WATERFALL & O'BRIEN
LIFE QUALITY ANALYTICAL CHEMISTS

GUIDELINE FOR THE SPECIFICATION OF TOPSOIL QUALITY.

Guideline Statement

The historical and current land management uses determine the type and effectiveness of a physico-chemical testing regime. The testing regime for agricultural soils is geared towards determining its ability to sustain growth and maintain its current agricultural yield; contaminated land is geared towards identifying and quantifying the contamination.

This guidance note is designed to assist in identifying a suitable testing regime for the agricultural soil and provide guidance on the procedure for reporting the physico-chemical testing data of soil samples submitted to the laboratories of Waterfall & O'Brien.

Scope

This guidance note is only applicable to soil samples that are intended for the specification, interpretation and rationalising of land intended for use as agricultural or horticultural land. These guidance notes are not intended to be used for soil samples removed from contaminated land sites.

Guidelines

A soil which meets the requirements of this specification would possess the necessary attributes to sustain healthy plant growth in a variety of landscape situations under satisfactory conditions of management.

GENERAL PHYSICO-CHEMICAL TESTS FOR SOIL SAMPLES.

The physico-chemical tests are designed to evaluate the suitability and general health of the soil to support and maintain plant growth. The values in table 1 are the minimum requirements to maintain plant growth. Specific planting regimes may need to meet additional physico-chemical specifications.

Table 1: Major Physico-chemical Tests and Nutrients.

pH	5.5-7.8
Electrical Conductivity 1:2.5 (w/v) extract	<1500 us/cm
Organic Matter[1]	> 4.0% (w/w)
Nitrogen (N)[2]	> 0.2% (w/w)
Extractable Phosphorus (P)[3]	> 45 mg/kg
Extractable Potassium (K)[3]	> 240 mg/kg
Extractable Magnesium (Mg)[3]	> 80 mg/kg

(1) BS 1377, (2) Kjeldahl, (3) MAFF Handbook RB427

PHYTOTOXIC ELEMENTS (NOT NORMALLY HAZARDOUS TO HEALTH)

Phytotoxic elements are not normally hazardous to animal health and welfare but may be toxic to plants and marine life. The presence of phytotoxic elements may reduce crop and plant yields and can produce weak malformed plants. The threshold trigger concentrations for any uses where plants are to be grown are given in ICRCL 59/83 (published by the UK Department of Environment). A summary of the information is given in Table 2. A pH value of 6.5 is assumed. If the pH falls the toxic effects and the uptake of these elements will be increased.

Table 2: Phytotoxic Elements (not normally hazardous to health).

Total Copper (Cu)	<130 mg/kg
Total Nickel (Ni)	< 70 mg/kg
Total Zinc (Zn)	< 300 mg/kg
Water-soluble Boron (B)	< 3 mg/kg

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ZOOTOXIC ELEMENTS (WHICH MAY POSE HAZARDS TO HEALTH)

Threshold trigger concentrations for use in residential gardens with plant uptake, as given in Soil Guideline Value Documents (SGV) published as part of the CLEA model by DEFRA/EA 2002.

Table 3: Zootoxic Elements (which may pose a hazard to health).

Total Arsenic (As)	< 20 mg/kg		
	pH6	pH7	pH8
Total Cadmium (Cd)	<1 mg/kg	<2 mg/kg	<8 mg/kg
Total Chromium (Cr)	< 130 mg/kg		
Total Lead (Pb)	< 450 mg/kg		
Total Mercury (Hg)	< 8 mg/kg		
Total Nickel (Ni)	<50 mg/kg		

PHYSICAL ATTRIBUTES OF AGRICULTURAL SOILS.

Soils are made from a combination of different natural materials that provide suitable anchorage for plants, absorb and retain water and chemical nutrients for plant growth and consequently produce a stable environment to sustain plant growth. Good soil is therefore reused for planting the same or different crops or plants year upon year. Fertilisers are used to maintain the soils chemical balance, but the use of heavy plant machinery and ploughing of the land, together with natural events may cause the erosion of the land.

Use this section if the land use has changed or if land erosion is suspected for the deterioration of planting yields, especially in open fields.

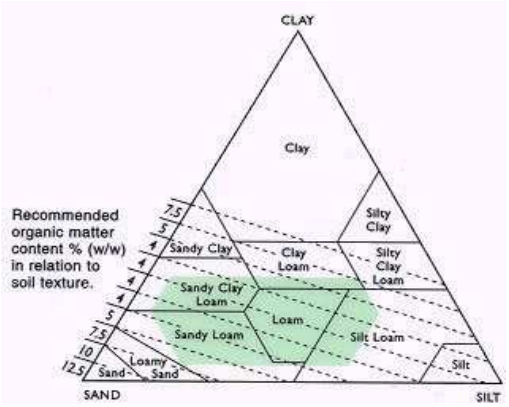
Table 4: Recommended Soil Stone Content.

Maximum size in any direction	50mm
Maximum content (2mm-50mm)	35% by dry weight of which the fraction 2mm-5mm must not exceed 20% by dry weight

Table 5: Recommended Soil Composition and Texture.

Sand (0.05-2.00mm)	Maximum 75%	Minimum 20%
Silt (0.002-0.05mm)	Maximum 60%	Minimum 5%
Clay (less than 0.002mm)	Maximum 30%	Minimum 5%

Figure 1: Graphical Representation of the Relationship Between Soil Type and Organic Matter Content.



References

1) "A Guide to Specifying Topsoil" Parts 1 and 2 by R.M.Voelcker et al., published in Landscape Design, March and April 1989.

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