Agrispread Ltd
22 Coniston Drive
Frodsham
Cheshire
WA6 7LR

Natural Resources Wales
29 Newport Road
Ty Cambria
Cardiff
CF24 0TP

5th August 2017

To whom it may concern

Re: Deployment Applications declarations

I write to confirm that Richard Street of Trade Effluent Services Ltd is authorised to complete deployment applications and sign declarations on behalf of Agrispread Ltd.

Yours sincerely,

Robert Netzband-Piggott
Company Secretary

SOIL CHEMICAL ANALYSIS REPORT FOR FIELD - 13

MR ROB PIGGOTT
TRADE EFFLUENT SERVICES
HUGMOOR HOUSE
HUGMOOR
LLANYPWLL
WREXHAM LL13 9YE

F990

Please quote above code for all enquiries

JOHN HANDLEY
WELL HOUSE FARM
SALTNEY
FLINTSHIRE

Date Received	23-AUG-2017
Date Reported	30-AUG-2017

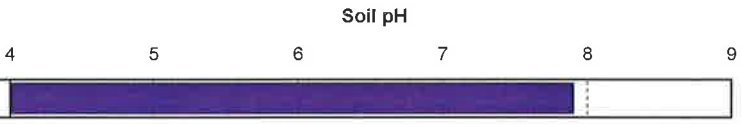
Laboratory References

Report Number	71154
Sample Number	353382

ANALYTICAL RESULTS *on 'dry matter' basis.*

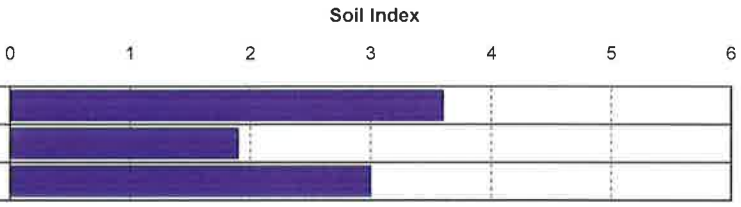
pH (1)

Determinand	Result
Soil pH	7.9



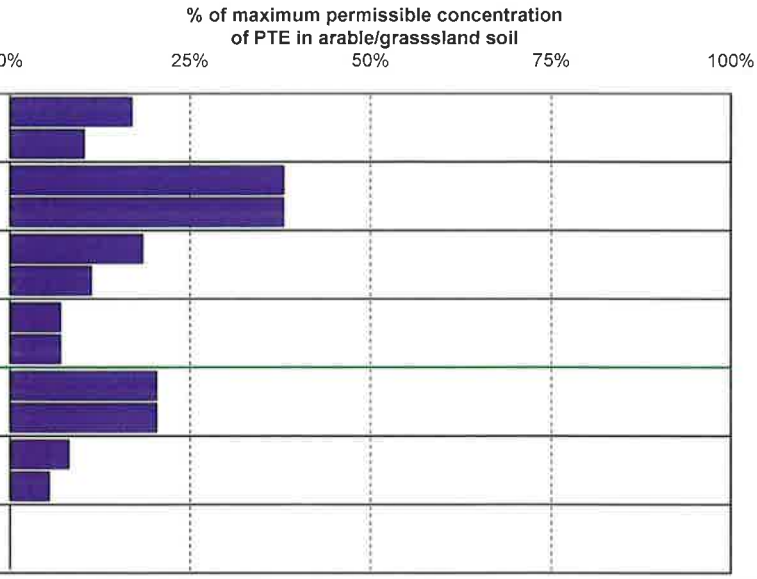
Soil Nutrients (1)

Determinand	Result mg/litre	Soil Index
Soil Phosphorus as P	39.0	3
Soil Potassium as K	120	1
Soil Magnesium as Mg	104	3



Potentially Toxic Elements (2)

Determinand	Result mg/kg		Maximum mg/kg
Total Copper as Cu	33.9	Arable	200
		Grassland	330
Total Zinc as Zn	114	Arable	300
		Grassland	300
Total Nickel as Ni	20.3	Arable	110
		Grassland	180
Total Cadmium as Cd	0.21	Arable	3
		Grassland	3
Total Lead as Pb	61.1	Arable	300
		Grassland	300
Total Chromium as Cr	32.7	Arable	400
		Grassland	600
Total Mercury as Hg	<0.2	Arable	1
		Grassland	1.5



(1) Recommendations for liming and fertiliser should be obtained from Defra's Fertiliser Manual (RB209). The analytical methods used are as described in Defra's RB427.

(2) Concentration of Potentially Toxic Elements (PTE, commonly referred to as 'heavy metals') are in mg/kg dry soil. The maximum and the percentage of this maximum permissible concentration of PTE in soil are derived from the values in Defra's Code of Practice for Agricultural Use of Sewage Sludge (England & Wales) 1996. If applying organic manures to this soil it is important to ensure the soil is managed with a pH no less than 5.0, and that the PTE maximum values are not exceeded following the application. For soil where the pH value is less than 5.2, a FACTS Qualified Adviser should be consulted. Further details are provided in the Sludge Code.

Released by *Katie Dunn* Date *30/08/17*

NRM Coopers Bridge, Braziers Lane, Bracknell, Berkshire RG42 6NS
Tel: +44 (0) 1344 886338 **Fax:** +44 (0) 1344 890972 **Email:** enquiries@nrm.uk.com **www**.nrm.uk.com

SOIL CHEMICAL ANALYSIS REPORT FOR FIELD - 14

MR ROB PIGGOTT
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WREXHAM LL13 9YE

F990

Please quote above code for all enquiries

JOHN HANDLEY
WELL HOUSE FARM
SALTNEY
FLINTSHIRE

Date Received	23-AUG-2017
Date Reported	30-AUG-2017

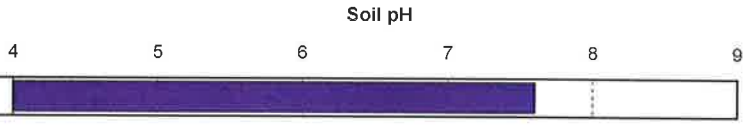
Laboratory References

Report Number	71154
Sample Number	353383

ANALYTICAL RESULTS *on 'dry matter' basis.*

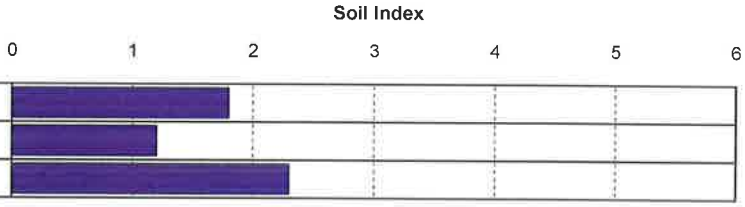
pH (1)

Determinand	Result
Soil pH	7.6



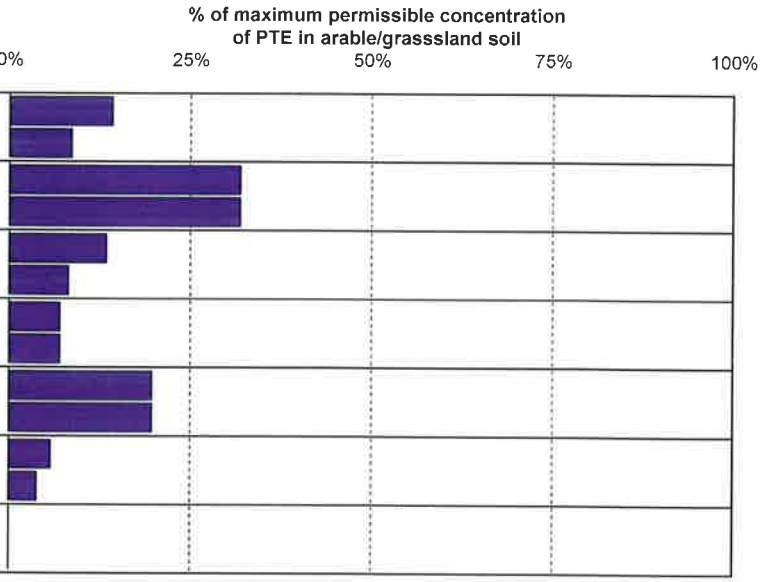
Soil Nutrients (1)

Determinand	Result mg/litre	Soil Index
Soil Phosphorus as P	14.8	1
Soil Potassium as K	75.8	1
Soil Magnesium as Mg	69.7	2



Potentially Toxic Elements (2)

Determinand	Result mg/kg		Maximum mg/kg
Total Copper as Cu	28.3	Arable	200
		Grassland	330
Total Zinc as Zn	95.8	Arable	300
		Grassland	300
Total Nickel as Ni	14.7	Arable	110
		Grassland	180
Total Cadmium as Cd	0.21	Arable	3
		Grassland	3
Total Lead as Pb	59.1	Arable	300
		Grassland	300
Total Chromium as Cr	23.0	Arable	400
		Grassland	600
Total Mercury as Hg	<0.2	Arable	1
		Grassland	1.5



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SOIL CHEMICAL ANALYSIS REPORT FOR FIELD - 15

MR ROB PIGGOTT
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LLANYPWLL
WREXHAM LL13 9YE

F990

Please quote above code for all enquiries

JOHN HANDLEY
WELL HOUSE FARM
SALTNEY
FLINTSHIRE

Date Received	23-AUG-2017
Date Reported	30-AUG-2017

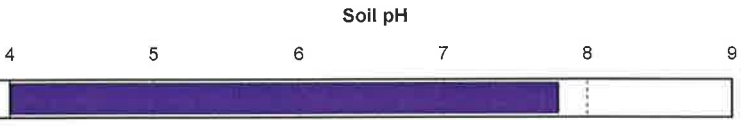
Laboratory References

Report Number	71154
Sample Number	353384

ANALYTICAL RESULTS *on 'dry matter' basis.*

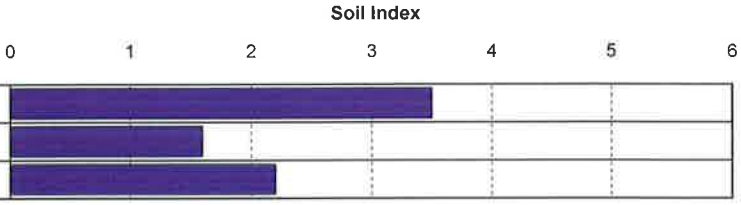
pH (1)

Determinand	Result
Soil pH	7.8



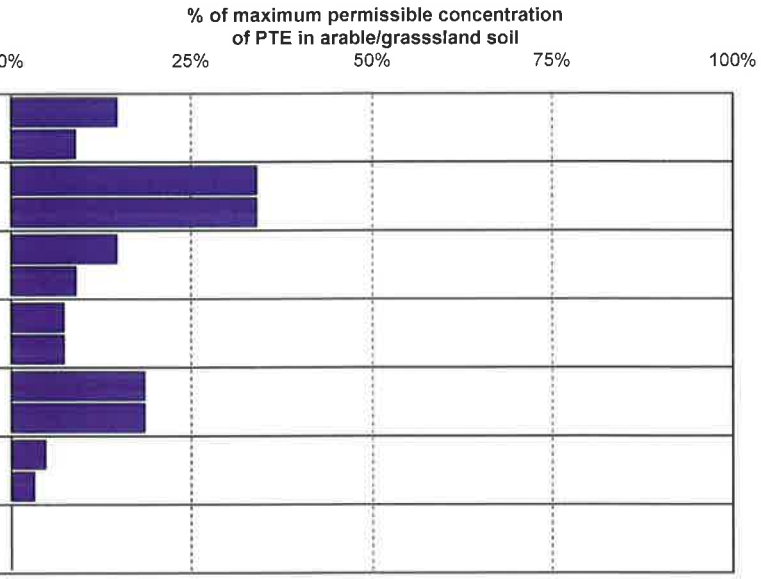
Soil Nutrients (1)

Determinand	Result mg/litre	Soil Index
Soil Phosphorus as P	36.8	3
Soil Potassium as K	102	1
Soil Magnesium as Mg	63.7	2



Potentially Toxic Elements (2)

Determinand	Result mg/kg		Maximum mg/kg
Total Copper as Cu	29.5	Arable	200
		Grassland	330
Total Zinc as Zn	102	Arable	300
		Grassland	300
Total Nickel as Ni	16.2	Arable	110
		Grassland	180
Total Cadmium as Cd	0.22	Arable	3
		Grassland	3
Total Lead as Pb	55.7	Arable	300
		Grassland	300
Total Chromium as Cr	19.0	Arable	400
		Grassland	600
Total Mercury as Hg	<0.2	Arable	1
		Grassland	1.5



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SOIL CHEMICAL ANALYSIS REPORT FOR FIELD - 16

MR ROB PIGGOTT
TRADE EFFLUENT SERVICES
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Please quote above code for all enquiries

JOHN HANDLEY
WELL HOUSE FARM
SALTNEY
FLINTSHIRE

Date Received	23-AUG-2017
Date Reported	30-AUG-2017

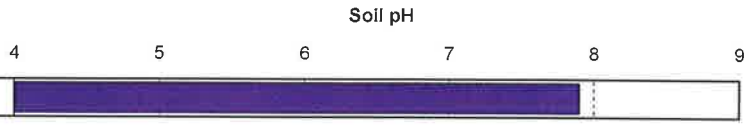
Laboratory References

Report Number	71154
Sample Number	353385

ANALYTICAL RESULTS *on 'dry matter' basis.*

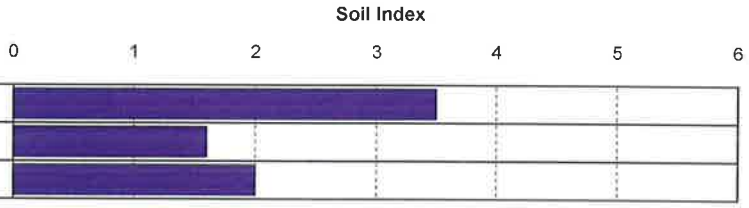
pH (1)

Determinand	Result
Soil pH	7.9



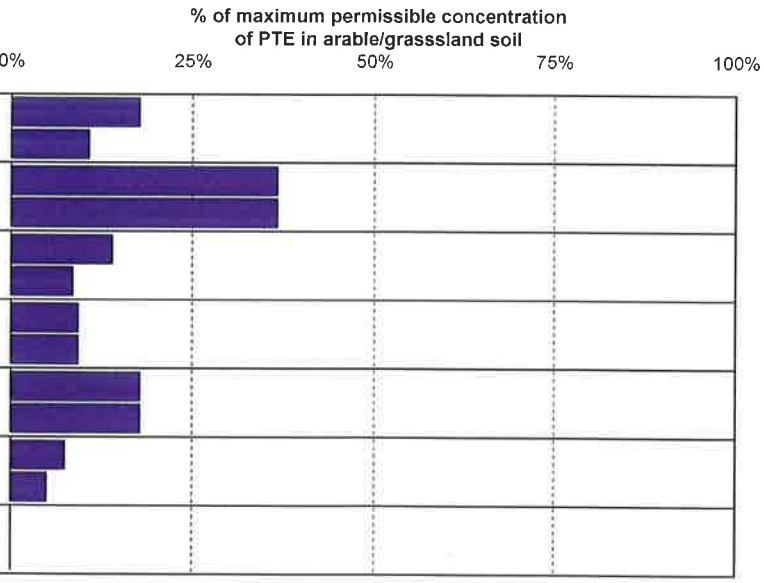
Soil Nutrients (1)

Determinand	Result mg/litre	Soil Index
Soil Phosphorus as P	37.2	3
Soil Potassium as K	97.9	1
Soil Magnesium as Mg	51.2	2



Potentially Toxic Elements (2)

Determinand	Result mg/kg		Maximum mg/kg
Total Copper as Cu	35.4	Arable	200
		Grassland	330
Total Zinc as Zn	110	Arable	300
		Grassland	300
Total Nickel as Ni	15.4	Arable	110
		Grassland	180
Total Cadmium as Cd	0.28	Arable	3
		Grassland	3
Total Lead as Pb	53.5	Arable	300
		Grassland	300
Total Chromium as Cr	29.9	Arable	400
		Grassland	600
Total Mercury as Hg	<0.2	Arable	1
		Grassland	1.5



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SOIL CHEMICAL ANALYSIS REPORT FOR FIELD - 17

MR ROB PIGGOTT
TRADE EFFLUENT SERVICES
HUGMOOR HOUSE
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LLANYPWLL
WREXHAM LL13 9YE

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Please quote above code for all enquiries

JOHN HANDLEY
WELL HOUSE FARM
SALTNEY
FLINTSHIRE

Date Received	23-AUG-2017
Date Reported	30-AUG-2017

Laboratory References

Report Number	71154
Sample Number	353386

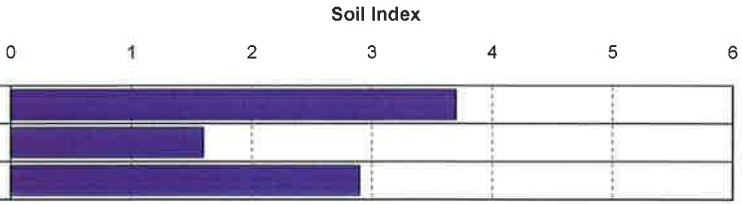
ANALYTICAL RESULTS *on 'dry matter' basis.*

pH (1)

Determinand	Result
Soil pH	7.6

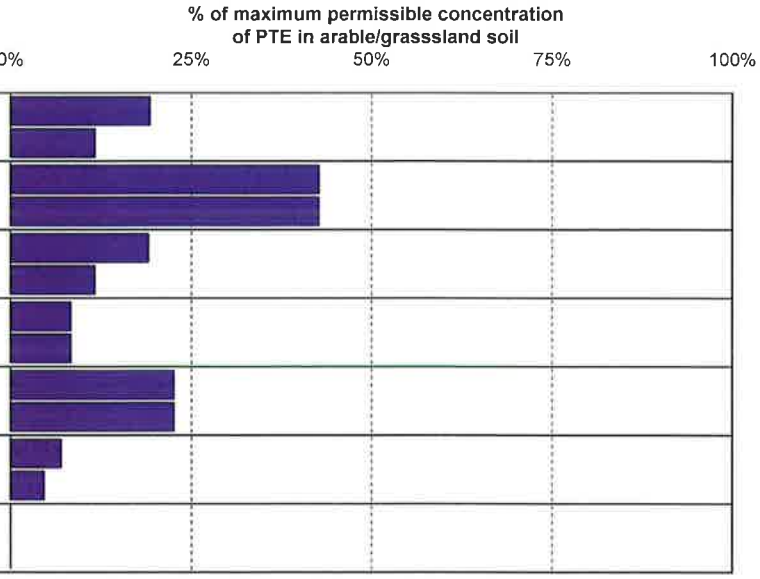
Soil Nutrients (1)

Determinand	Result mg/litre	Soil Index
Soil Phosphorus as P	39.6	3
Soil Potassium as K	102	1
Soil Magnesium as Mg	96.5	2



Potentially Toxic Elements (2)

Determinand	Result mg/kg		Maximum mg/kg
Total Copper as Cu	38.5	Arable	200
		Grassland	330
Total Zinc as Zn	128	Arable	300
		Grassland	300
Total Nickel as Ni	21.0	Arable	110
		Grassland	180
Total Cadmium as Cd	0.25	Arable	3
		Grassland	3
Total Lead as Pb	67.8	Arable	300
		Grassland	300
Total Chromium as Cr	27.9	Arable	400
		Grassland	600
Total Mercury as Hg	<0.2	Arable	1
		Grassland	1.5



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Released by *Katie Dunn* **Date** *30/08/17*

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SOIL CHEMICAL ANALYSIS REPORT FOR FIELD - 18

MR ROB PIGGOTT
TRADE EFFLUENT SERVICES
HUGMOOR HOUSE
HUGMOOR
LLANYPWLL
WREXHAM LL13 9YE

F990

Please quote above code for all enquiries

JOHN HANDLEY
WELL HOUSE FARM
SALTNEY
FLINTSHIRE

Date Received	23-AUG-2017
Date Reported	30-AUG-2017

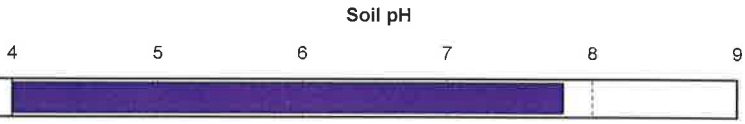
Laboratory References

Report Number	71154
Sample Number	353387

ANALYTICAL RESULTS *on 'dry matter' basis.*

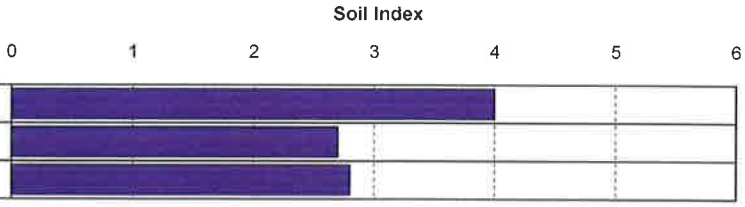
pH (1)

Determinand	Result
Soil pH	7.8



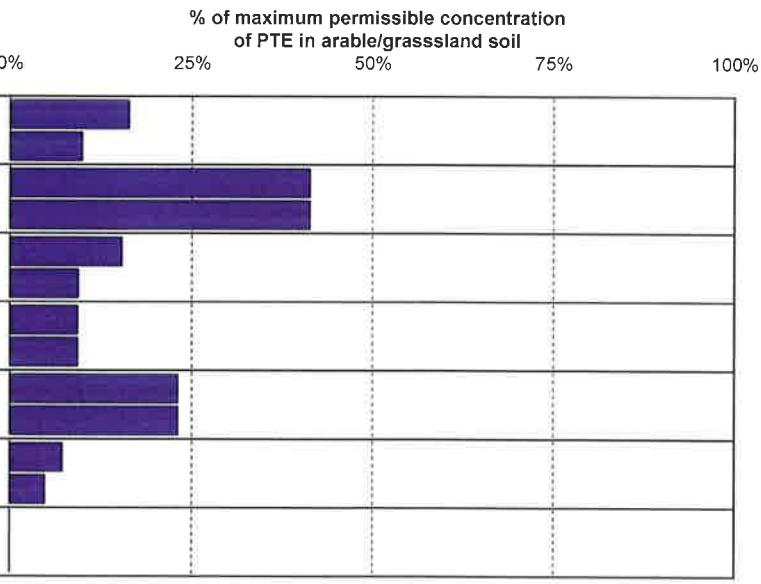
Soil Nutrients (1)

Determinand	Result mg/litre	Soil Index
Soil Phosphorus as P	46.0	4
Soil Potassium as K	216	2+
Soil Magnesium as Mg	93.7	2



Potentially Toxic Elements (2)

Determinand	Result mg/kg		Maximum mg/kg
Total Copper as Cu	32.6	Arable	200
		Grassland	330
Total Zinc as Zn	124	Arable	300
		Grassland	300
Total Nickel as Ni	16.9	Arable	110
		Grassland	180
Total Cadmium as Cd	0.28	Arable	3
		Grassland	3
Total Lead as Pb	69.3	Arable	300
		Grassland	300
Total Chromium as Cr	28.9	Arable	400
		Grassland	600
Total Mercury as Hg	<0.2	Arable	1
		Grassland	1.5



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Released by *Katie Dunn* Date *30/08/17*

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SOIL CHEMICAL ANALYSIS REPORT FOR FIELD - 19

MR ROB PIGGOTT
TRADE EFFLUENT SERVICES
HUGMOOR HOUSE
HUGMOOR
LLANYPWLL
WREXHAM LL13 9YE

F990

Please quote above code for all enquiries

JOHN HANDLEY
WELL HOUSE FARM
SALTNEY
FLINTSHIRE

Date Received	23-AUG-2017
Date Reported	30-AUG-2017

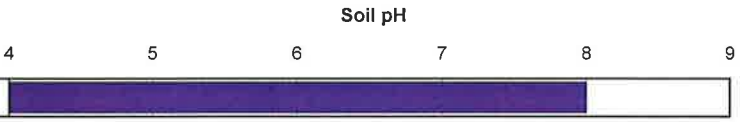
Laboratory References

Report Number	71154
Sample Number	353388

ANALYTICAL RESULTS *on 'dry matter' basis.*

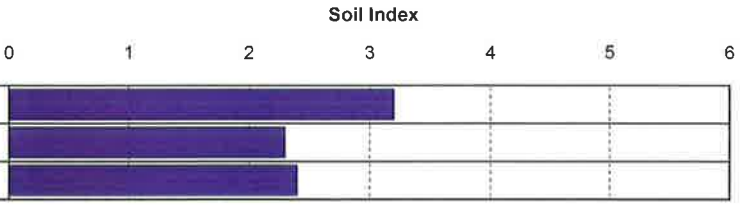
pH (1)

Determinand	Result
Soil pH	8.0



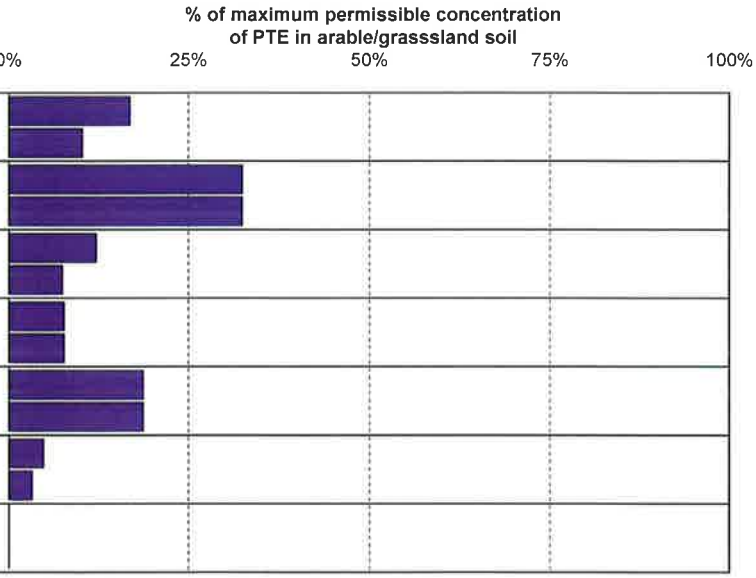
Soil Nutrients (1)

Determinand	Result mg/litre	Soil Index
Soil Phosphorus as P	31.4	3
Soil Potassium as K	162	2-
Soil Magnesium as Mg	71.8	2



Potentially Toxic Elements (2)

Determinand	Result mg/kg		Maximum mg/kg
Total Copper as Cu	33.7	Arable	200
		Grassland	330
Total Zinc as Zn	97.3	Arable	300
		Grassland	300
Total Nickel as Ni	13.4	Arable	110
		Grassland	180
Total Cadmium as Cd	0.23	Arable	3
		Grassland	3
Total Lead as Pb	56.2	Arable	300
		Grassland	300
Total Chromium as Cr	19.3	Arable	400
		Grassland	600
Total Mercury as Hg	<0.2	Arable	1
		Grassland	1.5



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HUGMOOR
LLANYPWLL
WREXHAM LL13 9YE

F990

Please quote above code for all enquiries

AHLSTROM

LIQUID WASTE

LIQUID WASTE

Sample Reference :

AHLSTROM

Sample Matrix : LIQUID WASTE

Laboratory References	
Report Number	27935
Sample Number	73778

Date Received	19-SEP-2018
Date Reported	26-SEP-2018

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept under refrigeration for at least 3 weeks.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Oven Dry Solids	13.0	%
Conductivity 1:6	11110	uS/cm
Total Nitrogen	<0.04	% w/w
Nitrate Nitrogen	<10	mg/kg
Ammonium Nitrogen	<50	mg/kg
Total Phosphorus (P)	<5	mg/kg
Total Potassium (K)	3200	mg/kg
Total Magnesium (Mg)	<10	mg/kg
Total Copper (Cu)	<0.2	mg/kg
Total Zinc (Zn)	0.69	mg/kg

Released by Darren Whitbread Date 26/09/18

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Please quote above code for all enquiries

AHLSTROM

LIQUID WASTE

LIQUID WASTE

Sample Reference :

AHLSTROM

Sample Matrix : LIQUID WASTE

Laboratory References	
Report Number	27935
Sample Number	73778

Date Received	19-SEP-2018
Date Reported	26-SEP-2018

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept under refrigeration for at least 3 weeks.

ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Total Sulphur (S)	12553	mg/kg
Total Calcium (Ca)	15.9	mg/kg
Total Lead (Pb)	<0.5	mg/kg
Total Cadmium (Cd)	<0.01	mg/kg
Total Mercury (Hg)	<0.05	mg/kg
Total Nickel (Ni)	<0.2	mg/kg
Total Chromium (Cr)	<0.2	mg/kg
Total Sodium (Na)	23904	mg/kg
pH 1:6 [Fresh]	9.31	
Organic Matter LOI	4.44	% w/w

Released by *Darren Whitbread* Date *26/09/18*

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ANALYTICAL RESULTS *on 'as received' basis.*

Determinand	Value	Units
Water Soluble Magnesium	1.74	mg/kg
Water Soluble Phosphorus	1.70	mg/kg
Water Soluble Potassium	2913	mg/kg

Released by *Darren Whitbread* Date *26/09/18*

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Waste Producer	Ahlstrom Black Liquor
EWC code	03 03 11
Waste description	Black liquor from long fibre pulp
Laboratory	NRM Laboratories Ltd

Sample Ref: 73778

Ahlstrom Black Liquor was sampled in accordance with the standard sampling procedures in October 2017 and was analysis by NRM laboratories Ltd.

	Units	Result	Nutrients applied at 26t/ha
pH	-	9.31	-
Electrical conductivity	µS/cm	11400	-

The waste has low dry matter content and will apply 13% solids to the receiving soil. This will help improve soil structure and aid nutrient and water holding capacity.

The black liquor has a pH of 9.31 and no detrimental effects are anticipated from its application to most soils at the proposed spreading rate of 26t/ha.

A detailed report carried out in 2008 regarding the suitability of land application of the black liquor found no disbenefit from the application of black liquor and this is attached in Appendix E.

1. Major Plant Nutrients

	Unit	Result	Nutrients applied at 26t/ha
Nitrogen	kg/t	0	10
Phosphate	kg/t	0	0
Potash	kg/t	4	100
Magnesium	kg/t	0	0
Sulphur	kg/t	31.38	815.95

The liquor from the effluent treatment plant at Ahlstrom contains high levels of potash and sulphur with small quantities of phosphate, nitrogen and magnesium. Potash availability should be high and will be available for the next crop. Phosphate levels are low and less than 1kg/ha will be applied to the soil and following crop.

2. Potentially Toxic Elements (PTEs)

The waste was analysed for a range of PTEs as described in the Sludge (Use in Agriculture) Regulations. The analysis shows that the waste contains only trace elements of the majority of PTEs additions, and they fall well within the maximum permitted annual application limit. The table below shows the waste contribution of PTEs in kg/ha at the proposed application rate.

Application rate (t/ha)	Copper	Zinc	Lead	Cadmium	Mercury	Nickel	Chromium
26	0.01	0.02	0.01	0.0	0.0	0.01	0.01

3. Sodium

The total addition of sodium in any one application of the Ahlstrom Black liquor waste is 621.50kg/ha, which is higher than that recommended in agency guidance. However, the sodium will not all be immediately available as the extraction process makes use of the less available forms of sodium, which is likely to be bound within the lignin in the waste.

The loamy topsoil at the farm is at a lower risk of structural instability following addition of sodium than if they were a lighter texture. Structural instability is usually a feature associated with the addition of many tonnes of

sodium deposited within topsoil from seawater inundation, saline intrusion or from capillary rise and evaporation of saline water leading to salt in the upper layers. In extreme cases this can lead to de-flocculation of clay particles and structural instability, changes in soil-plant osmotic processes, induced drought stress and in extreme cases sodium toxicity. The sodium content has remained fairly stable since 2005 and with more than 9 years experience of spreading the black liquor; we are yet to see evidence of damage to the soil structure following an application of black liquor.

Bioassays carried out in 2000 applied black liquor at an application rate of 50t/ha and over 800kg/ha of total sodium was added to the soil. No detrimental effect to the soil structure was noted and after 12 weeks the elevated conductivity of the soil was 2165uS/cm, within the normal range for agricultural soils in the UK and within the limit for topsoil detailed in the BS3882. I would therefore conclude from this that the waste will not lead to unacceptable high longer term EC and sodium issues after application.

In addition, sodium is an essential element for grass herbage growth. Sodium fertilizers will not normally give extra grass yield but they will increase the Na content of grass which will improve the palatability of herbage and can reduce the chance of grass staggers. Sodium is also associated with a greater % of live herbage, higher D values and sugar content of grass. Research from Bangor University indicates that these effects increase milk output and % butterfat and may also have a small benefit on somatic cell count. Grass palatability and milk output increase at herbage sodium levels up to 0.5% in the dry matter.

4. Conductivity

While an application of Ahlstrom will temporarily elevate conductivity within the soils this does not automatically mean that it will cause crop scorch or lead structural damage after a receipt of the waste. It is largely dependent on soils type, weather and soil conditions. Many Chemical (Liquid & solid) fertiliser has an elevated conductivity far in excess of that measured in the Ahlstrom waste which will could lead to similar issues.

The conductivity within the waste is measured as the total of all of the salts it contains including chlorides, sulphates and other soluble oxides/compounds. The effects of conductivity are more pounced on soils that are lighter textured and also when soils are dry as the salts applied can increase the strength of the soil water solution and lead to induced drought stress. The fields are loamy textured and are in a heavy rainfall area so are low risk of induced drought stress.

5. Potential disbenefits

- The black liquor pH is 9.31 and no adverse effects are anticipated from its application to agricultural land.
- The level of PTEs applied are well within regulatory recommendations and will have no impact on the receiving soils or crops.
- Compaction of soils will be minimised by the use of an umbilical cord system and tractor mounted spreader.
- The black liquor does not have an offensive odour and is unlikely to cause a nuisance during normal spreading operations.
- Additions of sodium and conductivity which are discussed above.

6. Conclusion

The black liquor from the treatment plant at Ahlstrom provides agricultural benefit through the addition of major plant nutrients and will be used to reduce the requirement for chemical fertiliser. The liquor will supply additional benefit through the addition of organic matter to the receiving soil. Application rates will be reviewed to ensure soil and crop requirements are not exceeded following regular analysis of the waste.

The additions of sodium at the above applications rates fall within those that are recommended within previous assessments.

There should be no significant impacts on soil structural stability.

I would expect the electrical conductivity of the topsoil to initially rise after application but that it will return to normal within a matter of a few weeks, a feature no different to the effects of any fertiliser application.

The material has been recycled to land for a number of years and experience has shown that it can be applied without cause harm to the environment. There should be no disbenefit from the application when applied in accordance with the management plan and relevant current regulations.