REAL BCS Approved Testing Laboratory

PAS110 2014 Certificate of Analysis

Client: MARK BARLOW
(N435) SWANCOTE ENERGY
BRIDGNORTH
SHROPSHIRE
WV15 5HB

Originator: SWANCOTE
SEPARATED LIQUOR

Lab ID:	69476 - 136766	**Certification Code:**	SWA-SWA-SL	**Date Received:**	27/04/2023
Sample ID:	SL 26/04/23	**BCS Number:**	BCS0314C52	**Date Reported:**	09/05/2023
Sample Type:	Separated Liquor	**Plant / Site Name:**	Swancote	**Date Sampled:**	26/04/2023
				Order No:	96040

Potentially Toxic Elements in WD / SL / SF, on a fresh weight basis

Parameter	Units	Result	Upper Limit	Pass	Method of Test
Cadmium (Cd)	mg/kg	0.01	0.84 mg / kg	Y	BS EN 15587 (soluble in aqua regia)
Chromium (Cr)	mg/kg	0.36	56 mg / kg	Y	BS EN 15587 (soluble in aqua regia)
Copper (Cu)	mg/kg	2.15	112 mg / kg	Y	BS EN 15587 (soluble in aqua regia)
Lead (Pb)	mg/kg	<0.5	112 mg / kg	Y	BS EN 15587 (soluble in aqua regia)
Mercury (Hg)	mg/kg	<0.05	0.56 mg / kg	Y	BS EN 15587 (soluble in aqua regia)
Nickel (Ni)	mg/kg	1.08	28 mg / kg	Y	BS EN 15587 (soluble in aqua regia)
Zinc	mg/kg	10.6	224 mg / kg	Y	BS EN 15587 (soluble in aqua regia)

Stability of WD / SL / SF on a fresh weight basis

Parameter	Units	Result	Upper Limit	Pass	Method of Test
Volatile Fatty Acids	g COD / g VS	N/A	0.774 g VS		Chromatography

VFAs expressed as COD equivalent. Used as a pre-screening method: high VFA concentration indicates high potential biodegradability.
Samples with VFA concentrations above 0.774 g COD / g VS are expected to fail on RBP.
Test is valid as no spikes or inconsistencies were observed, the plots were smooth for all replicates.
All quality control criteria have been met.

* The digestate RBP is allowed to be negative only during the first 5 days of the test.

** The reference material RBP is allowed to be negative only during the first 5 days of the test. The 28-day RBP of the reference material should exceed 0.5 l/g VS

*** The inoculum control should produce a measurable volume of biogas over the 28 day period.

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Physical contaminants in WD / SL / SF on a fresh weight basis

Parameter	Units	Result	Upper Limit	Pass	Method of Test
Plastics > 2mm	kg / t	Zero			NRM-SOP-JAS-497
Glass > 2mm	kg / t	Zero			NRM-SOP-JAS-497
Metals > 2mm	kg / t	Zero			NRM-SOP-JAS-497
Other > 2mm	kg / t	Zero			NRM-SOP-JAS-497
Total > 2mm	kg / t	Zero	0.25 kg / t	Y*	NRM-SOP-JAS-497
of which Sharps:	kg / t	Zero	Zero in sample tested	Y	NRM-SOP-JAS-497
Stones > 5mm	kg / t	Zero	22.4 kg / t		NRM-SOP-JAS-497

Zero - No visible contaminants were found in the sample as submitted

* The upper limit for plastics in Scotland is more stringent than the PAS 110 limit. Please refer to the Scottish Environment Protection Agency's (SEPA's) regulatory position statement WST-PS-016, version 5, issued February 2017

Released by: *Daniel Petty* **Date: 09/05/2023**

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Characteristics of WD / SL / SF for declaration, without limit values, that influence application rates
(Results on an 'as received' basis)

Parameter	Units	Result	M *	Amount per fresh tonne or m^3	Amount applied at an equivalent total Nitrogen application of 250 kg N/ha	Units
pH		8.4	1			
Oven Dry Matter	% m/m	5.20	2	52.00	1940	Kg DM
Loss On Ignition	% m/m	3.21	3	32.10	1198	Kg OM
Total Kjeldahl Nitrogen (N)	% m/m	0.67	4	6.70	250	Kg N
Ammoniacal Nitrogen (NH4-N)	mg/kg	4476	5	4.48	167.00	Kg NH4-N
Total Phosphorus (P)	mg/kg	740	6	1.69	63.23	Kg P2O5
Total Potassium (K)	mg/kg	2299	6	2.76	102.93	Kg K2O
Total Magnesium (Mg)	mg/kg	149	6	0.25	9.23	Kg MgO
Total Sulphur (S)	mg/kg	489	6	1.22	45.61	Kg SO3
Equivalent field application rate		——		1.00	37.31	tonnes or m^3 / ha

*** Method of Test**

1 BS EN 13037
2 BS EN 14346
3 BS EN 15169
4 BS EN 13654-1 (Kjeldahl)
5 Sciantec SOP S1162 (Kjeldahl)
6 BS EN 15587 (soluble in aqua regia)

Additional Analysis

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Sample ID: SL 26/04/23
Sample Type: Separated Liquor

Certification Code: SWA-SWA-SL
BCS Number: BCS0314C52
Plant / Site Name: Swancote

Date Received: 27/04/2023
Date Reported: 09/05/2023
Date Sampled: 26/04/2023
Order No: 96040

Parameter on a Fresh basis.

Parameter	Units	Result
Total Molybdenum (Mo)	mg/kg	0.27
Total Sodium (Na)	mg/kg	3705
Chloride	mg/kg	7020
Fluoride [100:1 H2S04 Soluble]	mg/kg	<10
Total Arsenic (As)	mg/kg	<0.5
Total Selenium (Se)	mg/kg	0.23
Water Soluble Sodium	mg/kg	740

Released by: *Daniel Petty* **Date: 09/05/2023**

How does your sample analysis compare with the 'standard' figures for organic manures?

Farmyard Manure	Dry Matter (% DM)	Total Nitrogen (Kg N/t)	Total Phosphate (Kg P2O5/t)	Total Potash (Kg K2O/t)	Total Sulphur (Kg SO3/t)	Total Magnesium (Kg MgO/t)
Cattle FYM	25	6.0	3.2	9.4	2.4	1.8
Pig FYM	25	7.0	6.0	8.0	3.4	1.8
Sheep FYM	25	7.0	3.2	8.0	4.0	2.8
Duck FYM	25	6.5	5.5	7.5	2.6	2.4
Horse FYM	25	5.0	5.0	6.0	1.6	1.5
Goat FYM	40	9.5	4.5	12.0	2.8	1.8

Notes: The 'standard' phosphate & potash availability figures to the next crop grown from Defra's Fertiliser Manual are 60% & 90% respectively.

Poultry Manure	Dry Matter (% DM)	Total Nitrogen (Kg N/t)	Total Phosphate (Kg P2O5/t)	Total Potash (Kg K2O/t)	Total Sulphur (Kg SO3/t)	Total Magnesium (Kg MgO/t)
	20	9.4	8.0	8.5	3.0	2.7
	40	19.0	12.0	15.0	5.6	4.3
	60	28.0	17.0	21.0	8.2	5.9
	80	37.0	21.0	27.0	11.0	7.5

Notes: The 'standard' phosphate & potash availability figures to the next crop grown from Defra's Fertiliser Manual are 60% & 90% respectively.

Cattle & Pig Slurries	Dry Matter (% DM)	Total Nitrogen (Kg N/m3)	Total Phosphate (Kg P2O5/m3)	Total Potash (Kg K2O/m3)	Total Sulphur (Kg SO3/m3)	Total Magnesium (Kg MgO/m3)
Cattle slurry	6.0	2.6	1.2	2.5	0.7	0.6
Dirty water (from cattle)	0.5	0.5	0.1	1.0	0.1	0.1
Separated cattle slurries						
- strainer box liquid	1.5	1.5	0.3	1.5	ND	ND
- weeping wall liquid	3.0	2.0	0.5	2.3	ND	ND
- mechanically separated liquid	4.0	3.0	1.2	2.8	ND	ND
- solid portion after separation	20.0	4.0	2.0	3.3	ND	ND
Pig slurry	4.0	3.6	1.5	2.2	0.7	0.7
Separated pig slurry - liquid	3.0	3.6	1.1	2.0	ND	ND
Separated pig slurry - solid	20.0	5.0	3.7	2.0	ND	ND

Notes: ND = no data.
The 'standard' phosphate & potash availability figures to the next crop grown from Defra's Fertiliser Manual are 50% & 90% respectively (50% & 100% for dirty water).

Biosolids	Dry Matter (% DM)	Total Nitrogen (Kg N/t)	Total Phosphate (Kg P2O5/t)	Total Potash (Kg K2O/t)	Total Sulphur (Kg SO3/t)	Total Magnesium (Kg MgO/t)
Digested cake	25	11.0	11.0	0.6	8.2	1.6
Thermally dried	95	40.0	55.0	2.0	23.0	6.0
Lime stablised	25	8.5	7.0	0.8	7.4	2.4
Composted	40	11.0	10.0	3.0	6.1	2.0

Notes: The 'standard' phosphate & potash availability figures to the next crop grown from Defra's Fertiliser Manual are 50% & 90% respectively.

Other Organic Manures	Dry Matter	Total Nitrogen	Total Phosphate	Total Potash	Total Sulphur	Total Magnesium
Composts	(% DM)	(Kg N/t)	(Kg P2O5/t)	(Kg K2O/t)	(Kg SO3/t)	(Kg MgO/t)
Green compost	60	7.5	3.0	6.8	3.4	3.4
Green/food compost	60	11.0	4.9	8.0	5.1	3.4
Mushroom compost	35	6.0	5.0	9.0	ND	ND
Digestates						
Food-based whole	4.1	4.8	1.1	2.4	0.7	0.2
Food-based separated liquor	3.8	4.5	1.0	2.8	1.0	0.2
Food-based separated fibre	27.0	8.9	10.2	3.0	4.0	2.2
Farm-sourced whole	5.5	3.6	1.7	4.0	0.8	0.6
Farm-sourced separated liquor	3.0	1.9	0.6	2.5	<0.1	0.4
Farm-sourced separated fibre	24.0	5.6	4.7	6.0	1.2	1.8
Paper Crumble						
Chemically / physically treated	40	2.0	0.4	0.2	0.6	1.4
Biologically treated	30	7.5	3.8	0.4	2.4	1.0
Water Treatment Cake						
Water treatment cake	25	2.4	3.4	0.4	5.5	0.8
Food industry 'wastes'	(% DM)	(Kg N/m3)	(Kg P2O5/m3)	(Kg K2O/m3)	(Kg SO3/m3)	(Kg MgO/m3)
Dairy waste	4	1.0	0.8	0.2	ND	ND
Soft drinks waste	4	0.3	0.2	Trace	ND	ND
Brewing waste	7	2.0	0.8	0.2	ND	ND
General food waste	5	1.6	0.7	0.2	ND	ND

Notes: ND = no data.

The 'standard' figures for the above organic manures have been taken from Defra's Fertiliser Manual 2017 (RB209) 9th edition and the corresponding PLANET version 3 software. Further information on fertiliser recommendations for organic manures can be obtained from the Fertiliser Manual or from a FACTS qualified adviser.