



CERTIFIED REFERENCE MATERIAL BCR[®] – 145R

CERTIFICATE OF ANALYSIS

SEWAGE SLUDGE			
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	3.50	0.15	5
Co	5.6	0.4	5
Cu	696	12	9
Pb	286	5	7
Mn	156	4	10
Hg	2.01	0.22	6
Ni	247	7	6
Zn	2122	23	11
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			
Cr	307	13	9
Cu	707	9	7
Pb	282	9	9
Ni	251	6	9
Zn	2140	50	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 ²⁾.
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 100 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]	Number of sets of results p
Aqua regia soluble content			
Cd	3.43	0.17	3
Co	5.3	0.7	3
Mn	145	7	9
Hg	1.99	0.08	3
¹⁾ Mean value of the means of p datasets. ²⁾ Standard deviation.			

Additional Material Information	
Major Compounds	Mass Fraction [g/kg]
SiO ₂	155.0
CaO	93.5
MgO	15.0
Al ₂ O ₃	75.0
TiO ₂	4.5
Fe ₂ O ₃	25.0
P ₂ O ₅	38.0
K ₂ O	3.5

DESCRIPTION OF THE SAMPLE

The sample consists of about 40 g of homogeneous, powdered sewage sludge (particle size < 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
- Hydride generation 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, Energieonderzoekcentrum, 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, INW, Rijksuniversiteit 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 to constant mass.

Treatment with HF is recommended for the determination of 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

Neither IRMM, its subsidiaries, its contractors nor any person acting on their behalf.

(a) make any warranty or representation, express or implied that the use of any information, material, apparatus, method or process disclosed in this document does not infringe any privately owned intellectual property rights;

or

(b) assume any liability with respect to, or for damages resulting from, the use of any information, material, apparatus, method or process disclosed in this document save for loss or damage arising solely and directly from the negligence of IRMM or any of its subsidiaries.

NOTE

A technical report on the production of BCR-145R is available on the internet (<http://www.irmm.jrc.be>). A paper copy can be obtained from IRMM on request.