TECHNICAL DATASHEET

Sludge (Use in Agriculture) Regulations

In helping you meet the Sludge (Use In Agriculture) Regulations ALS Environmentals' Wakefield laboratory are able to offer UKAS ISO 17025:2005 accredited analysis of sludges.

Care should always be taken when applying sewage sludge to land to prevent any form of adverse environmental impact. The sludge must not contain non-degradable materials, such as plastics, which would make land disposal unsightly. Movement of sludge by tanker from sewage treatment plant to agricultural land can create traffic problems and give rise to noise and odour nuisance.

Table 1 outlines the ALS Environmental portfolio of chemical sludge analysis and respective limits of detection.

The application of sewage sludge to land in member countries of the European Economic Commission (EEC) is governed by Council Directive No. 86/278/EEC (Council of the European Communities 1986). This Directive prohibits the sludge from sewage treatment plants from being used in agriculture unless specified requirements are fulfilled, including the testing of the sludge and the soil.

Utilising our state of the art ICP-MS and ICP-OES instruments for the analysis of metals, ALS Environmental are able to meet all of the regulatory limits as set out in the Sludge (Use in Agriculture) Regulations. In addition to chemical analysis we are able to offer a broad portfolio of Microbiological analysis on sludge samples. This list includes organisms such as:

- Salmonella
- Aerobic colony count
- E.Coli
- Clostridia
- Coliforms

For zinc, copper and nickel, the maximum permissible concentrations vary with the pH of the soil because it is known that crop damage from phytotoxic elements is more likely to occur on acid soils. Tables 29 and 30 on the following page give the maximum permissible average annual rates of addition of potentially toxic elements (PTE) over a 10-year period.

Table 1: ALS Analytical Offering for Sludge Analysis

DET NAME	LOD	Units	Method
Ammonium Nitrogen	6	mg/kg	WSC19
Loss on ignition, dried solids	0.2	%	WSC12
Solids, Total at 105c, sludge.	0.2	%	WSC12
pH	1		WSC11
Alkalinity, digested sludge	8	mg/l	WWC9
Fluoride as F	10	mg/kg	WSC18
Nitrogen as N, dry weight	0.01	% DW	WSC8
Phosphorus, Total as P DW	58.4	mg/kg	WSC6
Mercury, Total as Hg DW	0.07	mg/kg	WSC5
Arsenic, Total as As DW	2.4	mg/kg	WSC6
Selenium, Total as Se DW	0.54	mg/kg	WSC16
Aluminium, Total as Al DW	74	mg/kg	WSC6
Cadmium, Total as Cd DW	0.11	mg/kg	WSC6
Calcium, Total as Ca DW	222	mg/kg	WSC6
Chromium, Total as Cr DW	4.3	mg/kg	WSC6
Cobalt, Total as Co DW	0.3	mg/kg	WSC6
Copper, Total as Cu DW	7.8	mg/kg	WSC6
Iron, Total as Fe DW	218	mg/kg	WSC6
Lead, Total as Pb DW	6.2	mg/kg	WSC6
Lithium, Total as Li DW	4.15	mg/kg	WSC6
Magnesium, Total as Mg DW	75	mg/kg	WSC6
Manganese, Total as Mn DW	32.7	mg/kg	WSC6
Molybdenum, Total as Mo DW	0.36	mg/kg	WSC6
Nickel, Total as Ni DW	5.1	mg/kg	WSC6
Potassium, Total as K DW	87	mg/kg	WSC6
Sodium, Total as Na DW	150	mg/kg	WSC6
Sulphur, Total as S DW	178	mg/kg	WSC6
Tin, Total as Sn DW	1.8	mg/kg	WSC6
Vanadium, Total as V DW	1.54	mg/kg	WSC6
Zinc, Total as Zn DW	12.3	mg/kg	WSC6

TABLE 29: Reproduced from the Sludge (Use in Agriculture) Regulations: Maximum permissible concentrations of potentially toxic elements in soil after application of sewage sludge and maximum annual rates of addition.

Potentially toxic element (PTE)	ALS LOD	Maximum permissible concentration of PTE in soil (mg/kg dry solids)				Maximum permissible average annual rate of PTE addition over a 10 year period (kg/ha)
		PH 5.0<5.5	PH 5.0<6.0	PH 6.0<7.0	PH > 7.0	
Zinc	12.3mg/kg	200	250	300	450	15
Copper	7.8mg/kg	80	100	135	200	7.5
Nickel	5.1mg/kg	50	60	75	110	3
Cadmium	0.11mg/kg	3				0.15
Lead	6.2mg/kg	300				15
Mercury	0.07mg/kg	1				0.1
Chromium	4.3mg/kg	400 (prov.)				15 (provisional)
*Molybdenum	0.36mg/kg	4				0.2
*Selenium	0.54mg/kg	3				0.15
*Arsenic	2.4mg/kg	50				0.7
*Fluoride	10mg/kg	500				20

** These parameters are not subject to the provisions of Directive 86/278/EEC.*

The concentrations of PTE in arable soils must not exceed certain prudent limits within the normal depth of cultivation as a result of sludge application. Maximum permissible concentrations of the PTE in soil after application of sewage sludge (according to the UK Code of Practice) are given in Table 29. For zinc, copper and nickel, the maximum permissible concentrations vary with the pH of the soil because it is known that crop damage from phytotoxic elements is more likely to occur on acid soils. This Table also gives the maximum permissible average annual rates of addition of PTE over a 10-year period.

TABLE 30: Reproduced from the Sludge (Use in Agriculture) Regulations: Maximum permissible concentrations of potentially toxic elements in soil under grass after application of sewage sludge when samples taken to depth of 7.5 cm.

Potentially toxic element (PTE)	ALS LOD	Maximum permissible concentration of PTE in soil (mg/kg dry solids)			
		PH 5.0<5.5	PH 5.0<6.0	PH 6.0<7.0	PH > 7.0
Zinc	12.3mg/kg	330	420	500	750
Copper	7.8mg/kg	130	170	225	330
Nickel	5.1mg/kg	80	100	125	180
Cadmium	0.11mg/kg	3/5			
Lead	6.2mg/kg	300			
Mercury	0.07mg/kg	1.5			
Chromium	4.3mg/kg	600(prov.)			
*Molybdenum	0.36mg/kg	4			
*Selenium	0.54mg/kg	5			
*Arsenic	2.4mg/kg	50			
*Fluoride	10mg/kg	500			

** These parameters are not subject to the provisions of Directive 86/278/EEC.*

When sludge is applied to the surface of grassland, the concentrations of PTE should be determined in soil samples taken to a depth of 75mm. The maximum concentrations of these parameters should not exceed the limits set out in Table 30. In order to minimize injestion of lead, cadmium and fluoride by livestock, the addition of these elements through sludge application to the surface should not exceed 3 times the 10 year average annual rates specified in Table 29.

References

Sludge (Use in Agriculture) Regulations 1989 (amended 1990).

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