

Seriti Power (Pty) Ltd

WASTE CLASSIFICATION AND ASSESSMENT

New Largo Colliery



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EXECUTIVE SUMMARY

WSP Africa Group Pty (Ltd) (WSP) was contracted by Seriti Coal (Pty) Ltd (New Largo Coal) to undertake a waste classification and assessment of the waste streams collected from the mine. A total of ten (10) samples were analysed as per the laboratory programme to classify and assess the waste streams.

Two of the samples were subsoil samples **(Table 1)** and it is noted that soils are not included in the definition of residue stockpile¹ in the Mineral and Petroleum Resources Development Act (MPRDA) and are not included in Schedule 3 (Defined Wastes) of the National Environmental Management: Waste Act (NEM: WA) and are therefore not considered as wastes. Although the data can be relevant to New Largo in their environmental planning, and in the context of proper soil management (Golder, 2020) neither a waste classification nor a waste assessment for subsoil should be presented to the regulator.

Of the ten samples, eight were overburden samples: one sample of soft overburden, and seven samples of hard overburden **(Table 1)**, with different lithologies. All samples were classified as non-hazardous in terms of SANS 10234 and (GN R. 634 2013). On waste assessment (GN R. 635 2013) all the samples did not meet the full definition of Type 3 waste, as although one or more constituents exceeded the first total concentration threshold (TC > TCT0), as shown in **Table 2**, no constituents exceeded the first leachable concentration threshold (LC < LCT0) shown in **Table 3**. <u>The overburden samples are therefore conservatively assessed as Type 3 waste per regulation 7(6) of (GN R. 635 2013)</u> but present a leachable constituent risk similar to Type 4 waste.

Soils are not considered wastes and do not require pollution control in terms of law, rather they should be managed in terms of New Largo's Environmental Management (Golder, 2020) and Soil Management Plan (Index, 2011). Mineral residues have been subject to the same environmental law as other wastes, with the pollution control barrier design prescribed by regulation 4 of (GN R. 636, 2013), and the New Largo overburden samples would require a Class C barrier in terms of that regulation – although licenses for a less stringent barrier design have been granted in cases similar to these stockpiles, where the leachability of the samples is low risk (LC<LCT0).

Regulations specific to mineral residues were issued in 2015 (GN R. 632 2013) and these were amended in 2018 to require per regulation 3(5) that the pollution control measures suitable for a specific residue stockpile or residue deposit must be recommended by a competent person based on a risk analysis that is required in those regulations.

¹ any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, beneficiation plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored, or accumulated for potential re-use, or which is disposed of, by the holder of a mining right, mining permit or production right.

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Although the Department of Water and Sanitation has continued to rely on (GN R. 636 2013) for determining the barrier design for mineral residues, the Water Tribunal recently ruled in the *Mafube* matter that there is no automatic requirement to insist on the Class C barrier in all cases and that the development of as specific regulations for mine residues demonstrates that a nuanced approach is required when it comes to dealing with waste material that requires specialist attention(Mafube 2023).

In this context, a risk-based approach is recommended for the pollution control barrier design for the New Largo stockpiles, which is the approach being taken by Seriti Power (Pty) Ltd in the matter of the Klipspruit Discard Dump Extension (Seriti 2024). Given the observed low risk from leachable constituents, a risk-based approach is likely to determine that a simpler barrier design than Class C will be satisfactory to protect the water resource from contamination.

The main findings from the waste classification and assessment are documented in Table 1.

Table 1 - Waste Classification and Assessment Summary

Waste Material	Classification	Assessment	Barrier/Liner	Comment							
Subsoils samples											
Subsoil 1 (Sample 3)	Non-hazardous	Type 3 Triggered by concentrations of Barium and Copper.	Class C	Conservatively assessed as Type 3 waste. Risk similar to Type 4 Waste							
Subsoil 2 (Sample 4)	Non-hazardous	Type 3 Triggered by concentrations of Arsenic, Barium, Copper, and Lead.	Class C	Conservatively assessed as Type 3 waste. Risk similar to Type 4 Waste							
		Soft overburden samples									
Whiteish softs (Sample 5)	Non-hazardous	Type 3 Triggered by concentrations of Arsenic, Barium, Copper, and Lead.	Class C	Conservatively assessed as Type 3 waste. Risk similar to Type 4 Waste							
		Hard overburden samples									
Sandstone (Sample A)	Non-hazardous	Type 3 Triggered by concentrations of Arsenic, Barium, Copper, and Lead.	Class C	Conservatively assessed as Type 3 waste. Risk similar to Type 4 Waste							
Shale (Sample B)	Non-hazardous	Type 3 Triggered by concentrations of Arsenic, Barium, Cobalt, Copper, Manganese, Nickel, and Lead.	Class C	Conservatively assessed as Type 3 waste. Risk similar to Type 4 Waste							
Carbonaceous shale (Sample C)	Non-hazardous	Type 3 Triggered by concentrations of Barium and Lead	Class C	Conservatively assessed as Type 3 waste. Risk similar to Type 4 Waste							
Sandstone (Sample D)	Non-hazardous	Type 3 Triggered by concentrations of Arsenic, Barium and Copper.	Class C	Conservatively assessed as Type 3 waste. Risk similar to Type 4 Waste							
Sandstone (Sample E)	Non-hazardous	Type 3 Triggered by concentrations of Barium, Copper, and Lead.	Class C	Conservatively assessed as Type 3 waste. Risk similar to Type 4 Waste							
Sandstone 1 (Sample 1)	Non-hazardous	Type 3 Triggered by concentrations of Barium and Manganese.	Class C	Conservatively assessed as Type 3 waste. Risk similar to Type 4 Waste							
Sandstone 2 (Sample 2)	Non-hazardous	Type 3 Triggered by concentrations of Barium and Copper.	Class C	Conservatively assessed as Type 3 waste. Risk similar to Type 4 Waste							

Table 2 – Comparison of solids concentrations for waste assessment

Constituents	GN R.635 levels of concentrations (m	f thresholds for leac g/kg)	hable	WASTE MATERIAL									
	тсто	тст1	TCT2	Subsoil 1 (Sample 3)	Subsoil 2 (Sample 4)	Whiteish softs (Sample 5)	Sandstone (Sample A)	Shale (Sample B)	Carbonaceous shale (Sample C)	Sandstone (Sample D)	Sandstone (Sample E)	Sandstone 1 (Sample 1)	Sandstone 2 (Sample 2)
As	5.8	500	2000	3.8	8.8	11.5	6.9	6.5	1.4	6.1	4.5	5.3	4.1
В	150	15000	60000	BDL	1.08	1.86	2.87	6.4	12.36	6.42	10.91	0.54	BDL
Ва	62.5	6250	25000	121	472	388	116	150	99	99	170	571	136
Cd	7.5	260	1040	BDL	BDL	BDL	BDL	BDL	BDL	0.3	0.2	BDL	BDL
Со	50	5000	20000	17.3	24.4	15.9	11.5	91.5	1.1	13	16.6	18	17.7
Cr (total)	46000	800000	-	48.8	42.1	47	30.1	28.2	6.9	25.1	28.3	42.4	88.1
Cr (VI)	6.5	500	2000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Cu	16	19500	78000	18	51	56	45	53	14	49	46	15	28
Hg	0.93	160	640	BDL	BDL	0.2	BDL	0.1	BDL	BDL	BDL	BDL	BDL
Mn	1000	25000	100000	576	818	387	730	1 197	74	62	450	1 662	496
Мо	40	1000	4000	0.8	1.8	2.2	1.3	5.2	0.1	0.2	0.7	1.3	0.8
Ni	91	10600	42400	29.8	43	41	22.7	144	5.1	15.2	27.3	19.9	29.4
Pb	20	1900	7600	17	31	29	22	36	21	26	28	7	18
Sb	10	75	300	3	2	2	1	2	BDL	BDL	BDL	1	3
Se	10	50	200	BDL	BDL	BDL	BDL	2	BDL	BDL	BDL	BDL	BDL
V	150	2680	10720	56	72	64	49	65	11	26	91	20	68
Zn	240	160000	640000	120	197	130	131	159	BDL	142	105	56	110
TDS	-	-	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chloride	-	-	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Sulphate	-	-	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate	-	-	-	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Fluoride	100	10000	40000	BDL	BDL	BDL	BDL	BDL	0.7	0.5	1	BDL	BDL
Cyanide (total)	14	10500	42000	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Notes:													

BDL – below detection limits

'- '– No data

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Table 3 – Comparison of leachable concentrations for waste assessment

Constituents	ts GN R.635 levels of thresholds for leachable concentrations (mg/L)					WASTE MATERIAL									
	LCT0	LCT1	LCT2	LCT3	Subsoil 1 (Sample 3)	Subsoil 2 (Sample 4)	Whiteish softs (Sample 5)	Sandstone (Sample A)	Shale (Sample B)	Carbonaceous shale (Sample C)	Sandstone (Sample D)	Sandstone (Sample E)	Sandstone 1 (Sample 1)	Sandstone 2 (Sample 2)	
As	0.01	0.5	1	4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
В	0.5	25	50	200	0.063	0.088	0.072	0.02	0.022	0.015	0.021	0.024	0.05	0.069	
Ва	0.7	35	70	280	0.274	0.246	0.272	0.289	0.257	0.214	0.229	0.161	0.272	0.231	
Cd	0.003	0.15	0.3	1.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Со	0.5	25	50	200	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Cr (total)	0.1	5	10	40	BDL	BDL	0.0027	BDL	BDL	BDL	BDL	BDL	0.0021	BDL	
Cr (VI)	0.05	2.5	5	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Cu	2	100	200	800	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Hg	0.006	0.3	0.6	2.4	0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Mn	0.5	25	50	200	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.034	BDL	
Мо	0.07	3.5	7	28	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Ni	0.07	3.5	7	28	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Pb	0.01	0.5	1	4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Sb	0.02	1	2	8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Se	0.01	0.5	1	4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
V	0.2	10	20	80	0.0032	0.002	0.0039	0.0017	BDL	BDL	0.0024	BDL	BDL	BDL	
Zn	5	250	500	2 000	0.017	0.012	0.018	0.007	0.011	0.01	0.011	0.014	0.014	0.014	
TDS	1 000	12 500	25 000	100 000	102	136	84	BDL	BDL	BDL	38	BDL	65	36	
Chloride	300	15 000	30 000	120 000	0.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.4	
Sulphate	250	12 500	25 000	100 000	2.4	2.7	2.5	2.9	1.9	0.0012	BDL	BDL	BDL	2.9	
Nitrate	11	550	1 100	4 400	0.3987	BDL	BDL	BDL	BDL	BDL	0.4873	BDL	0.3101	0.3987	
Fluoride	1.5	75	150	600	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Cyanide (total)	0.07	3.5	7	28	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Notes: BD/ = below detection limits															

'- '- No data

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REFERENCES

- GN R. 632. (2015). Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits from a Prospecting, Mining, Exploration or Production Operation. Issued under: National Environmental Management: Waste Act (as revised by GN R. 990 of 2018).
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