



CERTIFIED REFERENCE MATERIAL BCR[®] – 176R

CERTIFICATE OF ANALYSIS

FLY ASH		
	Mass Fraction	
	Certified value ¹⁾ [mg/kg]	Uncertainty ²⁾ [mg/kg]
As	54	5
Cd	226	19
Co	26.7	1.6
Cr	810	70
Cu	1050	70
Fe	13100	500
Ni	117	6
Pb	5000	500
Sb	850	50
Se	18.3	1.9
Tl	1.32	0.21
Zn	16800	400

1) Unweighted mean value of the means of 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) Expanded uncertainty with a coverage factor $k = 2$ according to the Guide for the Expression of Uncertainty in Measurement, corresponding to a level of confidence of about 95 %.

This certificate is valid for one year after purchase.

Sales date:

The minimum amount of sample to be used is 50 mg.

Geel, February 2007

Signed: _____

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

Indicative Values		
	Mass Fraction	
	Indicative value ¹⁾ [mg/kg]	Uncertainty ²⁾ [mg/kg]
Hg	1.60	0.23
Mn	730	50
V	35	6

1) Unweighted mean value of the means of accepted sets of data, each set being obtained in a different laboratory and/or with a different method of determination. The indicative values are traceable to the SI.
2) Expanded uncertainty with a coverage factor $k = 2$ according to the Guide for the Expression of Uncertainty in Measurement, corresponding to a level of confidence of about 95 %.

Additional Material Information	
	Mass Fraction
	Value ¹⁾ [mg/kg]
Ag	33.1
Au	0.604
Ba	4650
Br	836
Ce	47.7
Cs	8.27
Eu	0.868
Hf	4.85
La	30.2
Na	34800
Rb	102
Sc	2.91
Ta	2.02
Th	5.28
W	28.3

1) This data has been obtained by k_0 -NAA. The data are given here for information only.

DESCRIPTION OF THE SAMPLE

The samples consist of 40 g of fly ash in amber glass bottles, closed with polyethylene inserts, screw caps and a crimp seal

ANALYTICAL METHODS USED FOR CERTIFICATION

- Atomic fluorescence spectrometry (AFS)
- Cold vapour atomic absorption spectrometry (CVAAS)
- Electrothermal atomic absorption spectrometry (ETAAS)
- Flame atomic absorption spectrometry (FAAS)
- Hydride generation atomic absorption spectrometry (HGAAS)
- Hydride generation atomic fluorescence spectrometry (HGAFS)
- Inductively coupled plasma – mass spectrometry (ICP-MS)
- Inductively coupled plasma – optical emission spectrometry (ICP-OES)

- Isotope dilution - inductively coupled plasma – mass spectrometry (ID-ICP-MS)
- Isotope dilution – thermal ionization mass spectrometry (ID-TIMS)
- Instrumental neutron activation analysis (INAA)
- Neutron activation analysis using the k_0 -method (k_0 -NAA)
- Radiochemical neutron activation analysis (RNAA)

PARTICIPANTS

- Free University of Amsterdam, Institute for Environmental Studies (IVM), Amsterdam (NL)
- Municipal Incineration Plant (AVI), Amsterdam (NL)
- European Commission, DG JRC, Institute for Reference Materials and Measurements (EC-JRC-IRMM), Geel (BE)
- Water Research Centre (WRc-NSF Ltd), Analysis Department, Medmenham (GB)
- Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin (DE)
- Centre National de la Recherche Scientifique (CNRS), Service Central d'Analyse, Vernaison (FR)
- Laboratoire National d'Essais (LNE), Paris (FR)
- Nederlands Meetinstituut (NMI) - Van Swinden Laboratorium, Delft (NL)
- NRG Petten, Isotope Specific Analysis, Petten (NL)
- RISØ National Laboratory, Risø (DK)
- Siemens AG, Energieerzeugung (KWU), Erlangen (DE)
- University of Pavia, Nuclear Chemistry, Pavia (IT)
- University of Gent, Institute of Nuclear Science (INW), Gent (BE)
- Vlaamse Instelling voor Technologisch Onderzoek (VITO), Mol (BE)

SAFETY INFORMATION

The usual laboratory safety precautions apply.

INSTRUCTIONS FOR USE

The main purpose of the material is to assess method performance, i.e. for checking accuracy of analytical results. As any reference material, it can also be used for control charts or validation studies.

The bottles should be shaken for at least two minutes before opening to ensure re-homogenisation of the content.

When the material is analysed, care should be taken to analyse the total content of elements. For further details please refer to the certification report.

Dry mass determination should be carried out on separate subsamples. Weighing of the samples for dry mass determination and the analysis must be done at the same time to avoid differences in moisture due to the hygroscopicity of the fly ash. Dry mass determination should be carried out by drying in a ventilated oven at 105 °C for at least 2 hours, until constant weight is reached.

STORAGE

Samples should be stored in the dark at 18 °C. Care should be taken to avoid moisture pickup once the bottles are open, as the material is hygroscopic.

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.

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NOTE

A technical report on the production of BCR[®]-176R is available on the internet (<http://www.irmm.jrc.be>). A paper copy can be obtained from IRMM on request.