EUROPEAN COMMISSION
JOINT RESEARCH CENTRE

Institute for Reference Materials and Measurements (Geel)

CERTIFIED REFERENCE MATERIAL
BCR® – 524

CERTIFICATE OF ANALYSIS

INDUSTRIAL SOIL			
	Mass fraction based on dry mass		Number of accepted sets of data p
	Certified value [2] [mg/kg]	Uncertainty [3] [mg/kg]	
Pyrene[1]	173	11	13
Benz[*a*]anthracene[1]	22.5	1.8	12
Benzo[*a*]pyrene[1]	8.6	0.5	11
Benzo[*e*]pyrene[1]	10.6	1.4	13
Benzo[*b*]fluoranthene[1]	13.5	1.6	11
Benzo[*k*]fluoranthene[1]	6.2	0.7	10
Benzo[*b*]naphtho[2,1-*d*]thiophene[1]	3.8	0.6	8
Indeno[1,2,3-*cd*]pyrene[1]	5.1	0.4	11
Pentachlorophenol[1]	0.034 [3]	0.005	8

1) As determined by gas chromatographic (GC) methods.

2) Certified values are values that fulfil the highest standards of accuracy and represent the 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 value and its uncertainty are traceable to the International System of units (SI).

3) The certified uncertainty is half-width of the 95 % confidence interval of the mean given in 2).

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, November 1995
Latest revision: August 2015

Signed: 

Prof. Dr. Hendrik Emons
European Commission
Joint Research Centre
Institute for Reference Materials and Measurements
Retieseweg 111
B-2440 Geel, Belgium

Additional Material Information

	Mass fraction based on dry mass [1] [mg/kg]
Fluorene	119
Phenanthrene	980
Fluoranthene	360
Chrysene	31
Dibenz[ah]anthracene	1.4
Benzo[ghi]perylene	4.2
9-Fluorenone	150
4H-Cyclopenta[def]phenanthrenone	49
Benzo[a]fluorenone	18

1) Additional material information values are stated without an uncertainty and give merely information about other material properties that may be of interest for the user.

These values are the median values of eight laboratories obtained in an intercomparison organised by Lundstedt *et al.* (Trends Anal Chem 57:83-92). Different extraction methods were used. Quantification was based on GC-MS (low resolution MS) and GCxGC-TOF-MS. The values are traceable to the International System of units (SI).

DESCRIPTION OF THE MATERIAL

The sample consists of approximately 40 g of industrial soil in brown glass bottles with a polythene insert. Additional information on the presence of additional polycyclic aromatic hydrocarbons other than those tabulated is given in the report.

ANALYTICAL METHODS USED FOR CERTIFICATION

Calibration was done with BCR-CRMs for PAHs (047, 048, 050, 051R, 053, 135, 177) or with compounds of verified purity and stoichiometry (PCP and some PAHs). The samples were extracted with one or a mixture of solvents. Clean-up was carried out by column chromatography (on alumina, silica or florisil, gel permeation), high performance liquid chromatography (HPLC) or liquid/liquid partition for PCP, ion exchange chromatography or steam distillation. For PAHs capillary gas chromatography (CGC) with flame ionization detection or mass spectrometry was performed using different injection systems, different columns including multidimensional GC and different temperature programmes or HPLC with UV or fluorescence detection. For PCP, CGC with electron capture, mass spectrometry or atomic emission detection was used.

PARTICIPANTS

- Bayer A.G., Leverkusen (DE)
- Biochemisches Institut für Umweltcarcinogene, Grosshansdorf (DE)
- Institute for Reference Materials and Measurements, Joint Research Centre, European Commission, Geel (BE)
- Institut Pasteur, Lille (FR)
- Institut Universitaire de Médecine du Travail et d'Hygiène-IURST, Lausanne (CH)
- Institute for Environmental Studies, Free University, Amsterdam (NL)
- IRH - Génie de l'Environnement, Vandoeuvre (FR)
- Istituto Nazionale per la Ricerca sul Cancro, Genova (IT)
- Joint Research Centre, Environment Institute, European Commission, Ispra (IT)
- MiljøKemi, Rødovre (DK)
- Rheinisch-Westfälischer TÜV, Essen (DE)
- Rijksinstituut voor Volksgezondheid & Milieuhygiene – RIVM, Bilthoven (NL)
- Union Technique de l'Automobile et du Cycle – UTAC, Monthléry (FR)
- Universidad de Santiago, Departamento de Química Analítica, Santiago de Compostela (ES)
- Université de Bordeaux URA 348 CNRS, Talence (FR)
- Universiteit van Amsterdam, Dept. Environ. Toxicol. Chem., Amsterdam (NL)
- Vlaamse Instelling voor Technologisch Onderzoek (VITO), Mol (BE)
- VTT, Technical Research Centre of Finland, Espoo (FI)

SAFETY INFORMATION

The usual laboratory safety precautions apply.

INSTRUCTIONS FOR USE AND INTENDED USE

For analysis the sample should be taken as it is. Extracts of the material should only be prepared at the time of the analysis and then discarded. The water content is approximately 2 % by mass. It is recommended to determine the water content at the beginning of each analytical procedure as described in the certification report. For the determination of PAHs, it is strongly recommended to avoid evaporation to dryness in any step of the analytical procedure. The material is not intended for use as a calibrant.
More details about the analytic procedures are described in the certification report.

STORAGE

The material should be stored in the closed bottle in a dry place at a temperature of 4 °C.
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-524 is available on the internet (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, B - 2440 Geel (Belgium)
Telephone: +32-(0)14-571.722 - Telefax: +32-(0)14-590.406