0.081	5.0	250	500	2000
Arsenic, As	mg/ℓ	0.001	0.01	0.5	1	4
Selenium, Se	mg/ℓ	0.003	0.01	0.5	1	4

Comment: All metals fall below the Leachable Concentration Threshold (LCT0) limits (<LCT0), with the exception of Barium and Manganese which are greater than LCT0 but less than LCT1 (LCT0<LC<LCT1).

Vanessa Talbot
LABORATORY DIRECTOR

This report relates only to the samples tested. This report shall not be reproduced, except in full, without the written approval of **TALBOT LABORATORIES**. This report has been prepared by Talbot & Talbot (Pty) Ltd on behalf of the Client, taking into account the agreed scope of work. In preparing this report, Talbot & Talbot (Pty) Ltd has exercised all reasonable skill and care, taking into account the objectives and the agreed scope of work. Talbot & Talbot (Pty) Ltd does not accept any liability in negligence for any matters arising outside of the agreed scope of work. When issued in electronic format, Talbot Laboratories does not accept any responsibility for any unauthorised changes made by others.