EUROPEAN COMMISSION
JOINT RESEARCH CENTRE
Institute for Reference Materials and Measurements

CERTIFIED REFERENCE MATERIAL BCR® – 143R

CERTIFICATE OF ANALYSIS

SEWAGE SLUDGE AMENDED SOIL			
Element	Mass fraction based on dry mass		Number of accepted sets of results p
	Certified value [1] [mg/kg]	Uncertainty [2] [mg/kg]	
Total content			
Cd	71.8	1.2	7
Co	12.3	0.3	6
Cu	130.6	1.5	8
Pb	179.7	2.1	7
Mn	904	13	7
Hg	1.10	0.07	6
Ni	299	5	7
Zn	1055	14	12
Element	Mass fraction based on dry mass		Number of accepted sets of results p
	Certified value [3] [mg/kg]	Uncertainty [2] [mg/kg]	
Aqua regia soluble content			
Cd	72.0	1.8	6
Cr	426	12	8
Pb	174	5	8
Mn	858	11	8
Ni	296	4	6
Zn	1063	16	9

[1] Unweighted mean value of the means of p accepted sets of data, each set being obtained in a different laboratory and/or with a different method of determination. The certified values are traceable to the SI.

[2] Half-width of the 95 % confidence interval of the mean defined in [1] or [3].

[3] Unweighted mean value of the means of p accepted sets of data, each set being obtained in a different laboratory and/or with a different method of determination. The certified values are traceable to the aqua regia extraction method as described in the report (DIN 38414-S7).

This certificate is valid for one year after purchase.

Sales date:

The minimum amount of sample to be used is 250 mg.

NOTE

This material has been certified by BCR (Community Bureau of Reference, the former reference materials programme of the European Commission). The certificate has been revised under the responsibility of IRMM.

Brussels, April 1993
Latest revision: April 2007

Signed:

Prof. Dr. Hendrik Emons
Unit for Reference Materials
EC-JRC-IRMM
Retieseweg 111
2440 Geel, Belgium

Indicative Values

Element	Mass fraction	
	Indicative value[1)] [mg/kg]	Uncertainty [2)] [mg/kg]
Aqua regia soluble content		
Co	11.8	1.0
Cu	128	7
Hg	1.10	0.06

1) Mean value
2) Standard deviation

Additional Material Information

Major Compounds	Mass fraction [g/kg]
SiO_2	602.2
CaO	24.0
MgO	12.5
Al_2O_3	169.5
TiO_2	5.5
Fe_2O_3	28.0
P_2O_5	5.5
K_2O	21.5

DESCRIPTION OF THE SAMPLE

The sample consists of about 50 g of powdered sewage sludge amended soil (particles have passed a sieve with apertures < 90 µm) in brown glass bottles provided with a polyethylene insert and a screw cap.

ANALYTICAL METHOD USED FOR CERTIFICATION

A wide range of sample treatment methods was applied as necessary: amongst others digestion with mixtures of oxidising acids; addition of HF was mandatory for complete digestion of the material.
Methods of final determination were:

- Cold vapour atomic absorption spectrometry
- Cold vapour atomic fluorescence spectrometry
- Direct current plasma emission spectrometry
- Electrothermal atomic absorption spectrometry
- Energy dispersive X-ray fluorescence spectrometry
- Flame atomic absorption spectrometry
- Inductively coupled plasma atomic emission spectrometry
- Inductively coupled plasma mass spectrometry
- Instrumental neutron activation analysis
- Isotope dilution mass spectrometry
- Neutron activation analysis with radiochemical separation

PARTICIPANTS

- CNRS, Service Central d'Analyse, Vernaison (FR)
- ECN Energieonderzoek Centrum Nederland, Petten (NL)
- Ecole Européenne des Hautes Etudes des Industries Chimiques, Strasbourg (FR)
- Forschungszentrum für Umwelt und Gesundheit, Neuherberg (DE)
- European Commission, Joint Research Centre, Environment Institute Ispra (IT)
- Laboratorium voor Analytische Scheikunde, Instituut voor Nucleaire Wetenschappen, Rijksuniversiteit Gent, Gent (BE)
- Macaulay Institute for Soil Research, Aberdeen (GB)
- Ministère des Affaires Economiques, Brussel (BE)
- Risø National Laboratory, Isotope Division, Roskilde (DK)
- Teagasc, Wexford (IE)

SAFETY INFORMATION

The usual laboratory safety precautions apply.

INSTRUCTIONS FOR USE

The sample should be used as it is from the bottle. Before a bottle is opened, it should be shaken manually for 5 min so that the material is re-homogenised.
The correction to dry mass must be determined on a separate portion taken at the same time of the analysis from the same bottle. It can be done by drying in a desiccator over phosphorous pentoxide at room temperature until constant mass.
Treatment with HF is mandatory for the determination of the total contents.
The digestion procedure used for the determination of the aqua regia soluble contents (DIN 38414-S7) is described in detail in the certification report.
The reference material is intended to verify the performance of a method and not to calibrate a method.

STORAGE

The closed bottle should be stored in a dry place at a maximum temperature of 20 °C. Once opened, the bottle should be stored closed in a dry desiccator; direct prolonged exposure to sunlight should be avoided.
However, the European Commission cannot be held responsible for changes that happen during storage of the material at the customer's premises, especially of opened samples.

LEGAL NOTICE

NOTE

A technical report on the production of BCR-143R is available on the internet (http://www.irmm.jrc.be). A paper copy can be obtained from IRMM on request.

European Commission – Joint Research Centre
Institute for Reference Materials and Measurements (IRMM)
Retieseweg 111, 2440 Geel (Belgium)
Telephone: +32-(0)14-571.722 - Telefax: +32-(0)14-590.406