



**EUROPEAN COMMISSION  
Directorate General  
Joint Research Centre**

**Directorate F – Health, Consumers and Reference Materials**

# **CERTIFIED REFERENCE MATERIALS 2020**

Reference Materials Unit  
Retieseweg 111  
B - 2440 Geel, Belgium  
Fax: +32-(0)14-590 406  
Tel.: +32-(0)14-571 705  
e-mail: [jrc-rm-distribution@ec.europa.eu](mailto:jrc-rm-distribution@ec.europa.eu)  
Online catalogue: <https://crm.jrc.ec.europa.eu>  
Information on CRMs in general: <https://ec.europa.eu/jrc/en/reference-materials>

## TABLE OF CONTENTS

|   |           |
|---|-----------|
| INTRODUCTION .....  | 1         |
| <b>1 MATERIALS RELATED TO ENVIRONMENTAL ANALYSIS.....</b>                       | <b>4</b>  |
| 1.1 PURE MATERIALS AND SYNTHETIC MIXTURES .....                                 | 4         |
| 1.2 MATRIX MATERIALS .....  | 13        |
| 1.2.1 <i>CERTIFIED FOR THE TOTAL ELEMENT CONTENT</i> .....                      | 13        |
| 1.2.2 <i>CERTIFIED FOR THE EXTRACTABLE ELEMENT CONTENT AND SPECIES</i> .....    | 22        |
| 1.2.3 <i>CERTIFIED FOR ORGANIC POLLUTANTS</i> .....                             | 24        |
| 1.2.4 <i>OTHERS</i> .....   | 29        |
| <b>2 MATERIALS RELATED TO THE ANALYSIS OF FOOD AND FEEDING STUFF ...</b>        | <b>29</b> |
| 2.1 PURE MATERIALS AND SYNTHETIC MIXTURES .....                                 | 29        |
| 2.2 MATRIX MATERIALS .....  | 31        |
| 2.2.1 <i>CERTIFIED FOR GMO CONTENT</i> .....                                    | 31        |
| 2.2.2 <i>CERTIFIED FOR NATURAL TOXINS AND XENOBIOTICS</i> .....                 | 40        |
| 2.2.3 <i>CERTIFIED FOR THE TOTAL ELEMENT CONTENT</i> .....                      | 45        |
| 2.2.4 <i>CERTIFIED FOR PROXIMATES AND CONVENTIONAL PROPERTIES</i> .....         | 48        |
| 2.2.5 <i>CERTIFIED FOR MICROBIOLOGICAL PROPERTIES</i> .....                     | 52        |
| 2.2.6 <i>CERTIFIED FOR VETERINARY DRUGS</i> .....                               | 54        |
| 2.2.7 <i>CERTIFIED FOR IDENTITY</i> .....                                       | 56        |
| 2.2.8 <i>OTHERS</i> .....   | 57        |
| <b>3 MATERIALS RELATED TO CLINICAL CHEMISTRY .....</b>                          | <b>58</b> |
| 3.1 PURE STANDARDS AND SYNTHETIC MATERIALS .....                                | 58        |
| 3.2 MATRIX MATERIALS .....  | 59        |
| 3.2.1 <i>CERTIFIED FOR THE HORMONE CONTENT</i> .....                            | 59        |
| 3.2.2 <i>CERTIFIED FOR THE TOTAL ELEMENT CONTENT AND OTHER PROPERTIES</i> ..... | 59        |
| 3.2.3 <i>CERTIFIED FOR PROTEIN CONTENT</i> .....                                | 60        |
| 3.2.4 <i>CERTIFIED FOR CATALYTIC ACTIVITY</i> .....                             | 63        |
| 3.2.5 <i>CERTIFIED FOR DNA SEQUENCE AND MASS CONCENTRATION</i> .....            | 63        |
| 3.2.6 <i>OTHERS</i> .....   | 64        |
| <b>4 MATERIALS CERTIFIED FOR PHYSICAL PROPERTIES .....</b>                      | <b>64</b> |
| 4.1 CERTIFIED FOR THERMAL PROPERTIES .....                                      | 64        |
| 4.2 CERTIFIED FOR MECHANICAL PROPERTIES .....                                   | 66        |
| 4.3 CERTIFIED FOR MORPHOLOGICAL PROPERTIES .....                                | 68        |
| <b>5 MATERIALS RELATED TO INDUSTRIAL APPLICATIONS.....</b>                      | <b>71</b> |
| 5.1 CERTIFIED FOR COMPOSITION .....   | 72        |
| 5.2 CERTIFIED FOR TRACE ELEMENT CONTENT .....                                   | 73        |
| 5.3 OTHERS.....   | 80        |

|              |  |           |
|--------------|--|-----------|
| <b>6</b>     | <b>MATERIALS RELATED TO ISOTOPIC MEASUREMENTS.....</b>     | <b>80</b> |
| 6.1          | CERTIFIED FOR ISOTOPE ABUNDANCE RATIO (AMOUNT RATIO) ..... | 80        |
| 6.2          | CERTIFIED FOR ISOTOPE AMOUNT CONTENT .....                 | 82        |
| <b>INDEX</b> | <b>.....</b>   | <b>84</b> |
|              | NUMERICAL LIST .....                                       | 85        |
|              | ALPHABETICAL LIST .....                                    | 95        |

## INTRODUCTION

Public confidence in measurement results is important in many aspects of modern society, including consumer protection in food consumption, health-care, environmental protection, and fair trade. Certified Reference Materials (CRMs) are cornerstones of modern analytical quality assurance because they allow calibration of instruments, validation of methods, and quality control of methods and laboratories based on traceability and comparability of measurement results.

The JRC-Geel provides

**IRMM certified reference materials**, produced by the EC-JRC

**BCR<sup>®</sup> certified reference materials** (BCR<sup>®</sup> is a registered trademark of the EC), for which production was supported by research funding of the European Commission, DG Research

**ERM<sup>®</sup> certified reference materials** (ERM<sup>®</sup> is a registered trademark of the EC), a brand launched in 2003 for CRMs of the highest quality

and

**EURM<sup>®</sup> certified reference materials**, produced by the EC-JRC-Geel

These CRMs are produced according to specific Guidelines of the European Commission which are in agreement with the relevant ISO Guides 34 and 35. The JRC-Geel has been accredited for the production of reference materials since 2004 (accreditation certificate BELAC 268-RM)

## **Certificates**

Certificates carry a certified value with its uncertainty which is traceable either to a SI unit or an internationally accepted reference. The intended use for each CRM is stated on the certificate. CRMs are stored under controlled conditions which ensure their stability. Monitoring programmes have been set up to control CRM stability during the whole shelf-life.

At present JRC-Geel's Reference Materials Unit offers about 700 different CRMs. A complete list of these CRMs, including description and price as well as the CRM catalogue and all certificates and certification reports can be accessed directly via the online catalogue:

<https://crm.jrc.ec.europa.eu>

To order a free hardcopy of the catalogue simply write to:

**[jrc-rm-distribution@ec.europa.eu](mailto:jrc-rm-distribution@ec.europa.eu)**

## Availability

As CRMs should become regularly used items in any measurement laboratory, JRC-Geel's Reference Materials Unit continues its effort to supply CRMs in sufficient amount to cover market needs. However, in exceptional cases where only limited amounts are available, it reserves the right to restrict and/or refuse orders. The reference materials contained in this catalogue are made available world-wide through the JRC-Geel's Reference Materials Unit and its authorised distributors.

They can be purchased from the

European Commission  
Directorate General Joint Research Centre  
Directorate F – Health, Consumers and Reference Materials  
Reference Materials Unit  
Retieseweg 111, B-2440 Geel, Belgium  
Tel. +32-(0)14-571 705, Fax +32-(0)14-590 406  
[jrc-rm-distribution@ec.europa.eu](mailto:jrc-rm-distribution@ec.europa.eu)

or from

|  |
|--|
| <b>AUTHORISED DISTRIBUTORS OF CRMs</b> |
|--|

LGC STANDARDS GmbH (with storage facilities in Luckenwalde, Germany, Manchester, USA, and Nanjing, China)  
Louis-Pasteur-Strasse 30  
D-14943 Luckenwalde  
Germany  
Tel. +49 3371 68 16 80  
Fax +49 3371 68 16 89  
<http://www.lgcstandards.com>

SIGMA-ALDRICH CHEMIE GmbH  
Industriestrasse 25  
CH-9471 Buchs  
Switzerland  
Tel. +41 81 755 2828  
Fax +41 81 755 2815  
<http://www.sigmaaldrich.com>

Prices and sales conditions are freely determined by each distributor and can be obtained from them on request. They can provide advice and help in ordering and importing reference materials.

If samples are purchased through **UNAUTHORISED COMPANIES**, the JRC-Geel cannot be held responsible for the integrity of the materials (especially in case of potentially unstable materials) nor, for the accuracy and/or completeness of the accompanying information (certificates, reports, etc.).

# 1 MATERIALS RELATED TO ENVIRONMENTAL ANALYSIS

## 1.1 PURE MATERIALS AND SYNTHETIC MIXTURES

|                 | Substance   | Purity (g/g) |   |         |
|-----------------|---|--------------|---|---------|
|                 | <b>Polycyclic aromatic compounds</b>              |              |   |         |
| <b>BCR-046</b>  | BENZO[b]CHRYSENE                                  | 0.994        | + | 0.006   |
|                 |   |              | - | 0.008   |
| <b>BCR-047</b>  | BENZO[b]FLUORANTHENE                              | 0.997 4      | ± | 0.002 6 |
| <b>BCR-048R</b> | BENZO[k]FLUORANTHENE (unit size 10 mg)            | 0.997        | + | 0.003   |
|                 |   |              | - | 0.004   |
| <b>BCR-049</b>  | BENZO[j]FLUORANTHENE                              | 0.997        | ± | 0.003   |
|                 |   |              | ± | 0.006   |
| <b>BCR-050</b>  | BENZO[e]PYRENE                                    | 0.991        | + | 0.009   |
|                 |   |              | - | 0.010   |
| <b>BCR-052</b>  | BENZO[ghi]PERYLENE                                | 0.992 3      | ± | 0.002 1 |
| <b>BCR-077R</b> | 1-METHYLCHRYSENE (unit size 10 mg)                | 0.991        | ± | 0.007   |
| <b>BCR-078R</b> | 2-METHYLCHRYSENE (unit size 10 mg)                | 0.993        | ± | 0.005   |
| <b>BCR-079R</b> | 3-METHYLCHRYSENE (unit size 10 mg)                | 0.993        | ± | 0.005   |
| <b>BCR-080R</b> | 4-METHYLCHRYSENE (unit size 10 mg)                | 0.994        | ± | 0.004   |
| <b>BCR-081R</b> | 5-METHYLCHRYSENE (unit size 10 mg)                | 0.997 3      | ± | 0.001 3 |
| <b>BCR-091</b>  | ANTHANTHRENE                                      | 0.996        | ± | 0.004   |
| <b>BCR-092</b>  | 10-AZABENZO[a]PYRENE                              | 0.996        | ± | 0.006   |
| <b>BCR-093R</b> | 1-METHYLBENZ[a]ANTHRACENE (unit size 10 mg)       | 0.996        | ± | 0.005   |
| <b>BCR-094</b>  | DIBENZ[a,c]ANTHRACENE                             | 0.996        | ± | 0.004   |
| <b>BCR-095</b>  | DIBENZ[a,j]ANTHRACENE                             | 0.997 8      | ± | 0.002 5 |
| <b>BCR-096</b>  | DIBENZO[a,l]PYRENE                                | 0.997 2      | ± | 0.002 5 |
| <b>BCR-097</b>  | BENZO[a]FLUORANTHENE                              | 0.996        | ± | 0.004   |
| <b>BCR-133</b>  | DIBENZO[a,e]PYRENE                                | 0.996        | + | 0.004   |
|                 |   |              | - | 0.005   |
| <b>BCR-134</b>  | BENZO[c]PHENANTHRENE                              | 0.996 8      | ± | 0.001 4 |
| <b>BCR-136R</b> | BENZO[b]NAPHTHO[2,3-d]THIOPHENE (unit size 10 mg) | 0.994        | ± | 0.006   |
| <b>BCR-137R</b> | BENZO[b]NAPHTHO[1,2-d]THIOPHENE (unit size 10 mg) | 0.996 6      | ± | 0.002 9 |
| <b>BCR-138</b>  | DIBENZ[a,h]ANTHRACENE                             | 0.990        | ± | 0.007   |
| <b>BCR-139</b>  | BENZO[ghi]FLUORANTHENE                            | 0.995        | ± | 0.004   |
| <b>BCR-140</b>  | BENZO[c]CHRYSENE                                  | 0.996        | + | 0.004   |
|                 |   |              | - | 0.005   |
| <b>BCR-153R</b> | DIBENZ[a,h]ACRIDINE (unit size 10 mg)             | 0.999 2      | ± | 0.000 6 |
| <b>BCR-154</b>  | DIBENZ[a,j]ACRIDINE                               | 0.999 0      | + | 0.000 7 |
|                 |   |              | - | 0.001 0 |
| <b>BCR-155</b>  | DIBENZ[a,c]ACRIDINE                               | 0.999 1      | + | 0.000 7 |
|                 |   |              | - | 0.000 8 |
| <b>BCR-156R</b> | DIBENZ[c,h]ACRIDINE (unit size 10 mg)             | 0.993 6      | ± | 0.002 1 |
| <b>BCR-157</b>  | BENZ[a]ACRIDINE                                   | 0.998 2      | ± | 0.001 8 |
| <b>BCR-158</b>  | BENZ[c]ACRIDINE                                   | 0.998 7      | + | 0.001 3 |
|                 |   |              | - | 0.001 8 |
| <b>BCR-159</b>  | DIBENZO[a,h]PYRENE                                | 0.993        | ± | 0.007   |
| <b>BCR-160R</b> | FLUORANTHENE (unit size 10 mg)                    | 0.996        | + | 0.004   |
|                 |   |              | - | 0.005   |
| <b>BCR-168</b>  | PICENE (unit size 10 mg)                          | 0.998        | + | 0.001 3 |
|                 |   |              | - | 0.004   |
| <b>BCR-177R</b> | PYRENE (unit size 10 mg)                          | 0.998 0      | ± | 0.000 4 |

Availability: Amber vials containing about 100 mg of powdered material unless otherwise specified.

|                |                                      |         |   |         |
|----------------|--------------------------------------|---------|---|---------|
|                | <b>Polycyclic aromatic compounds</b> |         |   |         |
| <b>BCR-152</b> | DIBENZ[a,i]ACRIDINE                  | 0.998 5 | + | 0.001 0 |
|                |                                      |         | - | 0.000 8 |
| <b>BCR-265</b> | DIBENZO[a,e]FLUORANTHENE             | 0.998 5 | + | 0.001 6 |
|                |                                      |         | - | 0.001 0 |
| <b>BCR-266</b> | 7H-DIBENZO[c,g]CARBAZOLE             | 0.997 1 | ± | 0.001 6 |
| <b>BCR-267</b> | INDENO[1,2,3-cd]FLUORANTHENE         | 0.998 6 | + | 0.000 9 |
|                |                                      |         | - | 0.000 8 |
| <b>BCR-269</b> | CHRYSENE                             | 0.992 8 | ± | 0.002 8 |
| <b>BCR-270</b> | TRIPHENYLENE                         | 0.998 4 | + | 0.001 0 |
|                |                                      |         | - | 0.000 6 |
| <b>BCR-271</b> | BENZ[a]ANTHRACENE                    | 0.998 4 | ± | 0.000 9 |
| <b>BCR-272</b> | CORONENE                             | 0.998 9 | + | 0.000 6 |
|                |                                      |         | - | 0.000 4 |

Availability: Amber vials containing about 20 mg of powdered material.

|                  |                                      |       |   |       |
|------------------|--------------------------------------|-------|---|-------|
|                  | <b>Polycyclic aromatic compounds</b> |       |   |       |
| <b>ERM-AC051</b> | BENZO[A]PYRENE                       | 0.979 | ± | 0.007 |
| <b>ERM-AC053</b> | INDENO[1,2,3-CD]PYRENE               | 0.996 | + | 0.004 |
|                  |                                      |       | - | 0.005 |
| <b>ERM-AC082</b> | 6-METHYLCHRYSENE                     | 0.983 | ± | 0.005 |

Availability: Brown glass vials containing about 25 mg of material.

|                |   |         |   |         |
|----------------|---|---------|---|---------|
|                | <b>Nitro-polycyclic aromatic hydrocarbons</b> |         |   |         |
| <b>BCR-305</b> | 1-NITROPYRENE                                 | 0.997 6 | ± | 0.000 7 |
| <b>BCR-306</b> | 1-NITRONAPHTALENE                             | 0.996 9 | ± | 0.001 0 |
| <b>BCR-307</b> | 2-NITRONAPHTALENE                             | 0.997 7 | + | 0.000 9 |
|                |   |         | - | 0.001 1 |
| <b>BCR-308</b> | 9-NITROANTHRACENE                             | 0.997 5 | ± | 0.001 0 |
| <b>BCR-309</b> | 6-NITROCHRYSENE                               | 0.989   | ± | 0.004   |
| <b>BCR-310</b> | 3-NITROFLUORANTHENE                           | 0.996 8 | + | 0.001 2 |
|                |   |         | - | 0.002 1 |
| <b>BCR-311</b> | 6-NITROBENZO[a]PYRENE                         | 0.997 8 | + | 0.000 8 |
|                |   |         | - | 0.001 0 |
| <b>BCR-312</b> | 2-NITRO-7-METHOXYNAPHTHO[2.1-b]FURAN          | 0.998 4 | ± | 0.000 7 |

Availability: Amber vials containing about 10 mg of powdered material.

|                |  |         |   |         |
|----------------|--|---------|---|---------|
|                | <b>Oxygenated polycyclic aromatic hydrocarbons</b> |         |   |         |
| <b>BCR-337</b> | DIBENZO[b,d]FURAN                                  | 0.987   | ± | 0.007   |
| <b>BCR-339</b> | 6H-BENZO[c,d]PYREN-6-ONE                           | 0.988   | ± | 0.009   |
| <b>BCR-340</b> | BENZO[b]NAPHTHO[1,2-d]FURAN                        | 0.997   | + | 0.003   |
|                |  |         | - | 0.005   |
| <b>BCR-341</b> | BENZO[b]NAPHTHO[2,1-d]FURAN                        | 0.996   | + | 0.004   |
|                |  |         | - | 0.005   |
| <b>BCR-342</b> | BENZO[a]FLUORENONE                                 | 0.997 9 | + | 0.002 1 |
|                |  |         | - | 0.002 2 |

Availability: Amber vials containing about 10 mg of powdered material.

|                |   |         |   |         |
|----------------|---|---------|---|---------|
|                | <b>Polychlorinated biphenyls</b>                              |         |   |         |
|                | IUPAC No.   |         |   |         |
| <b>BCR-289</b> | 8                      2,4' - DICHLOROBIPHENYL                | 0.996 3 | + | 0.005   |
|                |   |         | - | 0.001 8 |
| <b>BCR-290</b> | 20                     2,3,3' - TRICHLOROBIPHENYL             | 0.998 5 | ± | 0.001 3 |
| <b>BCR-291</b> | 28                     2,4,4' - TRICHLOROBIPHENYL             | 0.997 9 | ± | 0.001 3 |
| <b>BCR-293</b> | 52                     2,2',5,5' - TETRACHLOROBIPHENYL        | 0.995 9 | ± | 0.002 5 |
| <b>BCR-296</b> | 138                    2,2',3,4,4',5' - HEXACHLOROBIPHENYL    | 0.999 2 | ± | 0.000 7 |
| <b>BCR-297</b> | 153                    2,2',4,4',5,5' - HEXACHLOROBIPHENYL    | 0.999 4 | + | 0.000 9 |
|                |   |         | - | 0.000 5 |
| <b>BCR-298</b> | 180                    2,2',3,4,4',5,5' - HEPTACHLOROBIPHENYL | 0.995 7 | ± | 0.001 4 |

Availability: Amber vials containing about 25 mg of powdered material.

### Polychlorinated biphenyls in iso-octane (BCR-365)

| IUPAC No. | Content in mg/kg | Concentration in g/m <sup>3</sup> at 25 °C <sup>1)</sup> |
|-----------|------------------|--|
| 8         | 11.4 ± 0.4       | (7.8 ± 0.2)  |
| 20        | 15.2 ± 0.9       | (10.5 ± 0.7)   |
| 28        | 24.8 ± 1.1       | (17.1 ± 0.8)   |
| 35        | 14.3 ± 0.8       | (9.8 ± 0.5)  |
| 52        | 14.8 ± 0.6       | (10.2 ± 0.4)   |
| 101       | 14.4 ± 0.6       | (9.9 ± 0.4)  |
| 118       | 14.9 ± 0.8       | (10.3 ± 0.6)   |
| 138       | 8.6 ± 0.6        | (5.9 ± 0.5)  |
| 153       | 14.2 ± 0.6       | (9.8 ± 0.4)  |
| 180       | 15.2 ± 0.6       | (10.4 ± 0.3)   |

1) Not certified concentrations (g/m<sup>3</sup>) were calculated from the certified content assuming a density of iso-octane of 687.77 kg/m<sup>3</sup> at 25 °C.

Availability: Unit consisting of a pair of dark glass ampoules, each containing 2 cm<sup>3</sup> of 2,2,4-Trimethylpentane (iso-octane) sealed under nitrogen.

The pair of ampoules is supplied in a metal can which is packed with absorbent material.



## Polychlorodibenzo-p-dioxins (PCDDs) and polychlorodibenzofurans (PCDFs)

### BCR-614 SOLUTION – S0

| Congener                           | Certified mass fraction <sup>1)</sup> | Uncertainty <sup>2)</sup> | Mass fraction expressed in concentration units <sup>3)</sup> | Uncertainty expressed in concentration units <sup>3)</sup> |
|------------------------------------|---------------------------------------|---------------------------|--|--|
|                                    | (µg/kg)                               | (µg/kg)                   | (µg/L)   | (µg/L)   |
| 2,3,7,8-T <sub>4</sub> CDD         | 0.137                                 | 0.004                     | 0.098 3  | 0.002 9  |
| 1,2,3,7,8-P <sub>5</sub> CDD       | 0.698                                 | 0.014                     | 0.501  | 0.010  |
| 1,2,3,4,7,8-HCDD                   | 0.688                                 | 0.021                     | 0.494  | 0.015  |
| 1,2,3,6,7,8-HCDD                   | 0.696                                 | 0.006                     | 0.500  | 0.004  |
| 1,2,3,7,8,9-HCDD                   | 0.705                                 | 0.008                     | 0.506  | 0.006  |
| 1,2,3,4,6,7,8-HCDD                 | 1.400                                 | 0.020                     | 1.005  | 0.014  |
| 1,2,3,4,6,7,8,9-O <sub>8</sub> CDD | 1.396                                 | 0.007                     | 1.001  | 0.005  |
| 2,3,7,8-T <sub>4</sub> CDF         | 0.139 7                               | 0.001 1                   | 0.100 2  | 0.000 8  |
| 1,2,3,7,8-P <sub>5</sub> CDF       | 0.707                                 | 0.013                     | 0.507  | 0.009  |
| 2,3,4,7,8-P <sub>5</sub> CDF       | 0.698                                 | 0.005                     | 0.501  | 0.004  |
| 1,2,3,4,7,8-HCDF                   | 0.700                                 | 0.006                     | 0.502  | 0.005  |
| 1,2,3,6,7,8-HCDF                   | 0.698                                 | 0.005                     | 0.501  | 0.004  |
| 1,2,3,7,8,9-HCDF                   | 0.699                                 | 0.009                     | 0.502  | 0.007  |
| 2,3,4,6,7,8-HCDF                   | 0.694                                 | 0.007                     | 0.498  | 0.005  |
| 1,2,3,4,6,7,8-HCDF                 | 1.396                                 | 0.008                     | 1.001  | 0.006  |
| 1,2,3,4,7,8,9-HCDF                 | 1.394                                 | 0.030                     | 1.001  | 0.022  |
| 1,2,3,4,6,7,8,9-O <sub>8</sub> CDF | 1.397                                 | 0.024                     | 1.002  | 0.017  |

- 1) The certified mass fraction has been calculated from the purity of the individual PCDD/F compounds as assessed in a comprehensive study and the gravimetric preparation of the solution.
- 2) Uncertainties have been calculated by combining contributions from the purity study and the gravimetric preparation; details are given in the certification report.
- 3) Non-certified values.

### BCR-614 SOLUTION – S0

| Congener   | Certified mass fraction <sup>1)</sup> | Uncertainty <sup>2)</sup> | Mass fraction expressed in concentration units <sup>3)</sup> | Uncertainty expressed in concentration units <sup>3)</sup> |
|--|---------------------------------------|---------------------------|--|--|
|  | (µg/kg)                               | (µg/kg)                   | (µg/L)   | (µg/L)   |
| <sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDD         | 13.95                                 | 0.06                      | 10.01  | 0.05   |
| <sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDD       | 13.9                                  | 0.4                       | 10.00  | 0.23   |
| <sup>13</sup> C-1,2,3,4,7,8-HCDD                   | 13.98                                 | 0.07                      | 10.03  | 0.05   |
| <sup>13</sup> C-1,2,3,6,7,8-HCDD                   | 13.94                                 | 0.24                      | 10.00  | 0.17   |
| <sup>13</sup> C-1,2,3,7,8,9-HCDD                   | 13.95                                 | 0.10                      | 10.01  | 0.07   |
| <sup>13</sup> C-1,2,3,4,6,7,8-HCDD                 | 27.9                                  | 0.6                       | 20.0   | 0.4  |
| <sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDD | 27.87                                 | 0.16                      | 20.00  | 0.12   |
| <sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDF         | 13.96                                 | 0.09                      | 10.02  | 0.07   |
| <sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDF       | 13.94                                 | 0.24                      | 10.00  | 0.17   |
| <sup>13</sup> C-2,3,4,7,8-P <sub>5</sub> CDF       | 13.95                                 | 0.06                      | 10.01  | 0.05   |
| <sup>13</sup> C-1,2,3,4,7,8-HCDF                   | 13.90                                 | 0.07                      | 9.97   | 0.05   |
| <sup>13</sup> C-1,2,3,6,7,8-HCDF                   | 13.93                                 | 0.10                      | 10.00  | 0.08   |
| <sup>13</sup> C-1,2,3,7,8,9-HCDF                   | 13.93                                 | 0.10                      | 10.00  | 0.07   |
| <sup>13</sup> C-2,3,4,6,7,8-HCDF                   | 13.93                                 | 0.09                      | 10.00  | 0.06   |
| <sup>13</sup> C-1,2,3,4,6,7,8-HCDF                 | 27.92                                 | 0.20                      | 20.03  | 0.15   |
| <sup>13</sup> C-1,2,3,4,7,8,9-HCDF                 | 27.87                                 | 0.24                      | 20.00  | 0.17   |
| <sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDF | 27.88                                 | 0.25                      | 20.01  | 0.18   |
| <sup>13</sup> C-1,2,3,4-T <sub>4</sub> CDD         | 13.94                                 | 0.08                      | 10.00  | 0.06   |

BCR-614 SOLUTION – S1

| Congener   | Certified mass fraction <sup>1)</sup> | Uncertainty <sup>2)</sup> | Mass fraction expressed in concentration units <sup>3)</sup> | Uncertainty expressed in concentration units <sup>3)</sup> |
|--|---------------------------------------|---------------------------|--|--|
|  | (µg/kg)                               | (µg/kg)                   | (µg/L)   | (µg/L)   |
| 2,3,7,8-T <sub>4</sub> CDD                         | 0.273                                 | 0.008                     | 0.196  | 0.006  |
| 1,2,3,7,8-P <sub>5</sub> CDD                       | 1.394                                 | 0.027                     | 1.000  | 0.020  |
| 1,2,3,4,7,8-HCDD                                   | 1.37                                  | 0.05                      | 0.986  | 0.030  |
| 1,2,3,6,7,8-HCDD                                   | 1.391                                 | 0.010                     | 0.998  | 0.007  |
| 1,2,3,7,8,9-HCDD                                   | 1.408                                 | 0.015                     | 1.011  | 0.011  |
| 1,2,3,4,6,7,8-HCDD                                 | 2.80                                  | 0.04                      | 2.006  | 0.028  |
| 1,2,3,4,6,7,8,9-O <sub>8</sub> CDD                 | 2.787                                 | 0.010                     | 2.000  | 0.007  |
| 2,3,7,8-T <sub>4</sub> CDF                         | 0.279 0                               | 0.002 1                   | 0.200 2  | 0.001 5  |
| 1,2,3,7,8-P <sub>5</sub> CDF                       | 1.412                                 | 0.025                     | 1.013  | 0.018  |
| 2,3,4,7,8-P <sub>5</sub> CDF                       | 1.395                                 | 0.008                     | 1.001  | 0.006  |
| 1,2,3,4,7,8-HCDF                                   | 1.398                                 | 0.011                     | 1.003  | 0.008  |
| 1,2,3,6,7,8-HCDF                                   | 1.393                                 | 0.009                     | 1.000  | 0.006  |
| 1,2,3,7,8,9-HCDF                                   | 1.397                                 | 0.017                     | 1.002  | 0.012  |
| 2,3,4,6,7,8-HCDF                                   | 1.387                                 | 0.012                     | 0.995  | 0.009  |
| 1,2,3,4,6,7,8-HCDF                                 | 2.787                                 | 0.012                     | 2.000  | 0.009  |
| 1,2,3,4,7,8,9-HCDF                                 | 2.78                                  | 0.06                      | 2.00   | 0.05   |
| 1,2,3,4,6,7,8,9-O <sub>8</sub> CDF                 | 2.79                                  | 0.05                      | 2.00   | 0.04   |
| <sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDD         | 13.95                                 | 0.06                      | 10.01  | 0.05   |
| <sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDD       | 13.9                                  | 0.4                       | 10.00  | 0.23   |
| <sup>13</sup> C-1,2,3,4,7,8-HCDD                   | 13.98                                 | 0.07                      | 10.03  | 0.05   |
| <sup>13</sup> C-1,2,3,6,7,8-HCDD                   | 13.93                                 | 0.24                      | 10.00  | 0.17   |
| <sup>13</sup> C-1,2,3,7,8,9-HCDD                   | 13.94                                 | 0.10                      | 10.01  | 0.07   |
| <sup>13</sup> C-1,2,3,4,6,7,8-HCDD                 | 27.9                                  | 0.6                       | 20.0   | 0.4  |
| <sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDD | 27.86                                 | 0.16                      | 19.99  | 0.11   |
| <sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDF         | 13.96                                 | 0.09                      | 10.01  | 0.07   |
| <sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDF       | 13.93                                 | 0.24                      | 10.00  | 0.17   |
| <sup>13</sup> C-2,3,4,7,8-P <sub>5</sub> CDF       | 13.94                                 | 0.06                      | 10.00  | 0.05   |
| <sup>13</sup> C-1,2,3,4,7,8-HCDF                   | 13.89                                 | 0.07                      | 9.97   | 0.05   |
| <sup>13</sup> C-1,2,3,6,7,8-HCDF                   | 13.93                                 | 0.11                      | 9.99   | 0.08   |
| <sup>13</sup> C-1,2,3,7,8,9-HCDF                   | 13.92                                 | 0.10                      | 9.99   | 0.07   |
| <sup>13</sup> C-2,3,4,6,7,8-HCDF                   | 13.93                                 | 0.09                      | 9.99   | 0.06   |
| <sup>13</sup> C-1,2,3,4,6,7,8-HCDF                 | 27.90                                 | 0.20                      | 20.02  | 0.14   |
| <sup>13</sup> C-1,2,3,4,7,8,9-HCDF                 | 27.86                                 | 0.24                      | 19.99  | 0.17   |
| <sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDF | 27.87                                 | 0.25                      | 20.00  | 0.18   |
| <sup>13</sup> C-1,2,3,4-T <sub>4</sub> CDD         | 13.93                                 | 0.07                      | 10.00  | 0.05   |

- 1) The certified mass fraction has been calculated from the purity of the individual PCDD/F compounds as assessed in a comprehensive study and the gravimetric preparation of the solution.
- 2) Uncertainties have been calculated by combining contributions from the purity study and the gravimetric preparation; details are given in the certification report.
- 3) Non-certified values.

BCR-614 SOLUTION – S2

| Congener   | Certified mass fraction <sup>1)</sup> Uncertainty <sup>2)</sup> |         | Mass fraction expressed in concentration units <sup>3)</sup> | Uncertainty expressed in concentration units <sup>3)</sup> |
|--|---|---------|--|--|
|  | (µg/kg)   | (µg/kg) | (µg/L)   | (µg/L)   |
| 2,3,7,8-T <sub>4</sub> CDD                         | 1.09  | 0.04    | 0.785  | 0.023  |
| 1,2,3,7,8-P <sub>5</sub> CDD                       | 5.57  | 0.11    | 4.00   | 0.08   |
| 1,2,3,4,7,8-HCDD                                   | 5.49  | 0.17    | 3.94   | 0.12   |
| 1,2,3,6,7,8-HCDD                                   | 5.56  | 0.04    | 3.992  | 0.027  |
| 1,2,3,7,8,9-HCDD                                   | 5.63  | 0.06    | 4.04   | 0.05   |
| 1,2,3,4,6,7,8-HCDD                                 | 11.18   | 0.16    | 8.02   | 0.11   |
| 1,2,3,4,6,7,8,9-O <sub>8</sub> CDD                 | 11.15   | 0.04    | 8.000  | 0.027  |
| 2,3,7,8-T <sub>4</sub> CDF                         | 1.116   | 0.008   | 0.801  | 0.006  |
| 1,2,3,7,8-P <sub>5</sub> CDF                       | 5.65  | 0.10    | 4.05   | 0.07   |
| 2,3,4,7,8-P <sub>5</sub> CDF                       | 5.58  | 0.03    | 4.004  | 0.022  |
| 1,2,3,4,7,8-HCDF                                   | 5.59  | 0.05    | 4.01   | 0.04   |
| 1,2,3,6,7,8-HCDF                                   | 5.57  | 0.04    | 3.999  | 0.024  |
| 1,2,3,7,8,9-HCDF                                   | 5.59  | 0.07    | 4.01   | 0.05   |
| 2,3,4,6,7,8-HCDF                                   | 5.55  | 0.05    | 3.98   | 0.04   |
| 1,2,3,4,6,7,8-HCDF                                 | 11.15   | 0.05    | 8.00   | 0.04   |
| 1,2,3,4,7,8,9-HCDF                                 | 11.14   | 0.24    | 7.99   | 0.17   |
| 1,2,3,4,6,7,8,9-O <sub>8</sub> CDF                 | 11.16   | 0.19    | 8.01   | 0.14   |
| <sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDD         | 13.95   | 0.06    | 10.01  | 0.05   |
| <sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDD       | 13.9  | 0.4     | 10.00  | 0.23   |
| <sup>13</sup> C-1,2,3,4,7,8-HCDD                   | 13.98   | 0.07    | 10.03  | 0.05   |
| <sup>13</sup> C-1,2,3,6,7,8-HCDD                   | 13.93   | 0.24    | 10.00  | 0.17   |
| <sup>13</sup> C-1,2,3,7,8,9-HCDD                   | 13.94   | 0.10    | 10.01  | 0.07   |
| <sup>13</sup> C-1,2,3,4,6,7,8-HCDD                 | 27.9  | 0.6     | 20.0   | 0.4  |
| <sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDD | 27.86   | 0.16    | 19.99  | 0.11   |
| <sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDF         | 13.96   | 0.09    | 10.01  | 0.07   |
| <sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDF       | 13.93   | 0.24    | 10.00  | 0.17   |
| <sup>13</sup> C-2,3,4,7,8-P <sub>5</sub> CDF       | 13.94   | 0.06    | 10.00  | 0.05   |
| <sup>13</sup> C-1,2,3,4,7,8-HCDF                   | 13.89   | 0.07    | 9.97   | 0.05   |
| <sup>13</sup> C-1,2,3,6,7,8-HCDF                   | 13.93   | 0.11    | 9.99   | 0.08   |
| <sup>13</sup> C-1,2,3,7,8,9-HCDF                   | 13.93   | 0.10    | 9.99   | 0.07   |
| <sup>13</sup> C-2,3,4,6,7,8-HCDF                   | 13.93   | 0.09    | 9.99   | 0.06   |
| <sup>13</sup> C-1,2,3,4,6,7,8-HCDF                 | 27.90   | 0.20    | 20.02  | 0.15   |
| <sup>13</sup> C-1,2,3,4,7,8,9-HCDF                 | 27.86   | 0.24    | 19.99  | 0.17   |
| <sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDF | 27.87   | 0.25    | 20.00  | 0.18   |
| <sup>13</sup> C-1,2,3,4-T <sub>4</sub> CDD         | 13.93   | 0.08    | 10.00  | 0.06   |

- 1) The certified mass fraction has been calculated from the purity of the individual PCDD/F compounds as assessed in a comprehensive study and the gravimetric preparation of the solution.
- 2) Uncertainties have been calculated by combining contributions from the purity study and the gravimetric preparation; details are given in the certification report.
- 3) Non-certified values.

BCR-614 SOLUTION – S3

| Congener   | Certified mass fraction <sup>1)</sup> | Uncertainty <sup>2)</sup> | Mass fraction expressed in concentration units <sup>3)</sup> | Uncertainty expressed in concentration units <sup>3)</sup> |
|--|---------------------------------------|---------------------------|--|--|
|  | (µg/kg)                               | (µg/kg)                   | (µg/L)   | (µg/L)   |
| 2,3,7,8-T <sub>4</sub> CDD                         | 5.47                                  | 0.16                      | 3.92   | 0.12   |
| 1,2,3,7,8-P <sub>5</sub> CDD                       | 27.9                                  | 0.6                       | 20.0   | 0.4  |
| 1,2,3,4,7,8-HCDD                                   | 27.5                                  | 0.9                       | 19.7   | 0.6  |
| 1,2,3,6,7,8-HCDD                                   | 27.81                                 | 0.19                      | 19.96  | 0.14   |
| 1,2,3,7,8,9-HCDD                                   | 28.17                                 | 0.30                      | 20.21  | 0.21   |
| 1,2,3,4,6,7,8-HCDD                                 | 55.9                                  | 0.8                       | 40.1   | 0.6  |
| 1,2,3,4,6,7,8,9-O <sub>8</sub> CDD                 | 55.74                                 | 0.19                      | 40.00  | 0.14   |
| 2,3,7,8-T <sub>4</sub> CDF                         | 5.58                                  | 0.04                      | 4.003  | 0.029  |
| 1,2,3,7,8-P <sub>5</sub> CDF                       | 28.2                                  | 0.5                       | 20.3   | 0.4  |
| 2,3,4,7,8-P <sub>5</sub> CDF                       | 27.90                                 | 0.16                      | 20.02  | 0.11   |
| 1,2,3,4,7,8-HCDF                                   | 27.96                                 | 0.22                      | 20.06  | 0.16   |
| 1,2,3,6,7,8-HCDF                                   | 27.87                                 | 0.17                      | 20.00  | 0.12   |
| 1,2,3,7,8,9-HCDF                                   | 27.9                                  | 0.4                       | 20.04  | 0.24   |
| 2,3,4,6,7,8-HCDF                                   | 27.73                                 | 0.23                      | 19.90  | 0.17   |
| 1,2,3,4,6,7,8-HCDF                                 | 55.74                                 | 0.24                      | 40.00  | 0.17   |
| 1,2,3,4,7,8,9-HCDF                                 | 55.7                                  | 1.2                       | 40.0   | 0.9  |
| 1,2,3,4,6,7,8,9-O <sub>8</sub> CDF                 | 55.8                                  | 1.0                       | 40.0   | 0.7  |
| <sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDD         | 13.95                                 | 0.06                      | 10.01  | 0.05   |
| <sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDD       | 13.9                                  | 0.4                       | 10.00  | 0.23   |
| <sup>13</sup> C-1,2,3,4,7,8-HCDD                   | 13.98                                 | 0.07                      | 10.03  | 0.05   |
| <sup>13</sup> C-1,2,3,6,7,8-HCDD                   | 13.93                                 | 0.24                      | 10.00  | 0.17   |
| <sup>13</sup> C-1,2,3,7,8,9-HCDD                   | 13.95                                 | 0.10                      | 10.01  | 0.07   |
| <sup>13</sup> C-1,2,3,4,6,7,8-HCDD                 | 27.9                                  | 0.6                       | 20.0   | 0.4  |
| <sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDD | 27.87                                 | 0.16                      | 20.00  | 0.11   |
| <sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDF         | 13.96                                 | 0.09                      | 10.02  | 0.07   |
| <sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDF       | 13.93                                 | 0.24                      | 10.00  | 0.17   |
| <sup>13</sup> C-2,3,4,7,8-P <sub>5</sub> CDF       | 13.94                                 | 0.06                      | 10.01  | 0.05   |
| <sup>13</sup> C-1,2,3,4,7,8-HCDF                   | 13.90                                 | 0.07                      | 9.97   | 0.05   |
| <sup>13</sup> C-1,2,3,6,7,8-HCDF                   | 13.93                                 | 0.11                      | 10.00  | 0.08   |
| <sup>13</sup> C-1,2,3,7,8,9-HCDF                   | 13.93                                 | 0.10                      | 10.00  | 0.07   |
| <sup>13</sup> C-2,3,4,6,7,8-HCDF                   | 13.93                                 | 0.09                      | 10.00  | 0.06   |
| <sup>13</sup> C-1,2,3,4,6,7,8-HCDF                 | 27.91                                 | 0.20                      | 20.03  | 0.14   |
| <sup>13</sup> C-1,2,3,4,7,8,9-HCDF                 | 27.87                                 | 0.24                      | 20.00  | 0.17   |
| <sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDF | 27.88                                 | 0.25                      | 20.00  | 0.18   |
| <sup>13</sup> C-1,2,3,4-T <sub>4</sub> CDD         | 13.93                                 | 0.07                      | 10.00  | 0.05   |

- 1) The certified mass fraction has been calculated from the purity of the individual PCDD/F compounds as assessed in a comprehensive study and the gravimetric preparation of the solution.
- 2) Uncertainties have been calculated by combining contributions from the purity study and the gravimetric preparation; details are given in the certification report.
- 3) Non-certified values.

BCR-614 SOLUTION – S4

| Congener   | Certified mass fraction <sup>1)</sup> | Uncertainty <sup>2)</sup> | Mass fraction expressed in concentration units <sup>3)</sup> | Uncertainty expressed in concentration units <sup>3)</sup> |
|--|---------------------------------------|---------------------------|--|--|
|  | (µg/kg)                               | (µg/kg)                   | (µg/L)   | (µg/L)   |
| 2,3,7,8-T <sub>4</sub> CDD                         | 27.3                                  | 0.8                       | 9.6  | 0.6  |
| 1,2,3,7,8-P <sub>5</sub> CDD                       | 139.3                                 | 2.7                       | 100.0  | 2.0  |
| 1,2,3,4,7,8-HCDD                                   | 137                                   | 5                         | 98.6   | 3.0  |
| 1,2,3,6,7,8-HCDD                                   | 139.1                                 | 1.0                       | 99.8   | 0.7  |
| 1,2,3,7,8,9-HCDD                                   | 140.8                                 | 1.5                       | 101.1  | 1.1  |
| 1,2,3,4,6,7,8-HCDD                                 | 280                                   | 4                         | 200.6  | 2.8  |
| 1,2,3,4,6,7,8,9-O <sub>8</sub> CDD                 | 278.7                                 | 1.0                       | 200.0  | 0.7  |
| 2,3,7,8-T <sub>4</sub> CDF                         | 27.89                                 | 0.21                      | 20.02  | 0.15   |
| 1,2,3,7,8-P <sub>5</sub> CDF                       | 141.2                                 | 2.5                       | 101.3  | 1.8  |
| 2,3,4,7,8-P <sub>5</sub> CDF                       | 139.5                                 | 0.8                       | 100.1  | 0.6  |
| 1,2,3,4,7,8-HCDF                                   | 139.8                                 | 1.1                       | 100.3  | 0.8  |
| 1,2,3,6,7,8-HCDF                                   | 139.3                                 | 0.9                       | 100.0  | 0.6  |
| 1,2,3,7,8,9-HCDF                                   | 139.6                                 | 1.7                       | 100.2  | 1.2  |
| 2,3,4,6,7,8-HCDF                                   | 138.7                                 | 1.2                       | 99.5   | 0.9  |
| 1,2,3,4,6,7,8-HCDF                                 | 278.7                                 | 1.2                       | 200.0  | 0.9  |
| 1,2,3,4,7,8,9-HCDF                                 | 278                                   | 6                         | 200  | 5  |
| 1,2,3,4,6,7,8,9-O <sub>8</sub> CDF                 | 279                                   | 5                         | 200  | 4  |
| <sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDD         | 13.95                                 | 0.06                      | 10.01  | 0.05   |
| <sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDD       | 13.99                                 | 0.4                       | 10.00  | 0.23   |
| <sup>13</sup> C-1,2,3,4,7,8-HCDD                   | 13.98                                 | 0.07                      | 10.03  | 0.05   |
| <sup>13</sup> C-1,2,3,6,7,8-HCDD                   | 13.93                                 | 0.24                      | 10.00  | 0.17   |
| <sup>13</sup> C-1,2,3,7,8,9-HCDD                   | 13.94                                 | 0.10                      | 10.01  | 0.07   |
| <sup>13</sup> C-1,2,3,4,6,7,8-HCDD                 | 27.9                                  | 0.6                       | 20.0   | 0.4  |
| <sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDD | 27.86                                 | 0.16                      | 19.99  | 0.11   |
| <sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDF         | 13.96                                 | 0.09                      | 10.01  | 0.07   |
| <sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDF       | 13.93                                 | 0.24                      | 10.00  | 0.17   |
| <sup>13</sup> C-2,3,4,7,8-P <sub>5</sub> CDF       | 13.94                                 | 0.06                      | 10.00  | 0.05   |
| <sup>13</sup> C-1,2,3,4,7,8-HCDF                   | 13.89                                 | 0.07                      | 9.97   | 0.05   |
| <sup>13</sup> C-1,2,3,6,7,8-HCDF                   | 13.93                                 | 0.11                      | 9.99   | 0.08   |
| <sup>13</sup> C-1,2,3,7,8,9-HCDF                   | 13.92                                 | 0.10                      | 9.99   | 0.07   |
| <sup>13</sup> C-2,3,4,6,7,8-HCDF                   | 13.93                                 | 0.09                      | 9.99   | 0.06   |
| <sup>13</sup> C-1,2,3,4,6,7,8-HCDF                 | 27.90                                 | 0.20                      | 20.02  | 0.15   |
| <sup>13</sup> C-1,2,3,4,7,8,9-HCDF                 | 27.86                                 | 0.24                      | 19.99  | 0.17   |
| <sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDF | 27.87                                 | 0.25                      | 20.00  | 0.18   |
| <sup>13</sup> C-1,2,3,4-T <sub>4</sub> CDD         | 13.93                                 | 0.08                      | 10.00  | 0.06   |

- 1) The certified mass fraction has been calculated from the purity of the individual PCDD/F compounds as assessed in a comprehensive study and the gravimetric preparation of the solution.
- 2) Uncertainties have been calculated by combining contributions from the purity study and the gravimetric preparation; details are given in the certification report.
- 3) Non-certified values.

**BCR-614 SOLUTION – S5**

| Congener   | Certified mass fraction <sup>1)</sup> Uncertainty <sup>2)</sup> |         | Mass fraction expressed in concentration units <sup>3)</sup> | Uncertainty expressed in concentration units <sup>3)</sup> |
|--|---|---------|--|--|
|  | (µg/kg)   | (µg/kg) |  |  |
| 2,3,7,8-T <sub>4</sub> CDD                         | 109   | 4       | 78.5   | 2.3  |
| 1,2,3,7,8-P <sub>5</sub> CDD                       | 557   | 11      | 400  | 8  |
| 1,2,3,4,7,8-HCDD                                   | 549   | 17      | 394  | 12   |
| 1,2,3,6,7,8-HCDD                                   | 556   | 4       | 399.1  | 2.7  |
| 1,2,3,7,8,9-HCDD                                   | 563   | 6       | 404  | 5  |
| 1,2,3,4,6,7,8-HCDD                                 | 1118  | 16      | 802  | 11   |
| 1,2,3,4,6,7,8,9-O <sub>8</sub> CDD                 | 1115  | 4       | 799.9  | 2.7  |
| 2,3,7,8-T <sub>4</sub> CDF                         | 1116  | 0.8     | 80.1   | 0.6  |
| 1,2,3,7,8-P <sub>5</sub> CDF                       | 565   | 0       | 405  | 7  |
| 2,3,4,7,8-P <sub>5</sub> CDF                       | 558   | 3       | 400.4  | 2.2  |
| 1,2,3,4,7,8-HCDF                                   | 559   | 5       | 401  | 4  |
| 1,2,3,6,7,8-HCDF                                   | 557   | 4       | 399.9  | 2.4  |
| 1,2,3,7,8,9-HCDF                                   | 559   | 7       | 401  | 5  |
| 2,3,4,6,7,8-HCDF                                   | 555   | 5       | 398  | 4  |
| 1,2,3,4,6,7,8-HCDF                                 | 1115  | 5       | 800  | 4  |
| 1,2,3,4,7,8,9-HCDF                                 | 1114  | 24      | 799  | 17   |
| 1,2,3,4,6,7,8,9-O <sub>8</sub> CDF                 | 1116  | 19      | 801  | 14   |
| <sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDD         | 13.95   | 0.06    | 10.01  | 0.05   |
| <sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDD       | 13.9  | 0.4     | 10.00  | 0.23   |
| <sup>13</sup> C-1,2,3,4,7,8-HCDD                   | 13.98   | 0.7     | 10.03  | 0.05   |
| <sup>13</sup> C-1,2,3,6,7,8-HCDD                   | 13.93   | 0.24    | 10.00  | 0.17   |
| <sup>13</sup> C-1,2,3,7,8,9-HCDD                   | 13.95   | 0.10    | 10.01  | 0.07   |
| <sup>13</sup> C-1,2,3,4,6,7,8-HCDD                 | 27.9  | 0.6     | 20.0   | 0.4  |
| <sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDD | 27.86   | 0.16    | 19.99  | 0.11   |
| <sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDF         | 13.96   | 0.09    | 10.02  | 0.07   |
| <sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDF       | 13.93   | 0.24    | 10.00  | 0.17   |
| <sup>13</sup> C-2,3,4,7,8-P <sub>5</sub> CDF       | 13.94   | 0.06    | 10.00  | 0.05   |
| <sup>13</sup> C-1,2,3,4,7,8-HCDF                   | 13.89   | 0.07    | 9.97   | 0.05   |
| <sup>13</sup> C-1,2,3,6,7,8-HCDF                   | 13.93   | 0.11    | 9.99   | 0.08   |
| <sup>13</sup> C-1,2,3,7,8,9-HCDF                   | 13.93   | 0.10    | 9.99   | 0.07   |
| <sup>13</sup> C-2,3,4,6,7,8-HCDF                   | 13.93   | 0.09    | 9.99   | 0.06   |
| <sup>13</sup> C-1,2,3,4,6,7,8-HCDF                 | 27.90   | 0.20    | 20.02  | 0.15   |
| <sup>13</sup> C-1,2,3,4,7,8,9-HCDF                 | 27.86   | 0.24    | 19.99  | 0.17   |
| <sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDF | 27.87   | 0.25    | 20.00  | 0.18   |
| <sup>13</sup> C-1,2,3,4-T <sub>4</sub> CDD         | 13.93   | 0.08    | 10.00  | 0.06   |

**BCR-614 SOLUTION – S6**

| Congener                                     | Certified mass fraction <sup>1)</sup> Uncertainty <sup>2)</sup> |         | Mass fraction expressed in concentration units <sup>3)</sup> | Uncertainty expressed in concentration units <sup>3)</sup> |
|--|---|---------|--|--|
|  | (µg/kg)   | (µg/kg) |  |  |
| <sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDF | 139.3   | 2.3     | 100.0  | 1.7  |
| <sup>13</sup> C-1,2,3,7,8,9-HCDF             | 139.4   | 0.9     | 100.0  | 0.7  |
| <sup>13</sup> C-1,2,3,4,7,8,9-HCDF           | 278.7   | 2.4     | 200.0  | 1.7  |

- 1) The certified mass fraction has been calculated from the purity of the individual PCDD/F compounds as assessed in a comprehensive study and the gravimetric preparation of the solution.
- 2) Uncertainties have been calculated by combining contributions from the purity study and the gravimetric preparation; details are given in the certification report.
- 3) Non-certified values.

**BCR-614 SOLUTION – S7**

| Congener   | Certified mass fraction <sup>1)</sup> Uncertainty <sup>2)</sup> |         | Mass fraction expressed in concentration units <sup>3)</sup> | Uncertainty expressed in concentration units <sup>3)</sup> |
|--|---|---------|--|--|
|  | (µg/kg)   | (µg/kg) |  |  |
| <sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDD         | 139.5   | 0.6     | 100.1  | 0.4  |
| <sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDD       | 139   | 4       | 99.9   | 2.4  |
| <sup>13</sup> C-1,2,3,4,7,8-HCDD                   | 139.8   | 0.7     | 100.3  | 0.5  |
| <sup>13</sup> C-1,2,3,6,7,8-HCDD                   | 139.3   | 2.4     | 100.0  | 1.7  |
| <sup>13</sup> C-1,2,3,4,6,7,8-HCDD                 | 279   | 6       | 200  | 4  |
| <sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDD | 278.7   | 1.6     | 200.0  | 1.1  |
| <sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDF         | 139.5   | 0.9     | 100.1  | 0.6  |
| <sup>13</sup> C-2,3,4,7,8-P <sub>5</sub> CDF       | 139.2   | 0.6     | 99.9   | 0.4  |
| <sup>13</sup> C-1,2,3,4,7,8-HCDF                   | 138.9   | 0.6     | 99.7   | 0.5  |
| <sup>13</sup> C-1,2,3,6,7,8-HCDF                   | 139.4   | 1.1     | 100.0  | 0.8  |
| <sup>13</sup> C-2,3,4,6,7,8-HCDF                   | 139.4   | 0.8     | 100.0  | 0.6  |
| <sup>13</sup> C-1,2,3,4,6,7,8-HCDF                 | 278.7   | 2.0     | 200.0  | 1.4  |
| <sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDF | 278.7   | 2.5     | 200.0  | 1.8  |

**BCR-614 SOLUTION – S8**

| Congener                                   | Certified mass fraction <sup>1)</sup> Uncertainty <sup>2)</sup> |         | Mass fraction expressed in concentration units <sup>3)</sup> | Uncertainty expressed in concentration units <sup>3)</sup> |
|--|---|---------|--|--|
|  | (µg/kg)   | (µg/kg) |  |  |
| <sup>13</sup> C-1,2,3,7,8,9-HCDD           | 558   | 4       | 400.5  | 2.7  |
| <sup>13</sup> C-1,2,3,4-T <sub>4</sub> CDD | 557.4   | 2.7     | 400.0  | 2.0  |

- 1) The certified mass fraction has been calculated from the purity of the individual PCDD/F compounds as assessed in a comprehensive study and the gravimetric preparation of the solution.
- 2) Uncertainties have been calculated by combining contributions from the purity study and the gravimetric preparation; details are given in the certification report.
- 3) Non-certified values.

Availability: BCR-614 Solutions S1-S7 contain about 1 mL solution and BCR-614 Solution S8 about 0.5 mL. The solutions are available individually or as set. A set consists of 11 ampoules, one of S2, S4-S8 and two of S1 and S3. In addition, the set contains an additional solution S9, which is not certified. This solution is intended as complementary tool for QA/QC purposes.

| Substance              | ERM-AC213<br>PAHs in Acetonitrile / Toluene<br>(µg/g) |   |      |
|------------------------|---|---|------|
|                        |   |   |      |
| Benz[a]anthracene      | 3.09  | ± | 0.04 |
| Chrysene               | 3.06  | ± | 0.05 |
| 5-methylchrysene       | 3.08  | ± | 0.07 |
| Benzo[b]fluoranthene   | 3.05  | ± | 0.05 |
| Benzo[k]fluoranthene   | 3.06  | ± | 0.08 |
| Benzo[j]fluoranthene   | 3.05  | ± | 0.10 |
| Dibenz[a,h]anthracene  | 2.76  | ± | 0.05 |
| Benzo[ghi]perylene     | 3.07  | ± | 0.05 |
| Dibenzo[a,l]pyrene     | 2.85  | ± | 0.10 |
| Dibenzo[a,e]pyrene     | 2.97  | ± | 0.10 |
| Benzo[a]pyrene         | 2.95  | ± | 0.06 |
| Indeno[1,2,3-cd]pyrene | 3.13  | ± | 0.05 |

Values in brackets are not certified.

Availability: ERM-AC213 consists of 2 mL toluene containing 15 PAHs in an ampoule.

## 1.2 MATRIX MATERIALS

### 1.2.1 CERTIFIED FOR THE TOTAL ELEMENT CONTENT

| Substance                           | BCR-142R<br>Light sandy soil<br>(mg/kg) | ERM-CC141<br>Loam soil<br>(mg/kg) | BCR-143R<br>Sewage sludge amended soil<br>(mg/kg) | ERM-CC144<br>Sewage sludge |
|-------------------------------------|---|-----------------------------------|---|----------------------------|
| As                                  |   | 9.9 ± 1.5                         |   | 7.7 ± 0.7 mg/kg            |
| Cd                                  | 0.34 ± 0.04                             | 0.35 ± 0.05                       | 71.8 ± 1.2  | 14.5 ± 1.4 mg/kg           |
| Co                                  | 12.1 ± 0.7                              | 8.5 ± 0.5                         | 12.3 ± 0.3  | 6.5 ± 0.4 mg/kg            |
| Cr                                  |   | 86 ± 8                            |   | 168 ± 14 mg/kg             |
| Cu                                  | 69.7 ± 1.3                              | 14.4 ± 1.4                        | 130.6 ± 1.5                                       | 348 ± 18 mg/kg             |
| Fe                                  |   |                                   |   | 32.9 ± 1.6 g/kg            |
| Hg                                  | 0.067 ± 0.011                           | 0.083 ± 0.017                     | 1.10 ± 0.07                                       | 5.9 ± 0.6 mg/kg            |
| Mn                                  | 970 ± 16                                | 464 ± 18                          | 904 ± 13  | 352 ± 14 mg/kg             |
| Ni                                  | 64.5 ± 2.5                              | 26.4 ± 2.4                        | 299 ± 5   | 91 ± 7 mg/kg               |
| Pb                                  | 40.2 ± 1.9                              | 41 ± 4                            | 179.7 ± 2.1                                       | 157 ± 9 mg/kg              |
| Zn                                  | (101 ± 6)                               | 57 ± 4                            | 1055 ± 14   | 0.98 ± 0.04 g/kg           |
| Aqua regia<br>soluble <sup>1)</sup> |   |                                   |   |                            |
| As                                  | 0.249 ± 0.010                           | 7.5 ± 1.4                         | 72.0 ± 1.8  | 7.7 ± 0.7 mg/kg            |
| Cd                                  | (10.2 ± 0.6)                            | 0.25 ± 0.04                       | (11.8 ± 1.0)                                      | 13.3 ± 0.9 mg/kg           |
| Co                                  |   | 7.9 ± 0.9                         | 426 ± 12  | 5.9 ± 0.4 mg/kg            |
| Cr                                  | (69.8 ± 1.0)                            | 31 ± 4                            | (128 ± 7)   | 150 ± 11 mg/kg             |
| Cu                                  |   | 12.4 ± 0.9                        | (1.10 ± 0.06)                                     | 346 ± 15 mg/kg             |
| Fe                                  |   |                                   |   | 32.8 ± 1.5 g/kg            |
| Hg                                  | (800 ± 50)                              | 0.080 ± 0.008                     | 858 ± 11  | 6.1 ± 0.7 mg/kg            |
| Mn                                  | 61.1 ± 1.5                              | 387 ± 17                          | 296 ± 4   | 340 ± 13 mg/kg             |
| Ni                                  | 25.7 ± 1.6                              | 21.9 ± 1.6                        | 174 ± 5   | 86 ± 6 mg/kg               |
| Pb                                  | 93.3 ± 2.7                              | 32.2 ± 1.4                        | 1063 ± 16   | 156 ± 7 mg/kg              |
| Zn                                  |   | 50 ± 4                            |   | 0.97 ± 0.04 g/kg           |

Values in brackets are not certified.

Availability: Glass bottles containing about 50 g of powdered material; ERM-CC141 contains minimum 24 g; ERM-CC144 minimum 30 g.

<sup>1)</sup> Details of the analytical procedure to obtain the aqua regia soluble content of the elements are given in the certification report.

| Substance | BCR-667<br>Estuarine sediment<br>(mg/kg) | ERM-CC690<br>Calcareous soil<br>(mg/kg) |
|-----------|--|---|
| Br        | (99.7 ± 2.5)                             |   |
| Cd        | (0.67 ± 0.11)                            |   |
| Ce        | 56.7 ± 2.5                               | 49.1 ± 2.5                              |
| Co        | (23.0 ± 1.3)                             |   |
| Cr        | (178 ± 16)                               |   |
| Cs        | (7.8 ± 0.7)                              |   |
| Cu        | (60 ± 9)                                 |   |
| Dy        | 4.01 ± 0.14                              | 2.90 ± 0.28                             |
| Er        | 2.35 ± 0.15                              |   |
| Eu        | 1.00 ± 0.05                              |   |
| Fe        | (44800 ± 1)                              |   |
| Gd        | 4.41 ± 0.12                              | 3.2 ± 0.4                               |
| Ho        | 0.80 ± 0.06                              |   |
| La        | 27.8 ± 1.0                               | 24.4 ± 1.7                              |
| Lu        | 0.325 ± 0.020                            |   |
| Mn        | (920 ± 40)                               |   |
| Nd        | 25.0 ± 1.4                               | 19.1 ± 2.2                              |
| Ni        | (128 ± 9)                                |   |
| Pb        | (31.9 ± 1.1)                             |   |
| Pr        | 6.1 ± 0.5                                |   |
| Sb        | (0.96 ± 0.05)                            |   |
| Sc        | 13.7 ± 0.7                               | 7.9 ± 0.9                               |
| Se        | (1.59 ± 0.08)                            |   |
| Sm        | 4.66 ± 0.20                              | 3.5 ± 0.4                               |
| Ta        | (0.876 ± 0.017)                          |   |
| Tb        | 0.682 ± 0.017                            | 0.50 ± 0.07                             |
| Th        | 10.0 ± 0.5                               | 7.6 ± 0.8                               |
| Tm        | 0.326 ± 0.025                            | 0.232 ± 0.026                           |
| U         | 2.26 ± 0.15                              | 1.90 ± 0.23                             |
| Yb        | 2.20 ± 0.09                              | 1.57 ± 0.19                             |
| Zn        | (175 ± 13)                               |   |

Values in brackets are not certified.

Availability: BCR-667: Glass bottles containing about 40 g of powdered material.

ERM-CC690: Glass bottles containing about 70 g of powdered material. The report gives additional indicative values for As, Au, Co, Cr, Cs, Cu, Er, Eu, Fe, Hf, Ho, Lu, Ni, Pb, Pr, Sb, Ta, W, Y and Zn.



| Substance | BCR-277R<br>Estuarine sediment<br>(mg/kg) |      |       | BCR-280R<br>Lake sediment<br>(mg/kg) |      |       | BCR-320R<br>Channel sediment<br>(mg/kg) |      |       |
|-----------|---|------|-------|--------------------------------------|------|-------|---|------|-------|
|           | As  | 18.3 | ±     | 1.8                                  | 33.4 | ±     | 2.9                                     | 21.7 | ±     |
| Cd        | 0.61                                      | ±    | 0.07  | 0.85                                 | ±    | 0.10  | 2.64                                    | ±    | 0.18  |
| Co        | 22.5                                      | ±    | 1.4   | 16.8                                 | ±    | 0.9   | 9.7                                     | ±    | 0.6   |
| Cr        | 188                                       | ±    | 14    | 126                                  | ±    | 7     | 59                                      | ±    | 4     |
| Cu        | 63  | ±    | 7     | 53                                   | ±    | 6     | 46.3                                    | ±    | 2.9   |
| Fe        |   |      |       |                                      |      |       | 25700                                   | ±    | 1300  |
| Hg        | 0.128                                     | ±    | 0.017 | 1.46                                 | ±    | 0.20  | 0.85                                    | ±    | 0.09  |
| Mn        |   |      |       |                                      |      |       | 910                                     | ±    | 50    |
| Ni        | 130                                       | ±    | 8     | 69                                   | ±    | 5     | 27.1                                    | ±    | 2.2   |
| Pb        |   |      |       |                                      |      |       | 85                                      | ±    | 5     |
| Sc        |   |      |       |                                      |      |       | 5.2                                     | ±    | 0.4   |
| Se        | (0.58                                     | ±    | 0.11) | (0.46                                | ±    | 0.09) | (0.96                                   | ±    | 0.18) |
| Sn        | (6.5                                      | ±    | 1.8)  | (9.5                                 | ±    | 1.7)  | (9.4                                    | ±    | 1.7)  |
| Th        |   |      |       |                                      |      |       | 5.3                                     | ±    | 0.4   |
| Tl        |   |      |       |                                      |      |       | 0.65                                    | ±    | 0.08  |
| U         |   |      |       |                                      |      |       | 1.56                                    | ±    | 0.20  |
| V         |   |      |       |                                      |      |       | 46.5                                    | ±    | 2.8   |
| Zn        | 178                                       | ±    | 20    | 224                                  | ±    | 25    | 318                                     | ±    | 20    |

Values in brackets are not certified.

Availability: Amber glass bottles containing 40 g of powder for BCR-277R and BCR-320R and 30 g for BCR-280R.

| Substance                        | BCR-145R<br>Sewage sludge<br>(mixed origin)<br>(mg/kg) |      |       | BCR-146R<br>Sewage sludge<br>(industrial origin)<br>(mg/kg) |      |      |
|----------------------------------|--|------|-------|---|------|------|
|                                  | Cd   | 3.50 | ±     | 0.15  | 18.8 | ±    |
| Co                               | 5.6  | ±    | 0.4   | 7.39  | ±    | 0.27 |
| Cr                               |  |      |       | 196   | ±    | 7    |
| Cu                               | 696  | ±    | 12    | 838   | ±    | 16   |
| Hg                               | 2.01   | ±    | 0.22  | 8.6   | ±    | 0.4  |
| Mn                               | 156  | ±    | 4     | 323   | ±    | 7    |
| Ni                               | 247  | ±    | 7     | 70  | ±    | 5    |
| Pb                               | 286  | ±    | 5     | 609   | ±    | 14   |
| Zn                               | 2122   | ±    | 23    | 3060  | ±    | 60   |
| Aqua regia soluble <sup>1)</sup> |  |      |       |   |      |      |
| Cd                               | (3.43  | ±    | 0.17) | 18.4  | ±    | 0.4  |
| Co                               | (5.3   | ±    | 0.7)  | 6.5   | ±    | 0.4  |
| Cr                               | 307  | ±    | 13    | 174   | ±    | 7    |
| Cu                               | 707  | ±    | 9     | 831   | ±    | 16   |
| Hg                               | (1.99  | ±    | 0.08) | 8.39  | ±    | 0.25 |
| Mn                               | (145   | ±    | 7)    | 298   | ±    | 9    |
| Ni                               | 251  | ±    | 6     | 65.0  | ±    | 3.0  |
| Pb                               | 282  | ±    | 9     | 583   | ±    | 17   |
| Zn                               | 2140   | ±    | 50    | 3040  | ±    | 60   |

Values in brackets are not certified.

Availability: Glass bottles containing about 50 g of powdered material for BCR-146R, 40 g for BCR-145R.

<sup>1)</sup> Details of the analytical procedure to obtain the aqua regia soluble content of the elements are given in the certification report.

| Substance                       | ERM-CC580<br>Estuarine sediment<br>(mg/kg) |     |       |
|---------------------------------|--|-----|-------|
|                                 | Total Hg                                   | 132 | ±     |
| CH <sub>3</sub> Hg <sup>+</sup> | 0.075                                      | ±   | 0.004 |

Availability: Glass bottles containing about 40 g powder.

| Substance | <b>BCR-038</b>                          |   |                        |
|-----------|---|---|------------------------|
|           | Fly ash from pulverised coal<br>(mg/kg) |   |                        |
| As        | 48.0                                    | ± | 2.3                    |
| Cd        | 4.6                                     | ± | 0.3                    |
| Co        | 53.8                                    | ± | 1.9                    |
| Cr        | 192                                     | ± | 10                     |
| Cu        | 176                                     | ± | 9                      |
| Fe        | 33.8 × 10 <sup>3</sup>                  | ± | 0.7 × 10 <sup>3</sup>  |
| Hg        | 2.10                                    | ± | 0.15                   |
| Mn        | 479                                     | ± | 16                     |
| Na        | 3.74 × 10 <sup>3</sup>                  | ± | 0.15 × 10 <sup>3</sup> |
| Pb        | 262                                     | ± | 11                     |
| Zn        | 581                                     | ± | 29                     |

Availability: BCR-038 in ampoules containing about 5 g.

| Substance | <b>BCR-176R</b>    |   |        |
|-----------|--------------------|---|--------|
|           | Fly ash<br>(mg/kg) |   |        |
| As        | 54                 | ± | 5      |
| Cd        | 226                | ± | 19     |
| Co        | 26.7               | ± | 1.6    |
| Cr        | 810                | ± | 70     |
| Cu        | 1050               | ± | 70     |
| Fe        | 13100              | ± | 500    |
| Hg        | (1.60)             | ± | (0.23) |
| Mn        | (730)              | ± | (50)   |
| Ni        | 117                | ± | 6      |
| Pb        | 5000               | ± | 500    |
| Sb        | 850                | ± | 50     |
| Se        | 18.3               | ± | 1.9    |
| Tl        | 1.32               | ± | 0.21   |
| V         | (35)               | ± | (6)    |
| Zn        | 16800              | ± | 400    |

Values in brackets are not certified.

The report gives additional indicative values for Ag, Au, Ba, Br, Ce, Cs, Eu, Hf, La, Na, Rb, Sc, Ta, Th and W.  
Availability: Amber glass bottles containing about 40 g of powdered material.

| Substance | <b>BCR-723</b>                         |   |     |
|-----------|--|---|-----|
|           | Trace elements in road dust<br>(µg/kg) |   |     |
| Pd        | 6.1                                    | ± | 1.9 |
| Pt        | 81.3                                   | ± | 2.5 |
| Rh        | 12.8                                   | ± | 1.3 |

Availability: Brown glass bottles with screw cap containing approximately 25 g of powder.

| Substance | <b>ERM-CZ120</b>  |   |      |
|-----------|---|---|------|
|           | Elements in fine dust (PM <sub>10</sub> -like)<br>(mg/kg) |   |      |
| As        | 7.1   | ± | 0.7  |
| Cd        | 0.90  | ± | 0.22 |
| Pb        | 113   | ± | 17   |
| Ni        | 58  | ± | 7    |

Availability: Vial containing approximately 0.5 g of fine dust.

| Substance | <b>BCR-596</b><br>Trapa natans<br>(Aquatic plant)<br>(mg/kg) |   |     |
|-----------|--|---|-----|
| Cr        | 36.3   | ± | 1.7 |

Availability: CRM is provided in units of 25 g.

| Substance  | <b>BCR-129</b><br>Hay powder<br>(g/kg) |   |                        | <b>BCR-402</b><br>White clover<br>(mg/kg) |   |       |
|------------|--|---|------------------------|---|---|-------|
| As         |  |   |                        | 0.093                                     | ± | 0.010 |
| Ca         | 6.40                                   | ± | 0.10                   |   |   |       |
| Co         |  |   |                        | 0.178                                     | ± | 0.008 |
| I          | $0.167 \times 10^{-3}$                 | ± | $0.024 \times 10^{-3}$ |   |   |       |
| K          | 33.8                                   | ± | 0.8                    |   |   |       |
| Mg         | 1.45                                   | ± | 0.04                   |   |   |       |
| Mo         |  |   |                        | 6.93                                      | ± | 0.19  |
| N          | 37.2                                   | ± | 0.5                    |   |   |       |
| P          | 2.36                                   | ± | 0.07                   |   |   |       |
| S          | 3.16                                   | ± | 0.04                   |   |   |       |
| Se         |  |   |                        | 6.70                                      | ± | 0.25  |
| Zn         | $32.1 \times 10^{-3}$                  | ± | $1.7 \times 10^{-3}$   |   |   |       |
| Kjeldahl-N | 34.2                                   | ± | 0.4                    |   |   |       |

Availability: CRMs are provided in powder form in bottles containing approximately for BCR-129 30 g, BCR-402 25 g.

Note: BCR-402 was produced from white clover grown on a ground specially rich in selenium. This explains the high content of this element.

| Substance | <b>ERM-CD281</b><br>Rye grass<br>(mg/kg) |             |        |
|-----------|--|-------------|--------|
| As        | 0.042                                    | ±           | 0.010  |
| B         | 5.5                                      | ±           | 0.5    |
| Ca        |  | (6.3 g/kg)  |        |
| Cd        | 0.120                                    | ±           | 0.007  |
| Cr        | 24.8                                     | ±           | 1.3    |
| Cu        | 10.2                                     | ±           | 0.5    |
| Fe        |  | (0.18 g/kg) |        |
| Hg        | 0.0164                                   | ±           | 0.0022 |
| K         |  | (34 g/kg)   |        |
| Mg        |  | (1.6 g/kg)  |        |
| Mn        | 82                                       | ±           | 4      |
| Mo        | 2.22                                     | ±           | 0.12   |
| Na        |  | (4.0 g/kg)  |        |
| Ni        | 15.2                                     | ±           | 0.6    |
| P         |  | (2.8 g/kg)  |        |
| Pb        | 1.67                                     | ±           | 0.11   |
| S         |  | (3.4 g/kg)  |        |
| Sb        | 0.042                                    | ±           | 0.007  |
| Se        | 0.023                                    | ±           | 0.004  |
| Si        |  | (1.3 g/kg)  |        |
| Sn        | 0.062                                    | ±           | 0.011  |
| Zn        | 30.5                                     | ±           | 1.1    |

Values in brackets are not certified.

Availability: Amber glass vial containing approximately 10 g.

| Substance | BCR-414<br>Plankton<br>(mg/kg) |   |            |
|-----------|--------------------------------|---|------------|
| As        | 6.82                           | ± | 0.28       |
| Cd        | 0.383                          | ± | 0.014      |
| Co        | (1.43                          | ± | 0.06)      |
| Cr        | 23.8                           | ± | 1.2        |
| Cu        | 29.5                           | ± | 1.3        |
| Fe        | (1.85                          | ± | 0.19 g/kg) |
| Hg        | 0.276                          | ± | 0.018      |
| K         | (7.55                          | ± | 0.17 g/kg) |
| Mn        | 299                            | ± | 13         |
| Mo        | (1.35                          | ± | 0.20)      |
| Ni        | 18.8                           | ± | 0.8        |
| Pb        | 3.97                           | ± | 0.19       |
| Sc        | (0.54                          | ± | 0.02)      |
| Se        | 1.75                           | ± | 0.10       |
| Sr        | (261                           | ± | 25)        |
| V         | 8.10                           | ± | 0.18       |
| Zn        | 111.6                          | ± | 2.5        |

Values in brackets are not certified.

Availability: CRM is provided in powder form in bottles containing approximately 5 g.

| Substance | BCR-482<br>Lichen<br>(mg/kg) |   |      | ERM-CD200<br>Bladderwrack<br>(Fucus vesiculosus)<br>(mg/kg) |   |        |
|-----------|------------------------------|---|------|---|---|--------|
|           |                              | ± |      |   | ± |        |
| Al        | 1103                         | ± | 24   |   |   |        |
| As        | 0.85                         | ± | 0.07 | 55  | ± | 4      |
| Cd        | 0.56                         | ± | 0.02 | 0.95  | ± | 0.06   |
| Cr        | 4.12                         | ± | 0.15 |   |   |        |
| Cu        | 7.03                         | ± | 0.19 | 1.71  | ± | 0.18   |
| Hg        | 0.48                         | ± | 0.02 | 0.0186  | ± | 0.0016 |
| Ni        | 2.47                         | ± | 0.07 |   |   |        |
| Pb        | 40.9                         | ± | 1.4  | 0.51  | ± | 0.06   |
| Se        |                              |   |      | 0.088   | ± | 0.010  |
| Zn        | 100.6                        | ± | 2.2  | 25.3  | ± | 1.7    |

Availability: BCR-482 is provided in powder form in bottles containing approximately 15 g.

ERM-CD200 is provided in powder form in bottles containing approximately 5 g.

| Substance | BCR-670<br>Lemna minor<br>(Aquatic plant) (duck weed)<br>(µg/kg) |   |       |
|-----------|--|---|-------|
|           |  |   |       |
| As        | (1980  | ± | 190)  |
| Cd        | (75.5  | ± | 2.5)  |
| Ce        | 990  | ± | 40    |
| Cr        | (2050  | ± | 100   |
| Cs        | (77  | ± | 10)   |
| Cu        | (1820  | ± | 300)  |
| Dy        | 79   | ± | 7     |
| Er        | 44.0   | ± | 2.8   |
| Eu        | 23.2   | ± | 1.5   |
| Gd        | 98   | ± | 8     |
| Ho        | 15.8   | ± | 1.8   |
| La        | 487  | ± | 20    |
| Lu        | 6.3  | ± | 0.5   |
| Mo        | (560   | ± | 70)   |
| Nd        | 473  | ± | 15    |
| Pb        | (2060  | ± | 120)  |
| Pr        | 121  | ± | 6     |
| Sc        | 191  | ± | 11    |
| Sm        | 94   | ± | 7     |
| Tb        | 14.0   | ± | 1.1   |
| Th        | 159  | ± | 18    |
| Tm        | 5.7  | ± | 0.7   |
| U         | 82   | ± | 8     |
| Y         | 460  | ± | 60    |
| Yb        | 40   | ± | 4     |
| Zn        | (24000   | ± | 2100) |

Values in brackets are not certified.

Availability: Glass bottles containing about 10 g of powdered material.

| Substance | ERM-CE278k<br>Mussel tissue<br>(mg/kg) |   |        | ERM-CE101<br>Trout muscle<br>(mg/kg) |   |        |
|-----------|--|---|--------|--------------------------------------|---|--------|
|           |  |   |        |                                      |   |        |
| As        | 6.7                                    | ± | 0.4    | 0.175                                | ± | 0.017  |
| Ag        | (0.044                                 | ± | 0.016) |                                      |   |        |
| Cd        | 0.336                                  | ± | 0.025  |                                      |   |        |
| Cr        | 0.73                                   | ± | 0.22   |                                      |   |        |
| Cu        | 5.98                                   | ± | 0.27   |                                      |   |        |
| Fe        | 161                                    | ± | 8      | 3.1                                  | ± | 0.6    |
| Hg        | 0.071                                  | ± | 0.007  | 0.0219                               | ± | 0.0027 |
| Mn        | 4.88                                   | ± | 0.24   | 0.108                                | ± | 0.017  |
| Ni        | 0.69                                   | ± | 0.15   | (0.051                               | ± | 0.012) |
| Pb        | 2.18                                   | ± | 0.18   |                                      |   |        |
| Rb        | 2.46                                   | ± | 0.16   |                                      |   |        |
| Se        | 1.62                                   | ± | 0.12   | 0.113                                | ± | 0.011  |
| Sr        | 19.0                                   | ± | 1.2    |                                      |   |        |
| Zn        | 71                                     | ± | 4      | 4.5                                  | ± | 0.6    |

Values in brackets are not certified.

Availability: ERM-CE278k is provided in powder form in bottles containing approximately 8 g.

ERM-CE101 consists of 40 g of homogenised, heat-treated fish muscle contained in a glass jar.

| Substance | <b>BCR-668</b><br>Mussel tissue<br>( $\mu\text{g}/\text{kg}$ ) |       |       |
|-----------|--|-------|-------|
| As        | (7100  | $\pm$ | 500)  |
| Cd        | (275   | $\pm$ | 11)   |
| Ce        | 89   | $\pm$ | 7     |
| Cr        | (370   | $\pm$ | 60)   |
| Cs        | (13.8  | $\pm$ | 1.5)  |
| Dy        | 8.9  | $\pm$ | 0.6   |
| Er        | 4.5  | $\pm$ | 0.5   |
| Eu        | 2.79   | $\pm$ | 0.16  |
| Gd        | 13.0   | $\pm$ | 0.6   |
| Ho        | (1.8   | $\pm$ | 0.6)  |
| La        | 80   | $\pm$ | 6     |
| Lu        | 0.389  | $\pm$ | 0.024 |
| Mo        | (1990  | $\pm$ | 150)  |
| Nd        | 54   | $\pm$ | 4     |
| Pr        | 12.3   | $\pm$ | 1.1   |
| Sc        | (8.5   | $\pm$ | 1.8)  |
| Sm        | 11.2   | $\pm$ | 0.8   |
| Tb        | 1.62   | $\pm$ | 0.12  |
| Th        | 10.7   | $\pm$ | 1.2   |
| Tm        | 0.48   | $\pm$ | 0.08  |
| U         | 56   | $\pm$ | 5     |
| Y         | 59   | $\pm$ | 5     |
| Yb        | (2.8   | $\pm$ | 0.5)  |
| Zn        | (70700   | $\pm$ | 400)  |

Values in brackets are not certified.

Availability: Glass bottles containing about 10 g of powdered material.

| Substance                | <b>ERM-CE464</b><br>Tuna fish<br>( $\text{mg}/\text{kg}$ ) |       |      |
|--------------------------|--|-------|------|
| Total Hg                 | 5.24   | $\pm$ | 0.10 |
| $\text{CH}_3\text{Hg}^+$ | 5.50   | $\pm$ | 0.17 |

Availability: Glass bottles containing about 15 g.

| Substance | <b>BCR-505</b><br>Trace elements in estuarine water<br>( $\text{nmol}/\text{kg}$ ) |       |       | <b>BCR-579</b><br>Coastal sea-water<br>( $\text{ng}/\text{kg}$ ) |     |       |
|-----------|--|-------|-------|--|-----|-------|
|           | Cd   | 0.80  | $\pm$ | 0.04   | 1.9 | $\pm$ |
| Co        | (0.99  | $\pm$ | 0.26) |  |     |       |
| Cu        | 29.4   | $\pm$ | 1.5   |  |     |       |
| Fe        | (19  | $\pm$ | 4)    |  |     |       |
| Hg        |  |       |       |  |     |       |
| Ni        | 24.1   | $\pm$ | 2.0   |  |     |       |
| Pb        | (0.24  | $\pm$ | 0.14) |  |     |       |
| Zn        | 172  | $\pm$ | 11    |  |     |       |

Values in brackets are not certified.

Availability: BCR-505 is provided in 1 L polyethylene bottles and BCR-579 in 1 L glass bottles.

| Substance                        | <b>ERM-CA408</b><br>Simulated rainwater<br>(low contents)<br>(mg/L) |   |           |
|----------------------------------|---|---|-----------|
| <b>Mass concentration:</b>       |   |   |           |
| Ammonium                         | 0.910   | ± | 0.028     |
| Cl                               | 1.96  | ± | 0.07      |
| Fluoride                         | 0.194   | ± | 0.008     |
| Mg                               | 0.145   | ± | 0.022     |
| NO <sub>3</sub>                  | 2.01  | ± | 0.09      |
| <i>Ortho</i> -phosphate          | 1.00  | ± | 0.05      |
| SO <sub>4</sub>                  | 1.46  | ± | 0.04      |
| <b>Electrochemical property:</b> |   |   |           |
| Conductivity (20 °C)             | 18.7  | ± | 1.8 μS/cm |
| pH (20 °C)                       | 6.3   | ± | 0.6       |

Availability: ERM-CA408 is provided in units of about 95 mL in flame-sealed ampoules.

| Substance                      | <b>BCR-479</b><br>Freshwater<br>(low contents) |         | <b>BCR-480</b><br>Freshwater<br>(high contents) |         |
|--------------------------------|--|---------|---|---------|
| Nitrate                        |  |         |   |         |
| As amount of substance content | 214  | ± 4     | 885   | ± 13    |
| As mass fraction               | 13.3   | ± 0.3   | 54.9  | ± 0.8   |
|                                |  | μmol/kg |   | μmol/kg |
|                                |  | mg/kg   |   | mg/kg   |

Availability: Units of about 100 mL in white glass ampoules.

| Substance | <b>BCR-611</b><br>Bromide in ground water based on IC-measurements<br>(low contents)<br>(μg/kg) |     | <b>BCR-612</b><br>Bromide in ground water based on IC-measurements<br>(high contents)<br>(μg/kg) |      |
|-----------|---|-----|--|------|
| Br        | 93  | ± 4 | 252  | ± 10 |

Availability: Set of four brown glass ampoules of 25 mL.

| Substance               | <b>ERM-CA616</b><br>Ground water<br>(high carbonate content)<br>(mg/L) |   |         |
|-------------------------|--|---|---------|
|                         | <b>Mass concentration:</b>   |   |         |
| Ca                      | 42.6   | ± | 1.4     |
| Cl                      | 44.6   | ± | 10.9    |
| K                       | 5.79   | ± | 0.15    |
| Mg                      | 10.1   | ± | 0.3     |
| Na                      | 27.9   | ± | 0.8     |
| <i>Ortho</i> -phosphate | 2.24   | ± | 0.10    |
|                         | <b>Electrochemical property:</b>                                       |   |         |
| Conductivity (20 °C)    | 426  | ± | 5 μS/cm |
| pH (20 °C)              | 7.12   | ± | 0.18    |

Availability: ERM-CA616 consists of about 95 mL natural groundwater in a flame-sealed ampoule

| Substance | ERM-CA615<br>Groundwater |   |       |      |
|-----------|--------------------------|---|-------|------|
| As        | 9.9                      | ± | 0.7   | µg/L |
| Cd        | 0.106                    | ± | 0.011 | µg/L |
| Fe        | 5.11                     | ± | 0.26  | mg/L |
| Hg        | 0.037                    | ± | 0.004 | µg/L |
| Mn        | 107                      | ± | 5     | µg/L |
| Ni        | 25.3                     | ± | 1.1   | µg/L |
| Pb        | 7.1                      | ± | 0.6   | µg/L |

Availability: One unit consists of about 95 mL natural groundwater in a flame-sealed ampoule.

| Substance | ERM-CA713<br>Wastewater<br>µg/L |   |      |  |
|-----------|---------------------------------|---|------|--|
| As        | 10.8                            | ± | 0.3  |  |
| Cd        | 5.09                            | ± | 0.20 |  |
| Cr        | 20.9                            | ± | 1.3  |  |
| Cu        | 101                             | ± | 7    |  |
| Fe        | 445                             | ± | 27   |  |
| Hg        | 1.84                            | ± | 0.11 |  |
| Mn        | 95                              | ± | 4    |  |
| Ni        | 50.3                            | ± | 1.4  |  |
| Pb        | 49.7                            | ± | 1.7  |  |
| Se        | 4.9                             | ± | 1.1  |  |

Availability: ampoule containing approximately 100 mL of wastewater effluent acidified with HNO<sub>3</sub> to about pH 2.

| Substance             | ERM-CA400<br>Seawater |   |        |                   |
|-----------------------|-----------------------|---|--------|-------------------|
| Hg mass concentration | 16.8                  | ± | 1.1    | ng/L              |
| Hg mass fraction      | 16.4                  | ± | 1.0    | ng/kg             |
| True density at 20 °C | 1.0226                | ± | 0.0003 | g/cm <sup>3</sup> |

Availability: One unit consists of 3 vials, each containing 100 mL acidified coastal surface seawater.

| Substance             | ERM-CA403<br>Seawater µg/L |   |         |      |
|-----------------------|----------------------------|---|---------|------|
| As                    | 1.90                       | ± | 0.13    |      |
| Cd                    | 0.094                      | ± | 0.011   |      |
| Co                    | 0.074                      | ± | 0.011   |      |
| Cu                    | 0.87                       | ± | 0.13    |      |
| Mn                    | 2.47                       | ± | 0.11    |      |
| Mo                    | 12.0                       | ± | 0.6     |      |
| Ni                    | 1.04                       | ± | 0.16    |      |
| Pb                    | 0.098                      | ± | 0.010   |      |
| True density at 20 °C | 1.02352                    | ± | 0.00005 | g/mL |

Availability: The sample consists of about 500 mL of seawater acidified to 1 < pH < 2 with hydrochloric acid.



## 1.2.2 CERTIFIED FOR THE EXTRACTABLE ELEMENT CONTENT AND SPECIES

| Substance                                   | BCR-483<br>Sewage sludge amended soil<br>(mg/kg) |   |          | BCR-484<br>Sewage sludge amended<br>(terra rossa) soil<br>(mg/kg) |   |        | BCR-700<br>Organic-rich soil<br>(mg/kg) |   |      |
|---|--|---|----------|---|---|--------|---|---|------|
|   |  |   |          |   |   |        |   |   |      |
| <u>EDTA:</u>                                |  |   |          |   |   |        |   |   |      |
| Cd  | 24.3   | ± | 1.3      | 0.509   | ± | 0.030  | 65.2                                    | ± | 3.5  |
| Cr  | 28.6   | ± | 2.6      |   |   |        | 10.1                                    | ± | 0.9  |
| Cu  | 215  | ± | 11       | 88  | ± | 4      | 89.4                                    | ± | 2.8  |
| Ni  | 28.7   | ± | 1.7      | 1.39  | ± | 0.11   | 53.2                                    | ± | 2.8  |
| Pb  | 229  | ± | 8        | 47.9  | ± | 2.6    | 103                                     | ± | 5    |
| Zn  | 612  | ± | 20       | 152   | ± | 7      | 510                                     | ± | 17   |
| <u>Acetic acid:</u>                         |  |   |          |   |   |        |   |   |      |
| Cd  | 18.3   | ± | 0.6      | 0.48  | ± | 0.04   | 67.5                                    | ± | 2.8  |
| Cr  | 18.7   | ± | 1.0      |   |   |        | 19.0                                    | ± | 1.1  |
| Cu  | 33.5   | ± | 1.6      | 33.9  | ± | 1.4    | 36.3                                    | ± | 1.6  |
| Ni  | 25.8   | ± | 1.0      | 1.69  | ± | 0.16   | 99.0                                    | ± | 5.1  |
| Pb  | 2.10   | ± | 0.25     | 1.17  | ± | 0.16   | 4.85                                    | ± | 0.38 |
| Zn  | 620  | ± | 24       | 193   | ± | 7      | 719                                     | ± | 24   |
| <u>Calcium chloride extractable content</u> |  |   |          |   |   |        |   |   |      |
| Cd  | (0.45  | ± | 0.05)    |   |   |        |   |   |      |
| Cr  | (0.35  | ± | 0.09)    |   |   |        |   |   |      |
| Cu  | (1.2   | ± | 0.4)     | (0.67   | ± | 0.29)  |   |   |      |
| Ni  | (1.4   | ± | 0.2)     |   |   |        |   |   |      |
| Pb  |  |   | (< 0.06) |   |   |        |   |   |      |
| Zn  | (8.3   | ± | 0.7)     | (0.31   | ± | 0.17)  |   |   |      |
| <u>Sodium nitrate extractable content</u>   |  |   |          |   |   |        |   |   |      |
| Cd  | (0.08  | ± | 0.03)    |   |   |        |   |   |      |
| Cr  | (0.30  | ± | 0.07)    |   |   |        |   |   |      |
| Cu  | (0.89  | ± | 0.22)    | (0.48   | ± | 0.15)  |   |   |      |
| Ni  | (0.65  | ± | 0.07)    | (0.023  | ± | 0.005) |   |   |      |
| Pb  |  |   | (< 0.03) |   |   |        |   |   |      |
| Zn  | (2.7   | ± | 0.8)     | (0.09   | ± | 0.04)  |   |   |      |
| <u>Ammonium nitrate extractable content</u> |  |   |          |   |   |        |   |   |      |
| Cd  | (0.26  | ± | 0.05)    | (0.003  | ± | 0.002) |   |   |      |
| Cr  | (0.27  | ± | 0.10)    |   |   |        |   |   |      |
| Cu  | (1.2   | ± | 0.3)     | (1.1  | ± | 0.4)   |   |   |      |
| Ni  | (1.1   | ± | 0.3)     | (0.033  | ± | 0.017) |   |   |      |
| Pb  | (0.020   | ± | 0.013)   |   |   |        |   |   |      |
| Zn  | (6.5   | ± | 0.9)     | (0.17   | ± | 0.05)  |   |   |      |

Availability: BCR-483 and -484 are provided in glass bottles containing about 70 g of powder. BCR-700 is provided in glass bottles containing about 40 g of powder.

| Substance            | BCR-684<br>River sediment<br>(mg/kg) |   |    |
|----------------------|--------------------------------------|---|----|
| NaOH-extractable P   | 550                                  | ± | 21 |
| HCl-extractable P    | 536                                  | ± | 28 |
| Inorganic P          | 1113                                 | ± | 24 |
| Organic P            | 209                                  | ± | 9  |
| Conc. HCl-extract. P | 1373                                 | ± | 35 |

Availability: Glass bottles containing about 35 g of powdered material.

| Substance         | <b>BCR-701</b><br>Lake sediment<br>(mg/kg)         |   |       |
|-------------------|--|---|-------|
|                   | <u>Extractable mass fraction based on dry mass</u> |   |       |
| <u>Step 1:</u> Cd | 7.3  | ± | 0.4   |
| Cr                | 2.26   | ± | 0.16  |
| Cu                | 49.3   | ± | 1.7   |
| Ni                | 15.4   | ± | 0.9   |
| Pb                | 3.18   | ± | 0.21  |
| Zn                | 205  | ± | 6     |
| <u>Step 2:</u> Cd | 3.77   | ± | 0.28  |
| Cr                | 45.7   | ± | 2.0   |
| Cu                | 124  | ± | 3     |
| Ni                | 26.6   | ± | 1.3   |
| Pb                | 126  | ± | 3     |
| Zn                | 114  | ± | 5     |
| <u>Step 3:</u> Cd | 0.27   | ± | 0.06  |
| Cr                | 143  | ± | 7     |
| Cu                | 55   | ± | 4     |
| Ni                | 15.3   | ± | 0.9   |
| Pb                | 9.3  | ± | 2.0   |
| Zn                | 46   | ± | 4     |
|                   | <u>Mass fraction based on dry mass</u>             |   |       |
| Cd                | (0.13  | ± | 0.08) |
| Cr                | (62.5  | ± | 7.4)  |
| Cu                | (38.5  | ± | 11.2) |
| Ni                | (41.4  | ± | 4.0)  |
| Pb                | (11.0  | ± | 5.2)  |
| Zn                | (95  | ± | 13)   |

Values in brackets are not certified.

Availability: Glass bottles containing about 20 g of powdered material.

| Substance            | <b>BCR-462</b><br>Coastal sediment<br>(µg/kg) |    |    | <b>BCR-646</b><br>Freshwater sediment<br>(µg/kg) |     |     |
|----------------------|---|----|----|--|-----|-----|
|                      | Tributyltin (TBT)                             | 54 | ±  | 15   | 480 | ±   |
| Dibutyltin (DBT)     | 68  | ±  | 12 | 770  | ±   | 90  |
| Monobutyltin (MBT)   |   |    |    | 610  | ±   | 120 |
| Triphenyltin (TPhT)  |   |    |    | 29   | ±   | 11  |
| Diphenyltin (DPhT)   |   |    |    | 36   | ±   | 8   |
| Monophenyltin (MPhT) |   |    |    | 69   | ±   | 18  |

Availability: Glass bottle containing about 25 g of powder for BCR-462 and 40 g of powder for BCR-646.

| Substance                       | <b>ERM-CC580</b><br>Estuarine sediment<br>(mg/kg) |   |       |
|---------------------------------|---|---|-------|
| Total Hg                        | 132   | ± | 3     |
| CH <sub>3</sub> Hg <sup>+</sup> | 0.075   | ± | 0.004 |

Availability: Glass bottles containing about 40 g powder.

|                    | <b>BCR-545</b><br>Welding dust loaded on a filter<br>(g/kg) |   |     |
|--------------------|---|---|-----|
| Cr (VI)            | 40.2  | ± | 0.6 |
| total leachable Cr | 39.5  | ± | 1.3 |

Availability: Glass fibre filter loaded with welding dust containing about 100 µg Cr (VI).

| Substance          | <b>ERM-CE477</b><br>Mussel tissue<br>(mg/kg) |   |      |
|--------------------|--|---|------|
| Tributyltin (TBT)  | 2.20   | ± | 0.19 |
| Dibutyltin (DBT)   | 1.54   | ± | 0.12 |
| Monobutyltin (MBT) | 1.50   | ± | 0.28 |

Availability: Glass bottle containing about 14 g of powder.

| Substance                       | <b>ERM-CE464</b><br>Tuna fish<br>(mg/kg) |   |      |
|---------------------------------|--|---|------|
| Total Hg                        | 5.24                                     | ± | 0.10 |
| CH <sub>3</sub> Hg <sup>+</sup> | 5.50                                     | ± | 0.17 |

Availability: Glass bottles containing about 15 g powder.

| Substance                    | <b>BCR-627</b><br>Tuna fish tissue |   |     |         | <b>ERM-BC211</b><br>Rice |   |    |       |
|------------------------------|------------------------------------|---|-----|---------|--------------------------|---|----|-------|
|                              |                                    | ± |     |         |                          | ± |    |       |
| Total As                     | 4.8                                | ± | 0.3 | mg/kg   | 260                      | ± | 13 | µg/kg |
| Dimethylarsinic acid         | 2.0                                | ± | 0.3 | µmol/kg | 119                      | ± | 13 | µg/kg |
| Sum of arsenite and arsenate |                                    |   |     |         | 124                      | ± | 11 | µg/kg |
| Arsenobetaine                | 52                                 | ± | 3   | µmol/kg |                          |   |    |       |

Availability: BCR-627: Glass bottles containing about 10 g powder  
ERM-BC211: Vial containing about 10 g of powder

### 1.2.3 CERTIFIED FOR ORGANIC POLLUTANTS

| Substance  | <b>ERM-CZ100</b><br>Fine dust (PM <sub>10</sub> -like)<br>(mg/kg) |   |      |
|--|---|---|------|
| Benz[a]anthracene  | 0.91  | ± | 0.07 |
| Benzo[a]pyrene   | 0.72  | ± | 0.05 |
| Benzo[b]fluoranthene   | 1.42  | ± | 0.14 |
| Benzo[j]fluoranthene   | 0.75  | ± | 0.14 |
| Benzo[k]fluoranthene   | 0.67  | ± | 0.06 |
| Dibenzo[a,h]anthracene   | 0.18  | ± | 0.04 |
| Indeno[1,2,3-c,d]pyrene  | 1.07  | ± | 0.10 |
| Sum of Benzo[b]fluoranthene, benzo[k]fluoranthene and benzo[j]fluoranthene | 2.84  | ± | 0.21 |

Availability: Vial containing about 0.5 g of fine dust.

| Substance                        | BCR-524<br>Contaminated industrial soil<br>(mg/kg) |   |       |
|----------------------------------|--|---|-------|
| Pyrene                           | 173  | ± | 11    |
| Benz[a]anthracene                | 22.5   | ± | 1.8   |
| Benzo[a]pyrene                   | 8.6  | ± | 0.5   |
| Benzo[e]pyrene                   | 10.6   | ± | 1.4   |
| Benzo[b]fluoranthene             | 13.5   | ± | 1.6   |
| Benzo[k]fluoranthene             | 6.2  | ± | 0.6   |
| Benzo[b]naphtho[2,1-d]-thiophene | 3.8  | ± | 0.6   |
| Indeno[1,2,3-cd]pyrene           | 5.1  | ± | 0.4   |
| Pentachlorophenol                | 0.034  | ± | 0.005 |

Availability: Glass bottle containing about 40 g of powder.

| Substance              | BCR-535<br>Freshwater harbour sediment<br>(mg/kg) |   |      |
|------------------------|---|---|------|
| Pyrene                 | 2.52  | ± | 0.18 |
| Benz[a]anthracene      | 1.54  | ± | 0.10 |
| Benzo[a]pyrene         | 1.16  | ± | 0.10 |
| Benzo[e]pyrene         | 1.86  | ± | 0.13 |
| Benzo[b]fluoranthene   | 2.29  | ± | 0.15 |
| Benzo[k]fluoranthene   | 1.09  | ± | 0.15 |
| Indeno[1,2,3-cd]pyrene | 1.56  | ± | 0.14 |

Availability: Glass bottle containing about 40 g of powder.

| Polychlorinated biphenyls<br>(IUPAC No.) | BCR-481<br>Industrial soil<br>(mg/kg) |   |     | BCR-536<br>Freshwater harbour sediment<br>(µg/kg) |   |     |
|--|---------------------------------------|---|-----|---|---|-----|
| 28                                       |                                       |   |     | 44  | ± | 5   |
| 52                                       |                                       |   |     | 38  | ± | 4   |
| 101                                      | 37                                    | ± | 3   | 44  | ± | 4   |
| 105                                      |                                       |   |     | 3.5   | ± | 0.6 |
| 118                                      | 9.4                                   | ± | 0.7 | 28  | ± | 3   |
| 128                                      | 9.1                                   | ± | 0.8 | 5.4   | ± | 1.2 |
| 138                                      |                                       |   |     | 27  | ± | 4   |
| 149                                      | 97                                    | ± | 7   | 49  | ± | 4   |
| 153                                      | 137                                   | ± | 7   | 50  | ± | 4   |
| 156                                      | 7.0                                   | ± | 0.5 | 3.0   | ± | 0.4 |
| 163                                      |                                       |   |     | 17  | ± | 3   |
| 170                                      | 52                                    | ± | 4   | 13.4  | ± | 1.4 |
| 180                                      | 124                                   | ± | 6   | 22  | ± | 2   |

Availability: BCR-481 is provided in brown glass bottles with a polyethylene insert containing approximately 25 g of soil. BCR-536 is provided in a glass bottle containing about 40 g of powder.

| Substance                  | BCR-529<br>Industrial (sandy) soil |   |       |       | BCR-530<br>Industrial (clay) soil |   |        |       |
|----------------------------|------------------------------------|---|-------|-------|-----------------------------------|---|--------|-------|
| 3,4-dichlorophenol         | 0.23                               | ± | 0.04  | mg/kg | 6.0                               | ± | 0.5    | mg/kg |
| 2,4,5-trichlorophenol      | 1.51                               | ± | 0.10  | mg/kg | 40                                | ± | 7      | mg/kg |
| Pentachlorophenol          | 0.23                               | ± | 0.04  | mg/kg | 0.47                              | ± | 0.09   | mg/kg |
| 2,3,7,8 - TCDD (D48)       | 4.5                                | ± | 0.6   | µg/kg |                                   |   |        |       |
| 1,2,3,7,8 - PeCDD (D54)    | 0.44                               | ± | 0.05  | µg/kg |                                   |   |        |       |
| 1,2,3,4,7,8 - HxCDD (D66)  | 1.22                               | ± | 0.21  | µg/kg |                                   |   |        |       |
| 1,2,3,6,7,8 - HxCDD (D67)  | 5.4                                | ± | 0.9   | µg/kg | 0.061                             | ± | 0.011  | µg/kg |
| 1,2,3,7,8,9 - HxCDD (D70)  | 3.0                                | ± | 0.4   | µg/kg | 0.0218                            | ± | 0.0029 | µg/kg |
| 2,3,7,8 - TCDF (F83)       | 0.078                              | ± | 0.013 | µg/kg |                                   |   |        |       |
| 1,2,3,7,8 - PeCDF (F94)    | 0.145                              | ± | 0.028 | µg/kg | 0.24                              | ± | 0.04   | µg/kg |
| 2,3,4,7,8 - PeCDF (F114)   | 0.36                               | ± | 0.07  | µg/kg | 0.62                              | ± | 0.07   | µg/kg |
| 1,2,3,4,7,8 - HxCDF (F118) | 3.4                                | ± | 0.5   | µg/kg | 0.321                             | ± | 0.016  | µg/kg |
| 1,2,3,6,7,8 - HxCDF (F121) | 1.09                               | ± | 0.15  | µg/kg | 0.186                             | ± | 0.023  | µg/kg |
| 1,2,3,7,8,9 - HxCDF (F124) | 0.022                              | ± | 0.010 | µg/kg |                                   |   |        |       |
| 2,3,4,6,7,8 - HxCDF (F130) | 0.37                               | ± | 0.05  | µg/kg | 0.126                             | ± | 0.012  | µg/kg |

Availability: Amber glass bottles containing about 50 g of dried soil.

| Substance                                 | BCR-677<br>Sewage sludge<br>(ng/kg) |   |                       |
|---|-------------------------------------|---|-----------------------|
| 2,3,7,8 - T <sub>4</sub> CDD (D48)        | 1.51                                | ± | 0.16                  |
| 1,2,3,7,8 - P <sub>5</sub> CDD (D54)      | 4.1                                 | ± | 0.9                   |
| 1,2,3,6,7,8 - H <sub>6</sub> CDD (D67)    | 235                                 | ± | 16                    |
| 1,2,3,7,8,9 - H <sub>6</sub> CDD (D70)    | 79                                  | ± | 7                     |
| 1,2,3,4,6,7,8 - H <sub>7</sub> CDD (D73)  | 3.5 x 10 <sup>3</sup>               | ± | 0.4 x 10 <sup>3</sup> |
| O <sub>8</sub> CDD (D75)                  | 12.7 x 10 <sup>3</sup>              | ± | 0.8 x 10 <sup>3</sup> |
| 2,3,7,8 - T <sub>4</sub> CDF (F83)        | 45                                  | ± | 4                     |
| 1,2,3,7,8 - P <sub>5</sub> CDF (F94)      | 24.8                                | ± | 1.6                   |
| 2,3,4,7,8 - P <sub>5</sub> CDF (F114)     | 16.9                                | ± | 1.5                   |
| 1,2,3,4,7,8 - H <sub>6</sub> CDF (F118)   | 14.5                                | ± | 1.6                   |
| 1,2,3,6,7,8 - H <sub>6</sub> CDF (F121)   | 6.1                                 | ± | 0.8                   |
| 1,2,3,7,8,9 - H <sub>6</sub> CDF (F124)   | 0.84                                | ± | 0.29                  |
| 2,3,4,6,7,8 - H <sub>6</sub> CDF (F130)   | 5.6                                 | ± | 0.6                   |
| 1,2,3,4,6,7,8 - H <sub>7</sub> CDF (F131) | 62                                  | ± | 3                     |
| 1,2,3,4,7,8,9 - H <sub>7</sub> CDF (F134) | 6.3                                 | ± | 0.8                   |
| O <sub>8</sub> CDF (F135)                 | 177                                 | ± | 7                     |

Availability: BCR-677 consists of approximately 40 g of dried sewage sludge in amber glass bottles.

| Substance                               | BCR-490<br>Fly ash<br>(µg/kg) |   |       |
|---|-------------------------------|---|-------|
| 2,3,7,8 - T <sub>4</sub> CDD (D48)      | 0.169                         | ± | 0.012 |
| 1,2,3,7,8 - P <sub>5</sub> CDD (D54)    | 0.67                          | ± | 0.04  |
| 1,2,3,4,7,8 - H <sub>6</sub> CDD (D66)  | 0.95                          | ± | 0.11  |
| 1,2,3,6,7,8 - H <sub>6</sub> CDD (D67)  | 4.8                           | ± | 0.4   |
| 1,2,3,7,8,9 - H <sub>6</sub> CDD (D70)  | 2.84                          | ± | 0.17  |
| 2,3,7,8 - T <sub>4</sub> CDF (F83)      | 0.90                          | ± | 0.05  |
| 1,2,3,7,8 - P <sub>5</sub> CDF (F94)    | 1.71                          | ± | 0.12  |
| 2,3,4,7,8 - P <sub>5</sub> CDF (F114)   | 1.85                          | ± | 0.11  |
| 1,2,3,4,7,8 - H <sub>6</sub> CDF (F118) | 2.37                          | ± | 0.12  |
| 1,2,3,6,7,8 - H <sub>6</sub> CDF (F121) | 2.64                          | ± | 0.14  |
| 1,2,3,7,8,9 - H <sub>6</sub> CDF (F124) | 0.34                          | ± | 0.05  |
| 2,3,4,6,7,8 - H <sub>6</sub> CDF (F130) | 2.47                          | ± | 0.17  |

Availability: BCR-490 consists of approximately 30 g of fly ash in amber glass bottles.

| Substance                                 | BCR-615<br>Fly ash (low level)<br>(ng/kg) |   |                        |
|---|---|---|------------------------|
| 2,3,7,8 - T <sub>4</sub> CDD (D48)        | 27  | ± | 5                      |
| 1,2,3,7,8 - P <sub>5</sub> CDD (D54)      | 92  | ± | 12                     |
| 1,2,3,4,7,8 - H <sub>6</sub> CDD (D66)    | 74  | ± | 12                     |
| 1,2,3,6,7,8 - H <sub>6</sub> CDD (D67)    | 103                                       | ± | 13                     |
| 1,2,3,7,8,9 - H <sub>6</sub> CDD (D70)    | 108                                       | ± | 16                     |
| 1,2,3,4,6,7,8 - H <sub>7</sub> CDD (D73)  | 0.87 x 10 <sup>3</sup>                    | ± | 0.13 x 10 <sup>3</sup> |
| O <sub>8</sub> CDD (D75)                  | 1.75 x 10 <sup>3</sup>                    | ± | 0.20 x 10 <sup>3</sup> |
| 2,3,7,8 - T <sub>4</sub> CDF (F83)        | 86  | ± | 28                     |
| 1,2,3,7,8 - P <sub>5</sub> CDF (F94)      | 176                                       | ± | 26                     |
| 2,3,4,7,8 - P <sub>5</sub> CDF (F114)     | 125                                       | ± | 20                     |
| 1,2,3,4,7,8 - H <sub>6</sub> CDF (F118)   | 203                                       | ± | 21                     |
| 1,2,3,6,7,8 - H <sub>6</sub> CDF (F121)   | 204                                       | ± | 23                     |
| 1,2,3,7,8,9 - H <sub>6</sub> CDF (F124)   | 13.3                                      | ± | 2.0                    |
| 2,3,4,6,7,8 - H <sub>6</sub> CDF (F130)   | 130                                       | ± | 15                     |
| 1,2,3,4,6,7,8 - H <sub>7</sub> CDF (F131) | 0.75 x 10 <sup>3</sup>                    | ± | 0.09 x 10 <sup>3</sup> |
| 1,2,3,4,7,8,9 - H <sub>7</sub> CDF (F134) | 61  | ± | 6                      |
| O <sub>8</sub> CDF (F135)                 | 0.29 x 10 <sup>3</sup>                    | ± | 0.04 x 10 <sup>3</sup> |

Availability: BCR-615 consists of approximately 50 g of dried fly ash in amber glass bottles.

| Substance            | BCR-683<br>Beech wood<br>(mg/kg) |   |      |
|----------------------|----------------------------------|---|------|
| Benz[a]anthracene    | 6.5                              | ± | 0.7  |
| Benzo[a]pyrene       | 3.4                              | ± | 0.4  |
| Benzo[e]pyrene       | 9.3                              | ± | 1.0  |
| Benzo[b]fluoranthene | 5.8                              | ± | 0.6  |
| Benzo[k]fluoranthene | 2.58                             | ± | 0.29 |
| Pentachlorophenol    | 3.6                              | ± | 0.5  |

Availability: Glass bottle containing about 60 g of powder.

| Polychlorinated biphenyls<br>(IUPAC No.) | BCR-682<br>Mussel tissue<br>(µg/kg) |   |      | BCR-718<br>Canned fresh herring<br>(µg/kg) |   |       |
|--|-------------------------------------|---|------|--|---|-------|
| 28                                       | 0.30                                | ± | 0.07 | 0.41                                       | ± | 0.04  |
| 52                                       | 0.78                                | ± | 0.09 | 1.00                                       | ± | 0.04  |
| 101                                      |                                     |   |      | 2.12                                       | ± | 0.06  |
| 105                                      |                                     |   |      | 0.63                                       | ± | 0.06  |
| 118                                      | 2.6                                 | ± | 0.3  | 1.78                                       | ± | 0.07  |
| 128                                      |                                     |   |      | 0.62                                       | ± | 0.101 |
| 138                                      | 4.6                                 | ± | 0.8  | 2.97                                       | ± | 0.11  |
| 149                                      | 5.7                                 | ± | 0.9  | 2.58                                       | ± | 0.11  |
| 153                                      | 9.2                                 | ± | 0.8  | 4.62                                       | ± | 0.10  |
| 170                                      | 0.17                                | ± | 0.05 | 0.350                                      | ± | 0.026 |
| 180                                      | 0.77                                | ± | 0.07 | 0.795                                      | ± | 0.027 |

Availability: BCR-682 and BCR-718 are provided in sealed tin cans containing approximately 70 g fresh mussel tissue.

| Polychlorinated biphenyls<br>(IUPAC No.) | BCR-420<br>Waste mineral oil (low level)<br>(mg/kg) |   |       | BCR-449<br>Waste mineral oil (high level)<br>(mg/kg) |   |      |
|--|---|---|-------|--|---|------|
| 28                                       | 0.61  | ± | 0.06  | 0.80   | ± | 0.07 |
| 52                                       |   |   |       | 31.4   | ± | 1.8  |
| 101                                      | 1.45  | ± | 0.18  | 57.2   | ± | 1.9  |
| 105                                      |   |   |       | 17.4   | ± | 1.0  |
| 118                                      | 1.69  | ± | 0.14  | 46.6   | ± | 2.4  |
| 128                                      |   |   |       | 12.5   | ± | 0.7  |
| 153                                      | 0.92  | ± | 0.06  | 39.0   | ± | 1.7  |
| 156                                      |   |   |       | 6.9  | ± | 0.5  |
| 170                                      |   |   |       | 6.6  | ± | 0.6  |
| 180                                      | 0.195   | ± | 0.017 | 10.4   | ± | 0.4  |

Availability: BCR-420 is provided in units of about 7.5 g in glass ampoules and BCR-449 in units of about 50 g in glass ampoules.

| Substance                                 | IRMM-427<br>Fish tissue (Pike-Perch)<br>(ng/g) |   |      |
|---|--|---|------|
| Linear perfluorooctane sulfonate (L-PFOS) | 16.0   | ± | 1.7  |
| Perfluorodecanoic acid (PFDA)             | 1.28   | ± | 0.17 |
| Perfluoroundecanoic acid (PFUnDA)         | 0.74   | ± | 0.20 |
| Perfluorododecanoic acid (PFDoDA)         | 0.97   | ± | 0.21 |

Availability: Glass jars containing 35 g of fish paste.

| Substance                                 | IRMM-428<br>Water<br>(ng/L) |   |     |
|---|-----------------------------|---|-----|
| Perfluorobutane sulfonate (PFBS)          | 5.5                         | ± | 1.4 |
| Perfluorohexane sulfonate (PFHxS)         | 3.6                         | ± | 1.0 |
| Linear perfluorooctane sulfonate (L-PFOS) | 9.6                         | ± | 1.7 |
| Perfluoropentanoic acid (PFPeA)           | 4.0                         | ± | 1.0 |
| Perfluorohexanoic acid (PFHxA)            | 7.4                         | ± | 1.0 |
| Perfluoroheptanoic acid (PFHpA)           | 3.7                         | ± | 0.7 |

Availability: High density polyethylene bottles containing 410 mL of water.

| Substance              | ERM-CA100<br>Surface water |   |      |      |
|------------------------|----------------------------|---|------|------|
| Naphthalene            | 1.21                       | ± | 0.13 | µg/L |
| Anthracene             | 91                         | ± | 11   | ng/L |
| Fluoranthene           | 104                        | ± | 11   | ng/L |
| Benzo[b]fluoranthene   | 32                         | ± | 9    | ng/L |
| Benzo[k]fluoranthene   | 38                         | ± | 9    | ng/L |
| Benzo[a]pyrene         | 42                         | ± | 8    | ng/L |
| Indeno[1,2,3-cd]pyrene | 29                         | ± | 7    | ng/L |

Availability: The CRM is available as unit kit that includes a plastic container with at least 1000 mL of surface water, an amber glass ampoule with at least 24 mL humic acids solution in water and an amber glass ampoule with at least 2 mL PAH solution in acetonitrile.

| Substance           | ERM-CE100<br>Fish tissue<br>(µg/kg) |   |   |
|---------------------|-------------------------------------|---|---|
| Hexachlorobenzene   | 120                                 | ± | 8 |
| Hexachlorobutadiene | 36                                  | ± | 4 |

Availability: The CRM is available in glass jars with twist-off lids containing approximately 40g of fish paste.

| Substance  | ERM-CE102<br>Fish tissue (PBDEs in fish tissue)<br>(µg/kg) |   |          |
|--|--|---|----------|
| BDE-28 (2,4,4'-tribromodiphenyl ether)             | (0.0077)   | ± | (0.0010) |
| BDE-47 (2,2',4,4'-tetrabromodiphenyl ether)        | 0.227  | ± | 0.019    |
| BDE-49 (2,2',4,5'-tetrabromodiphenyl ether)        | 0.033  | ± | 0.007    |
| BDE-99 (2,2',4,4',5-pentabromodiphenyl ether)      | 0.123  | ± | 0.013    |
| BDE-100 (2,2',4,4',6-pentabromodiphenyl ether)     | 0.060  | ± | 0.006    |
| BDE-153 (2,2',4,4',5,5'-hexabromodiphenyl ether)   | 0.069  | ± | 0.008    |
| BDE-154 (2,2',4,4',5,6'-hexabromodiphenyl ether)   | 0.109  | ± | 0.008    |
| BDE-183 (2,2',3,4,4',5,6-heptabromodiphenyl ether) | (0.014)  | ± | (0.004)  |
| Extractable fat                                    | (69 %)   |   |          |

Values in brackets are not certified.

Availability: The CRM is available in glass jars with twist-off lids containing approximately 40g of fish paste and packed in plastic aluminium sachets.

| Substance  | ERM-CC537a<br>Freshwater sediment |   |      |       |
|--|-----------------------------------|---|------|-------|
| BDE-28 (2,4,4'-tribromodiphenyl ether)             | 0.28                              | ± | 0.05 | µg/kg |
| BDE-47 (2,2',4,4'-tetrabromodiphenyl ether)        | 16.5                              | ± | 1.8  | µg/kg |
| BDE-99 (2,2',4,4',5-pentabromodiphenyl ether)      | 34                                | ± | 4    | µg/kg |
| BDE-100 (2,2',4,4',6-pentabromodiphenyl ether)     | 5.8                               | ± | 0.6  | µg/kg |
| BDE-153 (2,2',4,4',5,5'-hexabromodiphenyl ether)   | 6.6                               | ± | 0.9  | µg/kg |
| BDE-154 (2,2',4,4',5,6'-hexabromodiphenyl ether)   | 3.5                               | ± | 0.5  | µg/kg |
| BDE-183 (2,2',3,4,4',5,6-heptabromodiphenyl ether) | 1.41                              | ± | 0.21 | µg/kg |
| BDE-209 (decabromodiphenyl ether)                  | 7.8                               | ± | 0.7  | mg/kg |
| α-HBCD (1,2,5,6,9,10-hexabromocyclododecane)       | 8.3                               | ± | 1.6  | µg/kg |
| β-HBCD (1,2,5,6,9,10-hexabromocyclododecane)       | 2.3                               | ± | 0.5  | µg/kg |
| γ-HBCD (1,2,5,6,9,10-hexabromocyclododecane)       | 60                                | ± | 16   | µg/kg |

Availability: The CRM is available in amber glass bottles (sealed with a shrink film on the cap) containing about 40g of sediment.

## 2 MATERIALS RELATED TO THE ANALYSIS OF FOOD AND FEEDING STUFF

### 2.1 PURE MATERIALS AND SYNTHETIC MIXTURES

| BCR-123<br>Ethanol  |                           |                           |                           |                           |                           |                           |
|---------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Parameter           | Ethanol H                 |                           | Ethanol M                 |                           | Ethanol L                 |                           |
| (D/H) <sub>I</sub>  | 109.65 × 10 <sup>-6</sup> | ± 0.20 × 10 <sup>-6</sup> | 101.69 × 10 <sup>-6</sup> | ± 0.17 × 10 <sup>-6</sup> | 90.30 × 10 <sup>-6</sup>  | ± 0.18 × 10 <sup>-6</sup> |
| (D/H) <sub>II</sub> | 119.76 × 10 <sup>-6</sup> | ± 0.25 × 10 <sup>-6</sup> | 130.94 × 10 <sup>-6</sup> | ± 0.21 × 10 <sup>-6</sup> | 122.20 × 10 <sup>-6</sup> | ± 0.4 × 10 <sup>-6</sup>  |
| R                   | 2.184                     | ± 0.005                   | 2.575                     | ± 0.006                   | 2.708                     | ± 0.009                   |

Availability: Units of 3 sealed NMR tubes containing respectively H-, M-, and L-ethanols, to which the tetramethylurea internal standard and the C<sub>6</sub>F<sub>6</sub> lock substance are added. 10 mm (BCR-123A) or 15 mm (BCR-123B) O.D. NRM tubes can be supplied.

| Parameter                                 | Unit  | BCR-656<br>(96% ethanol) |         |
|---|-------|--------------------------|---------|
| (D/H) <sub>I</sub> by <sup>2</sup> H-NMR  | ppm   | 102.84                   | ± 0.20  |
| (D/H) <sub>II</sub> by <sup>2</sup> H-NMR | ppm   | 132.07                   | ± 0.30  |
| R by <sup>2</sup> H-NMR                   |       | 2.570                    | ± 0.005 |
| δ <sup>13</sup> C <sub>VPDB</sub> by IRMS | ‰     | -26.91                   | ± 0.07  |
| Alcoholic grade t <sub>D</sub>            | w/w % | (94)                     |         |

Value in brackets is not certified.

Availability: BCR-656: Units of 25 mL of 96 % vol. neutral ethanol from wine in glass bottle.

| Parameter                                 | Unit  | BCR-657<br>(Sugar) | BCR-660<br>(Ethanol in water) |
|---|-------|--------------------|-------------------------------|
| (D/H) <sub>I</sub> by <sup>2</sup> H-NMR  | ppm   |                    | 102.90 ± 0.16                 |
| (D/H) <sub>II</sub> by <sup>2</sup> H-NMR | ppm   |                    | 131.95 ± 0.23                 |
| R by <sup>2</sup> H-NMR                   |       |                    | 2.567 ± 0.005                 |
| δ <sup>13</sup> C <sub>VPDB</sub> by IRMS | ‰     | -10.76 ± 0.04      | -26.72 ± 0.09                 |
| (D/H) <sub>w</sub> of water (IRMS)        | ppm   |                    | 148.68 ± 0.14                 |
| Alcoholic grade t <sub>D</sub>            | w/w % |                    | 11.96 ± 0.06 <sup>1)</sup>    |

1) in v/v %

Availability: BCR-657: Units of approx. 1 g of dry glucose in a sealed amber vial;

BCR-660: Units of 370 mL of aqueous ethanol solution in glass bottle.

#### Tetramethylurea (STA-003m)

Tetramethylurea (TMU) which is used as Internal Standard in routine SNIF-NMR analysis is available in 500 mL quantities. The D/H nominal value of tetramethylurea batches is determined by multiple calibration at 61.45/400 MHz, 61.4/400 MHz and 45.05/400 MHz for deuterium and given in an accompanying analytical report.

| Substance                | BCR-423 (RM)<br>Aflatoxin M <sub>1</sub> in chloroform<br>(µg/mL) |
|--------------------------|---|
| Aflatoxin M <sub>1</sub> | (9.93)  |

Value in brackets is not certified.

Availability: Sealed ampoules containing about 2.5 mL.

| Compound      | ERM-AC626<br>Arsenobetaine in water     |
|---------------|---|
| Arsenobetaine | Mass fraction<br>(mg/kg)<br>250.0 ± 2.5 |

Availability: ERM-AC626 is available in ampoules containing 1 mL.



|                |  |   |     |
|----------------|--|---|-----|
| Compound       | <b>BCR-663</b><br>Saxitoxin in acetic acid |   |     |
|                | <u>Mass fraction</u><br>(mg/kg)            |   |     |
| Saxitoxin-2HCl | 9.8  | ± | 1.2 |

Availability: BCR-663 is available in ampoules containing 1 mL.

|           |   |   |      |
|-----------|---|---|------|
| Substance | <b>ERM-AC699</b><br>Zearalenone in acetonitrile |   |      |
|           | <u>Mass concentration</u><br>(µg/mL)            |   |      |
| ZON       | 9.95  | ± | 0.30 |

Availability: ERM-AC699 is supplied in ampoules filled and sealed under nitrogen in amounts of 4 mL.

|              |  |        |  |
|--------------|--|--------|--|
| Substance    | <b>ERM-AC057</b><br>Aflatoxin B1 in acetonitrile |        |  |
|              | <u>Mass fraction</u> (µg/g)                      |        | <u>Mass concentration at 20 °C</u> (µg/mL) |
| Aflatoxin B1 | 3.79   | ± 0.11 | (2.97 ± 0.09)                              |

Values in brackets are not certified.

Availability: ERM-AC057 is supplied in amber glass ampoules filled with 4 mL.

|              |  |        |  |
|--------------|--|--------|--|
| Substance    | <b>ERM-AC058</b><br>Aflatoxin B2 in acetonitrile |        |  |
|              | <u>Mass fraction</u> (µg/g)                      |        | <u>Mass concentration at 20 °C</u> (µg/mL) |
| Aflatoxin B2 | 3.80   | ± 0.08 | (2.98 ± 0.06)                              |

Values in brackets are not certified.

Availability: ERM-AC058 is supplied in amber glass ampoules filled with 4 mL.

|              |  |        |  |
|--------------|--|--------|--|
| Substance    | <b>ERM-AC059</b><br>Aflatoxin G1 in acetonitrile |        |  |
|              | <u>Mass fraction</u> (µg/g)                      |        | <u>Mass concentration at 20 °C</u> (µg/mL) |
| Aflatoxin G1 | 3.78   | ± 0.13 | (2.96 ± 0.10)                              |

Values in brackets are not certified.

Availability: ERM-AC059 is supplied in amber glass ampoules filled with 4 mL.

|              |  |        |  |
|--------------|--|--------|--|
| Substance    | <b>ERM-AC060</b><br>Aflatoxin G2 in acetonitrile |        |  |
|              | <u>Mass fraction</u> (µg/g)                      |        | <u>Mass concentration at 20 °C</u> (µg/mL) |
| Aflatoxin G2 | 3.80   | ± 0.07 | (2.98 ± 0.06)                              |

Values in brackets are not certified.

Availability: ERM-AC060 is supplied in amber glass ampoules filled with 4 mL.

| Substance        | IRMM-315<br>4-Deoxynivalenol in acetonitrile |                            |
|------------------|--|----------------------------|
|                  | Mass fraction (µg/g)                         | Mass concentration (µg/mL) |
| 4-Deoxynivalenol | 25.1 ± 1.2                                   | (19.7 ± 0.9)               |

Values in brackets are not certified.

Availability: IRMM-315 is supplied in amber glass ampoules filled with 4 mL.

| Substance | IRMM-316<br>Nivalenol in acetonitrile |                            |
|-----------|---------------------------------------|----------------------------|
|           | Mass fraction (µg/g)                  | Mass concentration (µg/mL) |
| Nivalenol | 24.0 ± 1.1                            | (18.8 ± 0.9)               |

Values in brackets are not certified.

Availability: IRMM-316 is supplied in amber glass ampoules filled with 4 mL.

## 2.2 MATRIX MATERIALS

### 2.2.1 CERTIFIED FOR GMO CONTENT

The materials were prepared by quantitative mixing of non-genetically modified powder and genetically modified powder, produced from ground seed with the help of a dry-mixing technique, and are intended for the calibration of methods for the detection of genetically modified food.

#### CRMs for genetically modified GTS 40-3-2 soya beans (ERM-BF410p)

Five CRMs of dried soya bean powder with different mass fractions of genetically modified (GTS 40-3-2) soya beans were produced.

|             | Certified value<br>GTS 40-3-2 mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|-------------|---|-----------------------|
| ERM-BF410ap | < 0.09  | -                     |
| ERM-BF410bp | > 985   | -                     |
| ERM-BF410cp | 1.00  | 0.10                  |
| ERM-BF410dp | 10.0  | 0.6                   |
| ERM-BF410ep | 100   | 5                     |

Availability: Vials containing about 1 g of soya bean powder.

#### CRMs for genetically modified Bt-176 maize (ERM-BF411)

Six CRMs of dried maize powder with different mass fractions of genetically modified (Bt-176) maize were produced.

|            | Certified value<br>Bt-176 mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|---|-----------------------|
| ERM-BF411a | < 0.14  | -                     |
| ERM-BF411b | 1.00  | 0.29                  |
| ERM-BF411c | 5.0   | 0.6                   |
| ERM-BF411d | 10.0  | 0.8                   |
| ERM-BF411e | 20.0  | 1.1                   |
| ERM-BF411f | 50.0  | 1.8                   |

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified Bt-11 maize (ERM-BF412k)

Five CRMs of dried maize powder with different mass fractions of genetically modified (Bt-11) maize were produced.

|             | Certified value<br>Bt-11 mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|-------------|--|-----------------------|
| ERM-BF412ak | < 0.12   | -                     |
| ERM-BF412bk | > 970  | -                     |
| ERM-BF412ck | 0.99   | 0.13                  |
| ERM-BF412dk | 9.9  | 0.7                   |
| ERM-BF412ek | 99   | 4                     |

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified MON 810 maize (ERM-BF413k)

Four CRMs of dried maize powder with different mass fractions of genetically modified (MON 810) maize were produced.

|               | Certified value<br>MON 810 mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|---------------|--|-----------------------|
| ERM-BF413ak   | < 0.9  | -                     |
| ERM-BF413ck   | 4.9  | 1.0                   |
| ERM-BF413ek * | 19.8   | 1.5                   |
| ERM-BF413gk   | 99   | 5                     |

Availability: Vials containing about 1 g of maize powder.

\* ERM-BF413ek is also certified for the DNA copy number ratio.

|             | Certified value<br>MON 810 DNA copy number ratio<br>(%) | Uncertainty<br>(%) |
|-------------|---|--------------------|
| ERM-BF413ek | 0.77  | 0.08               |

|   | <b>ERM-AD413</b><br>DNA fragments per plasmid |                          |
|---|---|--------------------------|
|   | <u>Number</u>                                 |                          |
| Fragment of <i>5' plant-P35S</i> junction DNA/plasmid   | 1   | (negligible uncertainty) |
| Fragment of <i>hmg</i> DNA/plasmid  | 1   | (negligible uncertainty) |
|   | <u>Number ratio</u>                           |                          |
| Ratio between the number of <i>5' plant-P35S</i> junction and <i>hmg</i> fragments in the plasmid by duplex rt-PCR <sup>(1)</sup> and simplex rt-PCR <sup>(2)</sup> | (1.00 <sup>1</sup>                            | ± 0.06)                  |
|   | (1.04 <sup>2</sup>                            | ± 0.06)                  |

Values in brackets are not certified. Availability: ERM-AD413 is available in vials.

### CRMs for genetically modified GA21 maize (ERM-BF414)

Six CRMs of dried maize powder with different mass fractions of genetically modified (GA21) maize were produced.

|            | Certified value<br>GA21 mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|---|-----------------------|
| ERM-BF414a | < 0.8   | -                     |
| ERM-BF414b | 1.0   | 0.8                   |
| ERM-BF414c | 4.9   | 1.0                   |
| ERM-BF414d | 9.9   | 1.1                   |
| ERM-BF414e | 17.2  | 1.2                   |
| ERM-BF414f | 42.9  | 1.7                   |

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified NK603 maize (ERM-BF415)

Six CRMs of dried maize powder with different mass fractions of genetically modified (NK603) maize were produced.

|              | Certified value<br>NK603 mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|--------------|--|-----------------------|
| ERM-BF415a   | < 0.4  | -                     |
| ERM-BF415b   | 1.0  | 0.4                   |
| ERM-BF415c   | 4.9  | 0.5                   |
| ERM-BF415d   | 9.8  | 0.7                   |
| ERM-BF415e * | 19.6   | 0.9                   |
| ERM-BF415f   | 49.1   | 1.3                   |

Availability: Vials containing about 1 g of maize powder.

\* ERM-BF415e is also certified for the DNA copy number ratio.

|            | Certified value<br>NK603 maize DNA copy number ratio<br>(%) | Uncertainty<br>(%) |
|------------|---|--------------------|
| ERM-BF415e | 0.95  | 0.11               |

|  | <b>ERM-AD415</b><br>DNA fragments per plasmid |                          |
|--|---|--------------------------|
|  | <u>Number</u>                                 |                          |
| Fragment of 3' insertion-specific DNA / pIRMM-0086 | 1   | (negligible uncertainty) |
| Fragment of <i>hmg</i> DNA / pIRMM-0086            | 1   | (negligible uncertainty) |

Availability: ERM-AD415 is available in vials.

### CRMs for genetically modified MON 863 maize (ERM-BF416)

Four CRMs of dried maize powder with different mass fractions of genetically modified (MON 863) maize were produced.

|            | Certified value<br>MON 863 mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|--|-----------------------|
| ERM-BF416a | < 1.0  | -                     |
| ERM-BF416b | 1.0  | - 0.3 ; + 1.0         |
| ERM-BF416c | 9.8  | - 0.7 ; + 1.2         |
| ERM-BF416d | 98.5   | - 2.2 ; + 2.5         |

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified MON 863 x MON 810 maize (ERM-BF417)

Four CRMs of dried maize powder with different mass fractions of genetically modified (MON 863 x MON 810) maize were produced.

|            | Certified value<br>MON 863 x MON 810 mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|--|-----------------------|
| ERM-BF417a | < 1.0  | -                     |
| ERM-BF417b | 1.0  | - 0.2 ; + 1.0         |
| ERM-BF417c | 9.8  | - 0.7 ; + 1.2         |
| ERM-BF417d | 98.5   | - 2.0 ; + 2.4         |

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified 1507 maize (ERM-BF418)

Four CRMs of dried maize powder with different mass fractions of genetically modified (1507) maize were produced.

|            | Certified value<br>1507 maize mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|---|-----------------------|
| ERM-BF418a | < 0.5   | -                     |
| ERM-BF418b | 1.0   | - 0.2 ; + 0.6         |
| ERM-BF418c | 9.9   | - 0.6 ; + 0.8         |
| ERM-BF418d | 98.6  | - 1.7 ; + 2.0         |

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified H7-1 sugar beet (ERM-BF419)

Two CRMs of dried sugar beet powder with different mass fractions of genetically modified (H7-1) sugar beet were produced.

|            | Certified value<br>H7-1 sugar beet mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|--|-----------------------|
| ERM-BF419a | 0  | 0                     |
| ERM-BF419b | 1000   | 0                     |

Availability: Vials containing about 1 g of sugar beet powder.

### CRMs for genetically modified 3272 maize (ERM-BF420)

Three CRMs of dried maize powder with different mass fractions of genetically modified (3272) maize were produced.

|            | Certified value<br>3272 maize mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|---|-----------------------|
| ERM-BF420a | < 1.3   | -                     |
| ERM-BF420b | 9.8   | 1.2                   |
| ERM-BF420c | 98  | 8                     |

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified EH92-527-1 potato (ERM-BF421)

Two CRMs of dried potato powder with different mass fractions of genetically modified (EH92-527-1) potato were produced.

|            | Certified value<br>Number fraction of<br>EH92-527-1 potato / total<br>number of potatoes [%] | Certified property<br>Identity         | Uncertainty    |
|------------|--|--|----------------|
| ERM-BF421a | 0  | potato without the EH92-527-1<br>event | Not applicable |
| ERM-BF421b | 100  | EH92-527-1 potato                      |                |

Availability: ERM-BF421a: vials containing about 1 g of potato powder, ERM-BF421b: vials containing about 0.5 g of potato powder.

### CRMs for genetically modified 281-24-236 x 3006-210-23 cotton seed (ERM-BF422)

Four CRMs of dried cotton seed powder with different mass fractions of genetically modified (281-24-236 x 3006-210-23) cotton seed were produced.

|            | Certified value<br>281-24-236 x 3006-210-23 cotton seed mass<br>fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|--|-----------------------|
| ERM-BF422a | < 0.5  | -                     |
| ERM-BF422b | > 979  | -                     |
| ERM-BF422c | 10.0   | 1.7                   |
| ERM-BF422d | 100  | 16                    |

Availability: Vials containing about 1 g of cotton seed powder.

### CRMs for genetically modified MIR604 maize (ERM-BF423)

Four CRMs of dried maize powder with different mass fractions of genetically modified (MIR604) maize were produced.

|            | Certified value<br>MIR604 maize mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|---|-----------------------|
| ERM-BF423a | < 0.9   | -                     |
| ERM-BF423b | 1.0   | - 0.3 ; + 1.0         |
| ERM-BF423c | 9.8   | - 0.9 ; + 1.3         |
| ERM-BF423d | 98.5  | - 2.6 ; + 2.9         |

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified 59122 maize (ERM-BF424)

Four CRMs of dried maize powder with different mass fractions of genetically modified (59122) maize were produced.

|            | Certified value<br>59122 maize mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|--|-----------------------|
| ERM-BF424a | < 1.2  | -                     |
| ERM-BF424b | 1.0  | - 0.2 ; + 1.2         |
| ERM-BF424c | 9.9  | - 0.8 ; + 1.4         |
| ERM-BF424d | 98.7   | - 5.8 ; + 5.9         |

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified 356043 soya seed (ERM-BF425)

Four CRMs of dried soya seed powder with different mass fractions of genetically modified soya seed were produced.

|              | Certified value<br>356043 soya seed mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|--------------|---|-----------------------|
| ERM-BF425a   | < 0.5   | -                     |
| ERM-BF425b   | 1.0   | 0.4                   |
| ERM-BF425c * | 10.0  | 1.1                   |
| ERM-BF425d   | 100   | 9                     |

Availability: Vials containing about 1 g of soya seed powder.

\* ERM-BF425c is also certified for the DNA copy number ratio.

|            | Certified value<br>356043 soya DNA copy number ratio<br>(%) | Uncertainty<br>(%) |
|------------|---|--------------------|
| ERM-BF425c | 0.85  | 0.11               |

| Substance  | ERM-AD425<br>DNA fragments per plasmid |                          |
|--|--|--------------------------|
|  | Number                                 |                          |
| Fragment of 5' insert-to-plant junction DNA / pIRMM-0073 | 1                                      | (negligible uncertainty) |
| Fragment of <i>le1</i> DNA / pIRMM-0073                  | 1                                      | (negligible uncertainty) |

Availability: ERM-AD425 is available in vials.

### CRMs for genetically modified 305423 soya seed (ERM-BF426)

Four CRMs of dried soya seed powder with different mass fractions of genetically modified soya seed were produced.

|            | Certified value<br>305423 soya seed mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|---|-----------------------|
| ERM-BF426a | < 0.8   | -                     |
| ERM-BF426b | 5.0   | 0.8                   |
| ERM-BF426c | 10.0  | 1.0                   |
| ERM-BF426d | 100   | 7                     |

Availability: Vials containing about 1 g of soya seed powder.

### CRMs for genetically modified 98140 maize (ERM-BF427)

Four CRMs of dried maize seed powder with different mass fractions of genetically modified (98140) maize were produced.

|              | Certified value<br>98140 maize seed mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|--------------|---|-----------------------|
| ERM-BF427a   | < 0.4   | -                     |
| ERM-BF427b   | 5.0   | 0.6                   |
| ERM-BF427c * | 20.0  | 0.8                   |
| ERM-BF427d   | 100   | 4                     |

Availability: Vials containing about 1 g of maize seed powder.

\* ERM-BF427c is also certified for the DNA copy number ratio.

|            | Certified value<br>98140 maize DNA copy number ratio<br>(%) | Uncertainty<br>(%) |
|------------|---|--------------------|
| ERM-BF427c | 1.75  | 0.13               |

|  | <b>ERM-AD427</b><br>DNA fragments per plasmid |                          |
|--|---|--------------------------|
|  | <u>Number</u>                                 |                          |
| Fragment of 5' insert-to-plant junction DNA / pIRMM-0090 | 1   | (negligible uncertainty) |
| Fragment of <i>hmg</i> DNA / pIRMM-0090                  | 1   | (negligible uncertainty) |

Availability: ERM-AD427 is available in vials.

### CRMs for genetically modified GHB119 cotton (ERM-BF428)

Three CRMs of dried cotton seed powder with different mass fractions of genetically modified (GHB119) cotton were produced.

|            | Certified value<br>GHB119 cotton seed mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|---|-----------------------|
| ERM-BF428a | < 0.2   | -                     |
| ERM-BF428b | 10  | 4                     |
| ERM-BF428c | 100   | 11                    |

Availability: Vials containing about 1 g of cotton seed powder.

### CRMs for genetically modified T304-40 cotton (ERM-BF429)

Three CRMs of dried cotton seed powder with different mass fractions of genetically modified (T304-40) cotton were produced.

|            | Certified value<br>T304-40 cotton seed mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|--|-----------------------|
| ERM-BF429a | < 0.4  | -                     |
| ERM-BF429b | 10   | 1.3                   |
| ERM-BF429c | 100  | 11                    |

Availability: Vials containing about 1 g of cotton seed powder.

### CRMs for genetically modified AM04-1020 potato (ERM-BF430)

Two CRMs for the detection of genetically modified AM04-1020 potato were produced.

|            | Certified value<br>AM04-1020 potato mass fraction (g/kg) |
|------------|--|
| ERM-BF430a | 0  |

  

|            | Certified identity           |
|------------|------------------------------|
| ERM-BF430b | Positive for event AM04-1020 |

Availability: Vials containing about 1 g of potato powder.



### CRMs for genetically modified AV43-6-G7 potato (ERM-BF431)

Two CRMs for the detection of genetically modified AV43-6-G7 potato were produced.

|            | Certified value<br>AV43-6-G7 potato mass fraction (g/kg) |
|------------|--|
| ERM-BF431a | 0  |

  

|            | Certified identity           |
|------------|------------------------------|
| ERM-BF431b | Positive for event AV43-6-G7 |

Availability: Vials containing about 1 g of potato powder.

### CRMs for genetically modified DAS-68416-4 soya seed (ERM-BF432)

Four CRMs of dried soya seed powder with different mass fractions of genetically modified soya seed DAS-68416-4 were produced.

|            | Certified value<br>DAS-68416-4 soya seed mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|--|-----------------------|
| ERM-BF432a | < 0.3  | -                     |
| ERM-BF432b | 5.0  | 0.6                   |
| ERM-BF432c | 10.0   | 1.7                   |
| ERM-BF432d | 100  | 13                    |

Availability: Vials containing about 1 g of soya seed powder.

### CRMs for genetically modified DAS-40278-9 maize (ERM-BF433)

Four CRMs of dried maize powder with different mass fractions of genetically modified DAS-40278-9 maize were produced.

|            | Certified value<br>DAS-40278-9 maize mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|--|-----------------------|
| ERM-BF433a | < 0.3  | -                     |
| ERM-BF433b | 5.0  | 0.6                   |
| ERM-BF433c | 10.0   | 0.9                   |
| ERM-BF433d | 100  | 8                     |

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified 73496 rapeseed (ERM-BF434)

Five CRMs of dried rapeseed powder with different mass fractions of genetically modified rapeseed 73496 were produced.

|            | Certified value<br>73496 rapeseed mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|---|-----------------------|
| ERM-BF434a | < 0.04  | -                     |
| ERM-BF434b | >988  | -                     |
| ERM-BF434c | 1.00  | 0.15                  |
| ERM-BF434d | 10.0  | 1.4                   |
| ERM-BF434e | 100   | 12                    |

Availability: Vials containing about 1 g of rapeseed powder.

### CRMs for genetically modified PH05-026-0048 potato (ERM-BF435)

Two CRMs for the detection of genetically modified PH05-026-0048 potato were produced.

|            | Certified value<br>PH05-026-0048 potato mass fraction (g/kg) |
|------------|--|
| ERM-BF435a | < 0.4  |

  

|            | Certified identity               |
|------------|----------------------------------|
| ERM-BF435b | Positive for event PH05-026-0048 |

Availability: Vials containing about 1 g of potato powder

### CRMs for genetically modified DAS-44406-6 soya seed (ERM-BF436)

Five CRMs of dried soya seed powder with different mass fractions of genetically modified soya seed DAS-44406-6 were produced.

|            | Certified value<br>DAS-44406-6 soya seed mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|--|-----------------------|
| ERM-BF436a | < 0.06   | -                     |
| ERM-BF436b | >986   | -                     |
| ERM-BF436c | 1.00   | 0.14                  |
| ERM-BF436d | 10.0   | 1.0                   |
| ERM-BF436e | 100  | 9                     |

Availability: Vials containing about 1 g of soya seed powder.

### CRMs for genetically modified DAS-81419-2 soya seed (ERM-BF437)

Five CRMs of dried soya seed powder with different mass fractions of genetically modified soya seed DAS-81419-2 were produced.

|            | Certified value<br>DAS-81419-2 soya seed mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|--|-----------------------|
| ERM-BF437a | < 0.07   | -                     |
| ERM-BF437b | >986   | -                     |
| ERM-BF437c | 0.99   | 0.12                  |
| ERM-BF437d | 9.9  | 1.5                   |
| ERM-BF437e | 100  | 9                     |

Availability: Vials containing about 1 g of soya seed powder.

### CRMs for genetically modified VCO-Ø1981-5 maize (ERM-BF438)

Five CRMs of dried maize powder with different mass fractions of genetically modified VCO-Ø1981-5 maize were produced.

|            | Certified value<br>VCO-Ø1981-5 maize mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|--|-----------------------|
| ERM-BF438a | < 0.06   | -                     |
| ERM-BF438b | >986   | -                     |
| ERM-BF438c | 1.00   | 0.13                  |
| ERM-BF438d | 10.0   | 0.8                   |
| ERM-BF438e | 100  | 5                     |

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified DP-ØØ4114-3 maize (ERM-BF439)

Five CRMs of dried maize powder with different mass fractions of genetically modified DP-ØØ4114-3 maize were produced.

|            | Certified value<br>DP-ØØ4114-3 maize mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|--|-----------------------|
| ERM-BF439a | < 0.06   | -                     |
| ERM-BF439b | >986   | -                     |
| ERM-BF439c | 1.00   | 0.13                  |
| ERM-BF439d | 10.0   | 0.8                   |
| ERM-BF439e | 100  | 5                     |

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified DAS-81910-7 cotton (ERM-BF440)

Five CRMs of dried cotton seed powder with different mass fractions of genetically modified (DAS-81910-7) cotton were produced.

|            | Certified value<br>DAS-81910-7 cotton seed mass fraction<br>(g/kg) | Uncertainty<br>(g/kg) |
|------------|--|-----------------------|
| ERM-BF440a | < 0.07   | -                     |
| ERM-BF440b | >986   | -                     |
| ERM-BF440c | 1.00   | 0.08                  |
| ERM-BF440d | 10.0   | 0.8                   |
| ERM-BF440e | 100  | 7                     |

Availability: Vials containing about 1 g of cotton seed powder.

## 2.2.2 CERTIFIED FOR NATURAL TOXINS AND XENOBIOTICS

| Substance              | BCR-459<br>Coconut oil<br>(µg/kg) |
|------------------------|-----------------------------------|
| Pyrene                 | < 0.9                             |
| Chrysene               | < 0.6                             |
| Benzo[k]fluoranthene   | < 0.2                             |
| Benzo[a]pyrene         | < 0.3                             |
| Benzo[ghi]perylene     | < 0.2                             |
| Indeno[1,2,3-cd]pyrene | < 0.2                             |

Availability: BCR-459 is provided in ampoules containing approximately 45 g.

| Polychlorinated biphenyls<br>(IUPAC No.) | <b>BCR-450</b><br>Natural milk powder<br>(µg/kg) | <b>ERM-BB444</b><br>Natural pork fat<br>(blank)<br>(µg/kg) | <b>ERM-BB445</b><br>Spiked pork fat<br>(very low level)<br>(µg/kg) | <b>ERM-BB446</b><br>Spiked pork fat<br>(low level)<br>(µg/kg) |
|--|--|--|--|---|
| 28                                       |  | < 2  | 14.8 ± 1.3   | 29.6 ± 2.1  |
| 52                                       | 1.16 ± 0.17                                      | < 2  | 12.9 ± 0.9   | 25.5 ± 1.8  |
| 101                                      |  | < 2  | 12.5 ± 1.2   | 30 ± 4  |
| 118                                      | 3.3 ± 0.4  | < 2  | 12.7 ± 1.3   | 30.2 ± 2.7  |
| 138                                      |  | < 2  | 14.6 ± 1.6   | 32 ± 4  |
| 153                                      | 19.0 ± 0.7                                       | < 2  | 13.1 ± 1.1   | 30.8 ± 2.4  |
| 156                                      | 1.62 ± 0.20                                      |  |  |   |
| 170                                      | 4.8 ± 0.6  |  |  |   |
| 180                                      | 11.0 ± 0.7                                       | < 2  | 12.6 ± 0.9   | 29.8 ± 2.5  |
| sum (28, 52, 101, 118, 138, 153, 180)    |  | < 14   | 93 ± 7   | 207 ± 11  |
| *PDBE 47                                 |  | (3.7)  | (3.9)  | (6.1)   |
| γ-HCH (lindane)                          |  | (5.7)  | (5.6)  | (4.6)   |

\* 2,2',4,4'-Tetrabromo-diphenylether. / Values in brackets are not certified.

Availability: BCR-450 in brown glass bottles of about 20 g. ERM-BB444 to 446 in glass ampoules of about 5 g.

| Polychlorinated biphenyls<br>(IUPAC No.) | <b>BCR-349</b><br>Cod liver oil<br>(µg/kg) | <b>ERM-BB350</b><br>Fish oil<br>(ng/g) |
|--|--|--|
| 28                                       | 68 ± 8                                     | 21.3 ± 1.1                             |
| 52                                       | 149 ± 21                                   | 37.4 ± 2.2                             |
| 74                                       |  | 23.0 ± 1.9                             |
| 95                                       |  | (38 ± 47)                              |
| 99                                       |  | 62 ± 6                                 |
| 101                                      | 372 ± 18                                   | 111 ± 5                                |
| 105                                      |  | 25.8 ± 2.1                             |
| 110                                      |  | 54.1 ± 2.8                             |
| 118                                      | 460 ± 40                                   | 84 ± 4                                 |
| 138                                      |  | 137 ± 10                               |
| 149                                      |  | 88 ± 9                                 |
| 153                                      | 940 ± 40                                   | 220 ± 11                               |
| 156                                      |  | 20.1 ± 1.3                             |
| 163                                      |  | (43 ± 73)                              |
| 167                                      |  | (17 ± 27)                              |
| 177                                      |  | 25.8 ± 2.0                             |
| 180                                      | 282 ± 23                                   | 67 ± 4                                 |
| 183                                      |  | 22.5 ± 1.8                             |
| 187                                      |  | 67 ± 5                                 |
| 194                                      |  | 23.4 ± 1.5                             |
| 196                                      |  | 41 ± 7                                 |

Values in brackets are not certified.

Availability: BCR-349 and ERM-BB350 are provided in sealed glass ampoules containing approximately 2 g fish oil.

| Substance      | <b>BCR-598</b><br>Cod liver oil<br>(µg/kg)        |
|----------------|---|
| HCB            | 55.7 ± 2.0  |
| α-HCH          | 42 ± 3  |
| β-HCH          | 16 ± 3  |
| γ-HCH          | 23 ± 4  |
| γ-Chlordane    | 6.9 ± 1.6   |
| α-Chlordane    | 24.4 ± 1.8  |
| Oxychlordane   | 11.0 ± 1.8  |
| Transnonachlor | 39 ± 4  |
| Dieldrin       | 59 ± 4  |
| p,p',-DDE      | 0.61 × 10 <sup>3</sup> ± 0.04 × 10 <sup>3</sup>   |
| o,p'-DDD       | 30 ± 4  |
| p,p'-DDD       | 0.40 × 10 <sup>3</sup> ± 0.03 × 10 <sup>3</sup>   |
| p,p'-DDT       | 0.179 × 10 <sup>3</sup> ± 0.018 × 10 <sup>3</sup> |

Availability: BCR-598 is provided in sealed glass ampoules containing approximately 5 g under dry argon.

| Substance | ERM-BB430<br>Pork fat<br>(mg/kg) |   |         |
|-----------|----------------------------------|---|---------|
| HCB       | 0.193                            | ± | 0.017   |
| α-HCH     | 0.25                             | ± | 0.04    |
| β-HCH     | 0.109                            | ± | 0.010   |
| γ-HCH     | (1.87)                           | ± | (0.31)  |
| β-HEPO    | 0.213                            | ± | 0.016   |
| Dieldrin  | (0.21)                           | ± | (0.05)  |
| Endrin    | (0.055)                          | ± | (0.016) |
| p,p',-DDT | 0.48                             | ± | 0.07    |
| p,p',-DDD | 0.222                            | ± | 0.022   |
| p,p',-DDE | 0.38                             | ± | 0.09    |

Values in brackets are not certified.

Availability: ERM-BB430 is provided in sealed amber glass ampoules containing approximately 5 g of material bottled under argon.

| Substance    | BCR-115<br>Animal feed<br>(mg/kg) |   |         |
|--------------|-----------------------------------|---|---------|
| HCB          | 0.019 4                           | ± | 0.001 4 |
| β-HCH        | 0.023 4                           | ± | 0.002 6 |
| γ-HCH        | 0.021 8                           | ± | 0.002 0 |
| Heptachlor   | 0.019 0                           | ± | 0.001 5 |
| γ-Chlordane  | 0.048                             | ± | 0.006   |
| α-Endosulfan | 0.046                             | ± | 0.004   |
| Dieldrin     | 0.018 1                           | ± | 0.002 3 |
| Endrin       | 0.046                             | ± | 0.006   |
| p,p'-DDE     | 0.047                             | ± | 0.004   |

Availability: BCR-115 is provided in sealed hard glass ampoules containing approximately 30 g under dry N<sub>2</sub>. The sample is a homogeneous animal feed obtained from commonly used ingredients and enriched with organochlorine pesticides.

| Substance | BCR-187<br>Milk powder<br>(µg/kg) |      |     | BCR-188<br>Milk powder (spiked)<br>(µg/kg) |      |     |
|-----------|-----------------------------------|------|-----|--|------|-----|
|           | HCB                               | 1.45 | ±   | 0.21                                       | 37.4 | ±   |
| β-HCH     |                                   |      |     | 12.0                                       | ±    | 1.2 |
| γ-HCH     | (> 3.6)                           |      |     | (> 25)                                     |      |     |
| β-HEPO    |                                   |      |     | 32.0                                       | ±    | 1.9 |
| p,p'-DDE  | 6.6                               | ±    | 0.6 | 51   | ±    | 4   |
| Dieldrin  |                                   |      |     | 36.1                                       | ±    | 2.5 |
| Endrin    |                                   |      |     | 6.2  | ±    | 0.9 |
| p,p'-DDT  |                                   |      |     | 69   | ±    | 5   |

Values in brackets are not certified.

Availability: The samples are provided in sealed hard glass ampoules containing about 20 g (under Argon).

| Substance                               | BCR-607<br>Natural spray dried milk powder<br>(ng/kg) |   |       |
|---|---|---|-------|
| 2,3,7,8 - T <sub>4</sub> CDD (D48)      | 0.25  | ± | 0.03  |
| 1,2,3,7,8 - P <sub>5</sub> CDD (D54)    | 0.79  | ± | 0.04  |
| 1,2,3,4,7,8 - H <sub>6</sub> CDD (D66)  | 0.42  | ± | 0.07  |
| 1,2,3,6,7,8 - H <sub>6</sub> CDD (D67)  | 0.98  | ± | 0.11  |
| 1,2,3,7,8,9 - H <sub>6</sub> CDD (D70)  | 0.34  | ± | 0.05  |
| 2,3,7,8 - T <sub>4</sub> CDF (F83)      | 0.05  | ± | 0.03  |
| 1,2,3,7,8 - P <sub>5</sub> CDF (F94)    | 0.054   | ± | 0.013 |
| 2,3,4,7,8 - P <sub>5</sub> CDF (F114)   | 1.81  | ± | 0.13  |
| 1,2,3,4,7,8 - H <sub>6</sub> CDF (F118) | 0.94  | ± | 0.04  |
| 1,2,3,6,7,8 - H <sub>6</sub> CDF (F121) | 1.01  | ± | 0.09  |
| 2,3,4,6,7,8 - H <sub>6</sub> CDF (F130) | 1.07  | ± | 0.05  |

Availability: Amber glass bottles containing approximately 100 g.

| Substance                   | <b>ERM-BC190</b><br>Rapeseed (colza) | <b>ERM-BC366</b><br>Rapeseed (colza) | <b>ERM-BC367</b><br>Rapeseed (colza) |  |
|-----------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--|
|                             | <u>Certified values</u>              |                                      | <u>Certified values</u>              |  |
| Total glucosinolate content | 23 ± 4 mmol/kg                       | 11.9 ± 1.3 mmol/kg                   | 99 ± 9 mmol/kg                       |  |
| Sulphur content             | 4.72 ± 0.22 g/kg                     | 3.31 ± 0.17 g/kg                     | 10.3 ± 0.5 g/kg                      |  |

Availability: 20 g whole seed in an aluminium plastic laminated sachet sealed under nitrogen.

| Substance                          | <b>BCR-262R</b><br>Defatted peanut meal (blank) | <b>BCR-263R</b><br>Defatted peanut meal (medium level) | <b>BCR-264</b><br>Defatted peanut meal (high level) | <b>BCR-375</b><br>Compound feed (very low level blank) | <b>ERM-BE375</b><br>Compound feed (very low level) | <b>ERM-BE376</b><br>Compound feed (high level) |
|------------------------------------|---|--|---|--|--|--|
|                                    | <u>Mass fraction</u> (µg/kg)                    |  | <u>Mass fraction</u> (µg/kg)                        |  | <u>Mass fraction</u> (µg/kg)                       |  |
| Aflatoxin B1                       | < 3   | 17.1 ± 2.4   | 206 ± 13  | < 1  | 2.6 ± 0.4  | 12.9 ± 1.8                                     |
| Aflatoxin B2                       |   | 3.0 ± 0.4  |   |  | 0.20 ± 0.04  | 0.68 ± 0.10                                    |
| Aflatoxin G1                       |   | 3.0 ± 0.5  |   |  | 0.40 ± 0.10  | 5.2 ± 0.8                                      |
| Aflatoxin G2                       |   | (0.62 ± 0.21)  |   |  | < 0.2  |  |
| Sum of aflatoxin B1, B2, G1 and G2 |   | (23.7 ± 2.5)   |   |  |  |  |

Values in brackets are not certified.

Availability: Sachets sealed under vacuum containing about 100 g (BCR-263R) and about 150 g (BCR-264) of finely ground defatted peanut meal.

BCR-262R is available in 280 mL amber glass bottles containing about 100 g of the peanut meal, additionally sealed in foil-laminate sachet.

BCR-375 is supplied in units of about 50 g of a finely ground compound feed, ERM-BE375 and ERM-BE376 consist of 2 bottles filled with about 75 g of compound feedingstuff each.

| Substance    | <b>BCR-401R</b><br>Peanut butter (very low level) | <b>BCR-385R</b><br>Peanut butter (low level) | <b>ERM-BD286</b><br>Paprika powder |  |
|--------------|---|--|------------------------------------|--|
|              | <u>Mass fraction</u> (µg/kg)                      |  | <u>Mass fraction</u> (µg/kg)       |  |
| Aflatoxin B1 | < 0.2   | 1.77 ± 0.30                                  | 3.72 ± 0.29                        |  |
| Aflatoxin B2 | < 0.2   | 0.48 ± 0.08                                  |                                    |  |
| Aflatoxin G1 | < 0.2   | 0.9 ± 0.4                                    | 2.4 ± 0.6                          |  |
| Aflatoxin G2 | < 0.2   | 0.30 ± 0.12                                  |                                    |  |
| Total        |   | 3.5 ± 0.5                                    |                                    |  |

Availability: The samples are supplied in units of about 100 g in aluminium cans

|                  | Description                    | Aflatoxin M <sub>1</sub> (µg/kg) |       |
|------------------|--------------------------------|----------------------------------|-------|
| <b>ERM-BD282</b> | Whole milk powder (zero level) | < 0.02                           |       |
| <b>ERM-BD283</b> | Whole milk powder (low level)  | 0.111 ±                          | 0.018 |
| <b>ERM-BD284</b> | Whole milk powder (high level) | 0.44 ±                           | 0.06  |

Availability: The materials are provided in units of 30 g in amber glass bottles filled and sealed under nitrogen.

| Substance | <b>BCR-377</b><br>Maize Flour (very low level blank) | <b>BCR-396</b><br>Wheat Flour (very low level blank) |
|-----------|--|--|
|           | <u>Mass fraction</u> (mg/kg)                         |  |
| DON       | < 0.05   |  |

Availability: Sachets sealed under vacuum containing about 150 g of sealed finely ground flour.

|              |  |
|--------------|--|
| Substance    | <b>BCR-471</b><br>Wheat<br>(blank)       |
| Ochratoxin A | <u>Mass fraction</u><br>(µg/kg)<br>< 0.6 |

Availability: Units of about 55 g in foil-laminate pouches sealed under vacuum.

|  |  |
|--|--|
| Compound   | <b>BCR-543</b><br>Mussel   |
| Saxitoxin-2HCl<br>Saxitoxin-2HCl<br>(if enriched with BCR-663)<br>dc-saxitoxin | <u>Mass fraction</u><br>(mg/kg)<br>< 0.07<br>0.48 ± 0.06<br>< 0.04 |

Availability: BCR-543 is available in heat-sealed laminate sachets containing about 15 g of material each. BCR-663 is available in ampoules containing 1 mL.

|                   |  |  |
|-------------------|--|--|
| Substance         | <b>ERM-BC716</b><br>Maize              | <b>ERM-BC717</b><br>Maize  |
| DON<br>NIV<br>ZON | <u>Mass fraction</u><br>(µg/kg)<br>< 5 | <u>Mass fraction</u><br>(µg/kg)<br>673 ± 87<br>53 ± 10<br>83 ± 9 |

Availability: ERM-BC716 and ERM-BC717 are supplied in sachets containing at least 60 g.

### IRMM-359: Staphylococcus aureus enterotoxin A (SEA) in cheese

| IRMM-359  | Diagnostic specificity |                                      |
|-----------|------------------------|--------------------------------------|
|           | Certified value [%]    | One-sided lower confidence limit [%] |
| IRMM-359a | 100                    | 97.3                                 |
| IRMM-359b | 100                    | 97.5                                 |
| IRMM-359c | 100                    | 97.6                                 |

Availability: Provided in a set of IRMM-359a, IRMM-359b and IRMM-359c, in plastic sachets protected in an alumina pouch.

|               |                              |
|---------------|------------------------------|
| Compound      | <b>ERM-BC403</b><br>Cucumber |
|               | <u>Mass fraction (mg/kg)</u> |
| Acetamiprid   | 0.064 ± 0.004                |
| Azoxystrobin  | 0.639 ± 0.030                |
| Carbendazim   | 0.074 ± 0.004                |
| Chlorpyrifos  | 0.064 ± 0.005                |
| Cypermethrin  | 0.045 ± 0.007                |
| Diazinon      | 0.051 ± 0.004                |
| α-Endosulfan  | 0.031 ± 0.006                |
| Fenitrothion  | 0.054 ± 0.007                |
| Imazalil      | 0.044 ± 0.004                |
| Imidacloprid  | 0.627 ± 0.026                |
| Iprodione     | 0.57 ± 0.05                  |
| Malathion     | 0.052 ± 0.007                |
| Methomyl      | 0.059 ± 0.004                |
| Tebuconazole  | 0.0611 ± 0.0026              |
| Thiabendazole | 0.056 ± 0.003                |

Availability: ERM-BC403 is available in sets of two glass vials containing each approximately 3.2 g of dried cucumber.

| Compound         | ERM-BC700<br>Soya bean |   |       |
|------------------|------------------------|---|-------|
|                  | Mass fraction (mg/kg)  |   |       |
| Azoxystrobin     | 0.46                   | ± | 0.05  |
| Carbendazim      | 0.197                  | ± | 0.019 |
| Chlorpyrifos     | 0.067                  | ± | 0.006 |
| Cypermethrin     | 0.052                  | ± | 0.010 |
| Diazinon         | 0.068                  | ± | 0.006 |
| Dieldrin         | 0.075                  | ± | 0.007 |
| (α+β)-Endosulfan | 0.49                   | ± | 0.05  |
| Imidacloprid     | 0.075                  | ± | 0.009 |
| Iprodione        | 0.104                  | ± | 0.015 |
| Methomyl         | 0.046                  | ± | 0.006 |
| Tebuconazole     | 0.048                  | ± | 0.005 |
| α-Endosulfan     | ( 0.08 – 0.15 )        |   |       |
| β-Endosulfan     | ( 0.28 – 0.47 )        |   |       |

Values in brackets are not certified.

Availability: ERM-BC700 is available in a glass vial containing 32 g of cryo-milled soya bean powder in an atmosphere of dry nitrogen.

### 2.2.3 CERTIFIED FOR THE TOTAL ELEMENT CONTENT

| Substance | ERM-BD150<br>Skimmed milk powder |   |       | ERM-BD151<br>Skimmed milk powder |   |       |
|-----------|----------------------------------|---|-------|----------------------------------|---|-------|
|           | (g/kg)                           |   |       | (g/kg)                           |   |       |
| Ca        | 13.9                             | ± | 0.8   | 13.9                             | ± | 0.7   |
| Cl        | 9.7                              | ± | 2.0   | 9.8                              | ± | 1.2   |
| K         | 17.0                             | ± | 0.7   | 17.0                             | ± | 0.8   |
| Mg        | 1.26                             | ± | 0.10  | 1.26                             | ± | 0.07  |
| Na        | 4.18                             | ± | 0.19  | 4.19                             | ± | 0.23  |
|           | (mg/kg)                          |   |       | (mg/kg)                          |   |       |
| Cd        | 0.0114                           | ± | 0.029 | 0.106                            | ± | 0.013 |
| Cu        | 1.08                             | ± | 0.06  | 5.00                             | ± | 0.23  |
| Fe        | 4.6                              | ± | 0.5   | 53                               | ± | 4     |
| Hg        | 0.060                            | ± | 0.007 | 0.52                             | ± | 0.04  |
| I         | 1.73                             | ± | 0.14  | 1.78                             | ± | 0.17  |
| Mn        | 0.289                            | ± | 0.018 | 0.29                             | ± | 0.03  |
| Pb        | 0.019                            | ± | 0.004 | 0.207                            | ± | 0.014 |
| Se        | 0.188                            | ± | 0.014 | 0.19                             | ± | 0.04  |
| Zn        | 44.8                             | ± | 2.0   | 44.9                             | ± | 2.3   |

Availability: Glass bottles containing 20 g of skimmed milk powder.

| Substance | ERM-BB184<br>Bovine muscle<br>(mg/kg) | ERM-BB185<br>Bovine liver<br>(mg/kg) | ERM-BB186<br>Pig kidney<br>(mg/kg) | ERM-BB422<br>Fish muscle<br>(mg/kg) | BCR-185R<br>Bovine liver<br>(mg/kg) |
|-----------|---------------------------------------|--------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|
| As        | 0.0234 ± 0.0026                       | 0.0177 ± 0.0021                      | (0.008 ± 0.006)                    | 12.7 ± 0.7                          | 0.0330 ± 0.0029                     |
| Cd        | 0.0022 ± 0.0004                       | 0.280 ± 0.014                        | 1.09 ± 0.05                        | 0.0075 ± 0.0018                     | 0.544 ± 0.017                       |
| Cu        | 2.31 ± 0.09                           | 598 ± 22                             | 36.5 ± 1.8                         | 1.67 ± 0.16                         | 277 ± 5                             |
| Fe        | 75 ± 4                                | -                                    | 255 ± 13                           | 9.4 ± 1.4                           | -                                   |
| Hg        | (0.0018 ± 0.0010)                     | -                                    | (0.023 ± 0.011)                    | 0.601 ± 0.030                       | -                                   |
| I         | -                                     | -                                    | -                                  | 1.4 ± 0.4                           | -                                   |
| Mn        | 0.276 ± 0.013                         | 13.1 ± 0.5                           | 7.26 ± 0.25                        | 0.368 ± 0.028                       | 11.07 ± 0.29                        |
| Pb        | -                                     | 0.0326 ± 0.0021                      | 0.040 ± 0.005                      | -                                   | 0.172 ± 0.009                       |
| Se        | 0.45 ± 0.04                           | 2.99 ± 0.18                          | 10.3 ± 0.9                         | 1.33 ± 0.13                         | 1.68 ± 0.14                         |
| Zn        | 146 ± 7                               | 143 ± 5                              | 134 ± 5                            | 16.0 ± 1.1                          | 138.6 ± 2.1                         |

Values in brackets are not certified.

Availability: BCR-185R is provided in units of 15 g as lyophilised powders, in screw-capped glass bottles.

ERM-BB184 is provided in units of 7 g as lyophilised powder, in brown-glass vials.

ERM-BB186 is provided in units of 10 g as lyophilised powders, in brown-glass vials.

ERM-BB186 and ERM-BB422 are provided in units of 10 g as lyophilised powders, in brown-glass vials.



| Substance |       | BCR-191<br>Brown bread |   |      |
|-----------|-------|------------------------|---|------|
| Cd        | µg/kg | 28.4                   | ± | 1.4  |
| Cu        | mg/kg | 2.63                   | ± | 0.07 |
| Fe        | mg/kg | 40.7                   | ± | 2.3  |
| Mn        | mg/kg | 20.3                   | ± | 0.7  |
| Pb        | µg/kg | 187                    | ± | 14   |
| Zn        | mg/kg | 19.5                   | ± | 0.5  |

Availability: BCR-191 is provided in units of 25 g.

| Substance |  | IRMM-804<br>Rice flour<br>(mg/kg) |   |       |
|-----------|--|-----------------------------------|---|-------|
| As        |  | 0.049                             | ± | 0.004 |
| Cd        |  | 1.61                              | ± | 0.07  |
| Cu        |  | 2.74                              | ± | 0.24  |
| Mn        |  | 34.2                              | ± | 2.3   |
| Pb        |  | 0.42                              | ± | 0.07  |
| Zn        |  | 23.1                              | ± | 1.9   |

Availability: Amber glass bottles containing about 15 g of powdered material.

| Substance | BCR-273<br>Single cell protein<br>(mg/g) |   |       | BCR-274<br>Single cell protein<br>(µg/g) |       |       |
|-----------|--|---|-------|--|-------|-------|
|           | As                                       |   |       | 0.132                                    | ±     | 0.014 |
| Ca        | 11.97                                    | ± | 0.14  |  |       |       |
| Cd        |  |   | 0.030 | ±  | 0.002 |       |
| Co        |  |   | 0.039 | ±  | 0.003 |       |
| Cu        |  |   | 13.1  | ±  | 0.4   |       |
| Fe        | 0.156                                    | ± | 0.004 |  |       |       |
| K         | 2.22                                     | ± | 0.05  |  |       |       |
| Mn        |  |   | 51.9  | ±  | 1.2   |       |
| N         | 121.6                                    | ± | 0.8   |  |       |       |
| P         | 26.8                                     | ± | 0.4   |  |       |       |
| Pb        |  |   | 0.044 | ±  | 0.010 |       |
| Se        |  |   | 1.03  | ±  | 0.05  |       |
| Zn        |  |   | 42.7  | ±  | 1.0   |       |

Availability: BCR-273 and BCR-274 are provided in units of 10 g as a dry powder in sealed glass ampoules.

| Substance |       | BCR-679<br>White cabbage |   |      |
|-----------|-------|--------------------------|---|------|
| B         | mg/kg | (27.7                    | ± | 1.9) |
| Ba        | mg/kg | (10.3                    | ± | 0.6) |
| Ca        | mg/kg | (7768                    | ± | 655) |
| Cd        | mg/kg | 1.66                     | ± | 0.07 |
| Cr        | mg/kg | (0.6                     | ± | 0.1) |
| Cu        | mg/kg | 2.89                     | ± | 0.12 |
| Fe        | mg/kg | 55.0                     | ± | 2.5  |
| Hg        | µg/kg | 6.3                      | ± | 1.4  |
| Mg        | mg/kg | (1362                    | ± | 127) |
| Mn        | mg/kg | 13.3                     | ± | 0.5  |
| Mo        | mg/kg | 14.8                     | ± | 0.5  |
| Ni        | mg/kg | 27.0                     | ± | 0.8  |
| P         | mg/kg | (3307                    | ± | 241) |
| Sb        | µg/kg | 20.6                     | ± | 2.6  |
| Sr        | mg/kg | 11.8                     | ± | 0.4  |
| Tl        | µg/kg | 3.0                      | ± | 0.3  |
| Zn        | mg/kg | 79.7                     | ± | 2.7  |

Values in brackets are not certified.

Availability: BCR-679 is provided in units of 15 g.

| Substance                                    | ERM-BC381<br>Rye Flour | ERM-BC382<br>Wheat Flour | BCR-383<br>Haricots Verts (Beans) | ERM-BB384<br>Lyophilised pork muscle |
|--|------------------------|--------------------------|-----------------------------------|--------------------------------------|
| <b>Major components (g / 100 g)</b>          |                        |                          |                                   |                                      |
| Glucose                                      |                        |                          | (12.4)                            |                                      |
| Fructose                                     |                        |                          | (4.6)                             |                                      |
| Sucrose                                      |                        |                          | (1.0)                             |                                      |
| N (Kjeldahl)                                 | 1.562 ± 0.014          | 1.851 ± 0.017            | 1.05 ± 0.04                       | 14.2 ± 0.4                           |
| Fat  | 1.36 ± 0.16            | 1.39 ± 0.17              |                                   | 8.99 ± 0.20                          |
| Starch <sup>1)</sup>                         | 72.2 ± 1.9             | 81.2 ± 1.7               |                                   |                                      |
| Starch & Sugars <sup>2)</sup>                |                        |                          | (78.9)                            |                                      |
| Dietary Fibre (Englyst)                      |                        |                          | (10.9)                            |                                      |
| Dietary Fibre (AOAC 1985/1988) <sup>3)</sup> |                        |                          | 11.9 ± 0.6                        |                                      |
| Ash at 550 °C                                | 1.08 ± 0.11            | 0.60 ± 0.10              | 2.39 ± 0.10                       | 4.51 ± 0.19                          |
| <b>Essential elements (g/kg)</b>             |                        |                          |                                   |                                      |
| Ca   | 0.32 ± 0.04            | 0.210 ± 0.018            | 2.85 ± 0.23                       | 0.164 ± 0.021                        |
| K  | 3.35 ± 0.11            | 1.88 ± 0.08              | 7.8 ± 0.4                         |                                      |
| Mg   | 0.567 ± 0.013          | 0.247 ± 0.010            | (0.9)                             | 1.03 ± 0.04                          |
| Na   |                        |                          | 0.075 ± 0.007                     | 1.86 ± 0.15                          |
| P  | 2.01 ± 0.07            | 1.19 ± 0.07              | (1.8)                             | 8.7 ± 0.5                            |

Values in brackets are not certified.

Availability: ERM-BC381 and ERM-BC382: 100 ml amber vial containing 37 g flour; ERM-BB384: 2 vials of 9 g lyophilised material; BCR-383: 100 g of powdered material in food grade laminated plastic/aluminium sachets sealed under nitrogen.

<sup>1)</sup> Mass fraction of polysaccharide in dry matter

<sup>2)</sup> Mass fraction of monosaccharides in dry matter

<sup>3)</sup> Prosky L. et al., J Assoc Off Anal Chem (1985) 68: 677-679, (1988) 71: 1017-1023

| Substance | ERM-BD512<br>Dark chocolate (mg/kg) |
|-----------|-------------------------------------|
| Cd mg/kg  | 0.302 ± 0.013                       |
| Cu mg/kg  | 14.3 ± 0.7                          |
| Mn mg/kg  | 15.7 ± 0.6                          |
| Ni mg/kg  | 3.01 ± 0.23                         |

Availability: The sample consists of 6 chocolate pellets of about 0.5 g each packaged in individual brown glass vials within an aluminised sachet

| Substance | ERM-CE101<br>Trout muscle (mg/kg) |
|-----------|-----------------------------------|
| Hg        | 0.0219 ± 0.0027                   |
| As        | 0.175 ± 0.017                     |
| Fe        | 3.1 ± 0.6                         |
| Mn        | 0.108 ± 0.017                     |
| Ni        | (0.051) ± 0.012                   |
| Se        | 0.113 ± 0.011                     |
| Zn        | 4.5 ± 0.6                         |

Values in brackets are not certified.

Availability: CRM consists of 40 g of homogenised, heat-treated fish muscle contained in a glass jar.

## 2.2.4 CERTIFIED FOR PROXIMATES AND CONVENTIONAL PROPERTIES

| Substance              |                          | BCR-162R<br>Soya-maize oil blend   |         |      |
|------------------------|--------------------------|--|---------|------|
| <u>Methyl ester of</u> |                          | <u>Mass fraction fatty acid methyl ester /<br/>Total fatty acid methyl ester (g/100 g)</u> |         |      |
| 16:0                   | n-hexadecanoic acid      | 10.74  | ±       | 0.16 |
| 18:0                   | n-octadecanoic acid      | 2.82   | ±       | 0.04 |
| 18:1                   | n-octadecenoic acids     |  | (26.5)  |      |
| 18:2                   | n-octadecadienoic acids  |  | (54.68) |      |
| 18:3                   | n-octadecatrienoic acids |  | (3.80)  |      |
| 9c-18:1                | n-octadecenoic acid      | 25.4   | ±       | 0.4  |
| 9c,12c-18:2            | n-octadecadienoic acid   | 54.13  | ±       | 0.25 |
| 9c,12c,15c-18:3        | n-octadecatrienoic acid  | 3.35   | ±       | 0.05 |

Values in brackets are not certified.

Availability: Each unit contains approximately 5.5 g soya-maize oil blend in 10 mL amber ampoule.

| Substance              |                          | BCR-163<br>Beef-pork fat oil blend   |   |      |
|------------------------|--------------------------|--|---|------|
| <u>Methyl ester of</u> |                          | <u>Mass fraction fatty acid methyl ester /<br/>Total fatty acid methyl ester <sup>1)</sup> (g/100 g)</u> |   |      |
| 14:0                   | n-tetradecanoic acids    | 2.29   | ± | 0.04 |
| 16:0                   | n-hexadecanoic acids     | 25.96  | ± | 0.30 |
| 16:1                   | n-hexadecenoic acids     | 2.58   | ± | 0.16 |
| 18:0                   | n-octadecanoic acids     | 18.29  | ± | 0.17 |
| 18:1                   | n-octadecenoic acids     | 38.3   | ± | 0.4  |
| 18:2                   | n-octadecadienoic acids  | 7.05   | ± | 0.17 |
| 18:3                   | n-octadecatrienoic acids | 0.86   | ± | 0.14 |
| <u>Sterols</u>         |                          | <u>Mass fraction (mg/100 g) in fat</u>   |   |      |
| Cholesterol            |                          | 134  | ± | 5    |

Availability: In units of 2 × 5 mL in dark glass ampoules sealed under nitrogen.

1) Includes any geometric (i.e. cis/trans) and positional isomers, expressed as mass fraction of total fatty acid (methyl esters) derived from triglycerides.

2) These components are included in the Certified Value for this group of fatty acids.

The report gives additional indicative values: Fatty Acids and "Total" Sterol Mass Fraction.

| Component                                  | BCR-633<br>Tracers in anhydrous butter fat<br>(mg/kg) |   |                    |
|--|---|---|--------------------|
| $\beta$ -Apo-8'-carotenic acid ethyl ester | 26.5  | ± | 1.4                |
| $\beta$ -Sitosterol                        | 530   | ± | 29                 |
| Stigmasterol                               | 147   | ± | 11                 |
| n-Heptanoic acid triglyceride              | $1.06 \times 10^3$                                    | ± | $0.04 \times 10^3$ |

Availability: BCR-633 is supplied in units of about 5 g each in amber glass ampoules, which were filled under inert gas conditions (nitrogen).

| Component                                | IRMM-801<br>Cocoa Butter<br>(%) |   |      |
|--|---------------------------------|---|------|
| 1,3-dipalmitoyl-2-oleyl-glycerol         | 18.14                           | ± | 0.26 |
| 1-palmitoyl-2-oleoyl-3-stearoyl-glycerol | 44.68                           | ± | 0.30 |
| 1,2-dioleoyl-3-palmitoyl-glycerol        | 2.26                            | ± | 0.16 |
| 1,3-distearoyl-2-oleoyl-glycerol         | 31.63                           | ± | 0.29 |
| 1,2-dioleoyl-3-stearoyl-glycerol         | 3.29                            | ± | 0.17 |

Availability: IRMM-801 is supplied in units of 5 g in brown amber glass ampoules sealed under argon/helium.

|  | <b>BCR-121</b><br>Wholemeal flour<br>(mg/kg) | <b>BCR-122</b><br>Margarine<br>(mg/kg) | <b>BCR-431</b><br>Brussels sprouts<br>(mg/kg) | <b>BCR-485</b><br>Mixed<br>vegetables<br>(mg/kg) | <b>BCR-487</b><br>Pig's liver<br>(mg/kg) | <b>ERM-BD600</b><br>Whole milk<br>powder<br>(mg/kg) |
|--|--|--|---|--|--|---|
| B <sub>1</sub> (thiamin)                   | 4.63 ± 0.39                                  |  |   | 3.07 ± 0.34                                      | 8.6 ± 1.1                                | 4.5 ± 0.6   |
| B <sub>2</sub> (riboflavin)                |  |  |   |  | 106.8 ± 5.6                              | 16.7 ± 1.4  |
| B <sub>6</sub> (total pyridoxine)          | 4.10 ± 1.02                                  |  |   | 4.8 ± 0.8  | 19.3 ± 2.9                               |   |
| B <sub>12</sub> (cyanocobalamin)           |  |  | 4830 ± 240                                    |  | 1.12 ± 0.09                              | 0.32 ± 0.07   |
| C (total ascorbate)                        |  |  |   |  |  | 74 ± 11   |
| D <sub>3</sub> (cholecalciferol)           |  | 0.125 ± 0.007                          |   |  |  |   |
| E (tocopherol)                             |  | 241 ± 12                               |   |  |  | 86 ± 15   |
| Folate (total)                             | 0.50 ± 0.07                                  |  |   | 3.15 ± 0.28                                      | 13.3 ± 1.3                               | (0.55 ± 0.16)                                       |
| Niacin                                     |  |  | 43 ± 3  |  |  | (8.0 ± 2.8)   |
| Trans- $\alpha$ -carotene                  |  |  |   | 10.5 ± 0.6                                       |  |   |
| Trans- $\beta$ -carotene                   |  |  |   | 23.7 ± 1.5                                       |  |   |
| Total- $\alpha$ -carotene                  |  |  |   | 9.8 ± 0.7  |  |   |
| Total- $\beta$ -carotene                   |  |  |   | 25.6 ± 1.2                                       |  |   |
| Lutein                                     |  |  |   | 12.5 ± 0.8                                       |  |   |
| Lutein + zeaxanthin                        |  |  |   | 22.3 ± 1.3                                       |  |   |
| 5-methyltetrahydro-<br>folic acid (5-MTHF) |  |  |   | (2.14 ± 0.42)                                    |  |   |

Values in brackets are not certified;

Availability: BCR-121: about 50 g unit size. - BCR-122: can filled with about 200 g.

BCR-431: about 20 g lyophilised and powdered material in food grade plastic/aluminium laminated sachets under nitrogen.

BCR-485: about 25 g unit size. - BCR-487: about 15 g unit size. - ERM-BD600: sachet with about 100 g.

|                | Description               | Amylose mass fraction<br>(g/100 g) |
|----------------|---------------------------|------------------------------------|
| <b>BCR-465</b> | Rice flour (low level)    | 15.40 ± 0.30                       |
| <b>BCR-466</b> | Rice flour (medium level) | 23.1 ± 0.5                         |
| <b>BCR-467</b> | Rice flour (high level)   | 27.7 ± 0.8                         |

Availability: 10 g of ground rice flour in vacuum sealed laminated polyester/aluminium/polyethylene sachets.

| Substance  | <b>BCR-644</b><br>Artificial foodstuff | <b>BCR-645</b><br>Artificial foodstuff |
|--|--|--|
| <u>Mass fraction on dry mass basis (g / 100 g)</u> |  |  |
| Fructose   | 16.2 ± 1.1                             |  |
| Sucrose  | 10.81 ± 0.25                           | 26.2 ± 0.8                             |
| Lactose  | 15.85 ± 0.29                           | 27.8 ± 0.6                             |
| Starch / glucose                                   | 35.1 ± 1.2                             | 25.2 ± 0.9                             |

Availability: BCR-644 and BCR-645 are supplied in units of approximately 50 g in 125 mL amber glass bottles.

|         | <b>BCR-651</b><br>Beer<br>(% ethanol v/v) | <b>BCR-652</b><br>Beer<br>(% ethanol v/v) | <b>BCR-653</b><br>Wine<br>(% ethanol v/v) |
|---------|---|---|---|
| Ethanol | 0.505 ± 0.006                             | 0.051 ± 0.002                             | 0.539 ± 0.007                             |

Availability: Amber glass ampoule, flushed with nitrogen, containing 10 mL of sample.

| Substance                                    | ERM-BC381<br>Rye Flour | ERM-BC382<br>Wheat Flour | BCR-383<br>Haricots Verts (Beans) | ERM-BB384<br>Lyophilised pork muscle |
|--|------------------------|--------------------------|-----------------------------------|--------------------------------------|
| <u>Major components (g / 100 g)</u>          |                        |                          |                                   |                                      |
| Glucose                                      |                        |                          | (12.4)                            |                                      |
| Fructose                                     |                        |                          | (4.6)                             |                                      |
| Sucrose                                      |                        |                          | (1.0)                             |                                      |
| N (Kjeldahl)                                 | 1.562 ± 0.014          | 1.851 ± 0.017            | 1.05 ± 0.04                       | 14.2 ± 0.4                           |
| Fat  | 1.36 ± 0.16            | 1.39 ± 0.17              |                                   | 8.99 ± 0.20                          |
| Starch <sup>1)</sup>                         | 72.2 ± 1.9             | 81.2 ± 1.7               |                                   |                                      |
| Starch & Sugars <sup>2)</sup>                |                        |                          | (78.9)                            |                                      |
| Dietary Fibre (Englyst)                      |                        |                          | (10.9)                            |                                      |
| Dietary Fibre (AOAC 1985/1988) <sup>3)</sup> |                        |                          | 11.9 ± 0.6                        |                                      |
| Ash at 550 °C                                | 1.08 ± 0.11            | 0.60 ± 0.10              | 2.39 ± 0.10                       | 4.51 ± 0.19                          |
| <u>Essential elements (g/kg)</u>             |                        |                          |                                   |                                      |
| Ca   | 0.32 ± 0.04            | 0.210 ± 0.018            | 2.85 ± 0.23                       | 0.164 ± 0.021                        |
| K  | 3.35 ± 0.11            | 1.88 ± 0.08              | 7.8 ± 0.4                         |                                      |
| Mg   | 0.567 ± 0.013          | 0.247 ± 0.010            | (0.9)                             | 1.03 ± 0.04                          |
| Na   |                        |                          | 0.075 ± 0.007                     | 1.86 ± 0.15                          |
| P  | 2.01 ± 0.07            | 1.19 ± 0.07              | (1.8)                             | 8.7 ± 0.5                            |

Values in brackets are not certified.

Availability: ERM-BC381 and ERM-BC382: 100 ml amber vial containing 37 g flour; ERM-BB384: 2 vials of 9 g lyophilised material; BCR-383: 100 g of powdered material in food grade laminated plastic/aluminium sachets sealed under nitrogen.

<sup>1)</sup> Mass fraction of polysaccharide in dry matter

<sup>2)</sup> Mass fraction of monosaccharides in dry matter

<sup>3)</sup> Prosky L. et al., J Assoc Off Anal Chem (1985) 68: 677-679, (1988) 71: 1017-1023

| Substance                            | BCR-685<br>Skim milk powder<br>(g / 100 g) |   |      |
|--------------------------------------|--|---|------|
| <u>Mass fraction</u>                 |  |   |      |
| Crude protein<br>(Kjeldahl-N x 6.38) | 38.2                                       | ± | 0.4  |
| Fat                                  | 0.96                                       | ± | 0.12 |

Availability: BCR-685 is supplied in units of about 50 g, in amber glass bottles.

| Substance            | BCR-708<br>Dairy feed |   |      |       |
|----------------------|-----------------------|---|------|-------|
| <u>Mass fraction</u> |                       |   |      |       |
| Crude protein        | 240                   | ± | 12   | g/kg  |
| Crude oils and fats  | 65                    | ± | 8    | g/kg  |
| Crude fibre          | 93                    | ± | 14   | g/kg  |
| Crude ash            | 50.0                  | ± | 3.0  | g/kg  |
| Ca                   | 4.8                   | ± | 0.5  | g/kg  |
| Cu                   | 37                    | ± | 4    | mg/kg |
| Mg                   | 1.47                  | ± | 0.22 | g/kg  |
| P                    | 4.7                   | ± | 0.4  | g/kg  |

Availability: 100 mL amber glass bottle containing about 40 g of material.

| Substance                       | ERM-BC514<br>Haricot beans<br>(g/kg) | ERM-BC515<br>Carrot<br>(g/kg) | ERM-BC516<br>Apple<br>(g/kg) | ERM-BC517<br>Full fat soya flour<br>(g/kg) | ERM-BD518<br>Bran breakfast cereal<br>(g/kg) |
|---------------------------------|--------------------------------------|-------------------------------|------------------------------|--|--|
| <u>Dietary Fibres</u>           |                                      |                               |                              |  |  |
| Methods used:                   |                                      |                               |                              |  |  |
| AOAC 1990                       | 256 ± 5                              | 311 ± 6                       | 164 ± 4                      | 126 ± 5                                    | 302 ± 8                                      |
| Englyst (by gas chromatography) | 198 ± 10                             | 271 ± 6                       | 137 ± 5                      | 119 ± 7                                    | 241 ± 8                                      |
| Uppsala                         | 237 ± 15                             | 298 ± 11                      | 162 ± 8                      | 128 ± 9                                    | 276 ± 18                                     |
| AOAC 1992 MES-TRIS              | 259 ± 15                             | 295 ± 4                       | 149 ± 10                     | 124 ± 21                                   | 305 ± 6                                      |
| Englyst (by colorimetry)        | 201 ± 6                              | 252 ± 12                      | 134 ± 5                      | 123 ± 8                                    | 250 ± 11                                     |

Availability: ERM-BC514 to BC517 and ERM-BD518 are supplied in units of approximately 25 g in food grade glass bottles sealed under vacuum.

|  | <b>BCR-537</b><br>Plastic film A<br>(mg/dm <sup>2</sup> ) | <b>BCR-539</b><br>Plastic film C<br>(mg/dm <sup>2</sup> ) |
|--|---|---|
| Overall migration by total immersion in olive oil 10 days at 40 °C<br>Overall migration by single sided cell in olive oil 10 days at 40 °C<br>Overall migration by pouch in olive oil 10 days at 40 °C | 8.3 ± 1.0   | 6.1 ± 1.0   |

Availability: PET/foil/PE heat sealed pouches containing double thickness sheets of additive free linear low density polyethylene of (33 x 22.5) cm for BCR-537 and (45 x 25) cm for BCR-539.

## 2.2.5 CERTIFIED FOR MICROBIOLOGICAL PROPERTIES

### BCR-528: Capsules filled with milk powder artificially contaminated by *Bacillus cereus* (ATCL 9139)

| Procedure  | Number of colony forming particles in one analytical portion <sup>1)</sup> |                        |      |
|--|--|------------------------|------|
|  | Certified value <sup>2)</sup>  | 95 % confidence limits |      |
| MEYP (ISO 7932) after 24 h incubation                    | 53.4   | 51.7                   | 55.2 |
| MEYP (ISO 7932) after 48 h incubation                    | 53.7   | 52.1                   | 55.4 |
| PEMBA (L 00.00 – 25) <sup>3)</sup> after 24 h incubation | 55.0   | 52.8                   | 57.4 |
| PEMBA (L 00.00 – 25) <sup>3)</sup> after 48 h incubation | 55.8   | 53.6                   | 58.0 |

Availability: BCR-528 is provided in containers holding 10 gelatine capsules filled with artificially contaminated milk powder.

1) Number of colony forming particles of *Bacillus cereus* determined in one analytical portion. Analytical portion: A volume of (0.100 ± 0.002) mL from 10 mL peptone saline solution in which one capsule has been reconstituted.

2) This value is the geometric mean of 11 accepted sets of data, independently obtained by 11 laboratories.

3) German Federal Food Law method number.

### ERM-BD001: Milk powder certified for the somatic cell count (SCC)

|            | Somatic cell count (SCC) [cells/ml] |          |                         |
|------------|-------------------------------------|----------|-------------------------|
|            | ISO13366-1                          |          | ISO13366-1 & ISO13366-2 |
| ERM-DB001a | 64000                               | ± 8000   | 62000 ± 6000            |
| ERM-DB001b | 1202000                             | ± 121000 | 1166000 ± 79000         |

Availability: ERM-BD001 is supplied in a set consisting of 1 bottle of ERM-BD001a and 1 bottle of ERM-BD001b. Each bottle contains 14 g of milk powder in an inert gas atmosphere.

### IRMM-311: Genomic DNA (gDNA) of *Bacillus licheniformis* DSM 5749 in agarose inserts for Pulsed Field Gel Electrophoresis (PFGE)

| <i>Sfi</i> I digested DNA fragments in the size interval 50 kb – 90 kb |    | Fragment length (kb) |   |     |
|--|----|----------------------|---|-----|
| Band no  | 1  | 89.6                 | ± | 4.7 |
|  | 2  | 80.9                 | ± | 2.5 |
|  | 3  | 75.3                 | ± | 2.7 |
|  | 4  | 72.2                 | ± | 3.5 |
|  | 5  | 66.9                 | ± | 1.9 |
|  | 6  | 64.6                 | ± | 2.9 |
|  | 7  | 60.3                 | ± | 1.3 |
|  | 8  | 56.5                 | ± | 1.3 |
|  | 9  | 53.9                 | ± | 1.3 |
|  | 10 | 50.6                 | ± | 1.3 |

Availability: Each vial contains one agarose insert of undigested genomic DNA of *Bacillus licheniformis* DSM 5749 for PFGE.

### IRMM-312: Genomic DNA (gDNA) of *Bacillus subtilis* DSM 5750 in agarose inserts for Pulsed Field Gel Electrophoresis (PFGE)

| <i>Sfi</i> I digested DNA fragments in the size interval 50 kb – 90 kb |   | Fragment length (kb) |   |     |
|--|---|----------------------|---|-----|
| Band no  | 1 | 89.2                 | ± | 0.9 |
|  | 2 | 81.4                 | ± | 0.8 |
|  | 3 | 77.7                 | ± | 0.6 |
|  | 4 | 62.5                 | ± | 1.8 |
|  | 5 | 59.5                 | ± | 2.1 |
|  | 6 | 44.0                 | ± | 2.4 |
|  | 7 | 29.2                 | ± | 2.0 |
|  | 8 | 23.6                 | ± | 1.3 |
|  | 9 | 18.6                 | ± | 1.3 |

Availability: Each vial contains one agarose insert of undigested genomic DNA of *Bacillus subtilis* DSM 5750 for PFGE.

**IRMM-313: Genomic DNA (gDNA) of *Campylobacter coli* (CNET068) and *Campylobacter jejuni* (CNET112) in agarose inserts for Pulsed Field Gel Electrophoresis (PFGE)**

| SmaI digested DNA fragments |    | DNA fragment sizes (kb) |   |      |
|-----------------------------|----|-------------------------|---|------|
| Fragment no                 | 2  | 458.8                   | ± | 2.0  |
|                             | 3  | 351.7                   | ± | 2.4  |
|                             | 4  | 303.0                   | ± | 2.3  |
|                             | 5  | 263.2                   | ± | 1.9  |
|                             | 6  | 188.2                   | ± | 1.2  |
|                             | 7  | 173.2                   | ± | 1.3  |
|                             | 8  | 131.1                   | ± | 1.5  |
|                             | 9  | 114.4                   | ± | 1.2  |
|                             | 10 | 95.5                    | ± | 1.4  |
|                             | 11 | 81.2                    | ± | 1.7  |
|                             | 12 | 54.9                    | ± | 2.2  |
|                             | 13 | 40.7                    | ± | 1.6  |
|                             | 14 | (25.4                   | ± | 1.3) |
|                             | 15 | (17.6                   | ± | 0.3) |
|                             | 16 | (10.9                   | ± | 0.4) |

Values in brackets are not certified.

Availability: Each vial contains one agarose plug for PFGE with undigested genomic DNA of *Campylobacter coli* CNET068 and *Campylobacter jejuni* CNET112 embedded.

**ERM-AD624: Certification of the PFGE fragment sizes of *Listeria monocytogenes* (strain H2446) DNA in agarose plugs**

| <i>Listeria monocytogenes</i> Ascl-digested DNA fragments |    | Certified value (kb) |   |     |
|---|----|----------------------|---|-----|
| Fragment no   | 1  | 1106                 | ± | 64  |
|   | 2  | 462.5                | ± | 2.4 |
|   | 3  | 404.1                | ± | 1.9 |
|   | 4  | 392.2                | ± | 2.1 |
|   | 5  | 249.9                | ± | 1.4 |
|   | 6  | 221.5                | ± | 1.4 |
|   | 7  | 126.2                | ± | 1.1 |
|   | 8  | 109.1                | ± | 1.1 |
|   | 9  | 77.8                 | ± | 0.9 |
|   | 10 | 50.2                 | ± | 1.7 |
|   | 11 | 43.7                 | ± | 2.7 |

Availability: Each unit consists of one vial containing one agarose plug for PFGE with embedded undigested DNA of *Listeria monocytogenes*.

**IRMM-351: *Escherichia coli* 0157 in material spheres**

|   | Number of colony forming unit (cfu) |   |   |
|---|-------------------------------------|---|---|
| cfu per material sphere on nutrient agar        | 4                                   | ± | 2 |
| cfu per material sphere on enterohemolysin agar | 4                                   | ± | 2 |

Availability: Each vial contains one material sphere of *Escherichia coli* 0157 (NCTC 12900).

**IRMM-352: *Salmonella enteritidis* in material spheres**

|  | Number of colony forming unit (cfu) |   |   |
|--|-------------------------------------|---|---|
| cfu per material sphere on nutrient agar                   | 5                                   | ± | 2 |
| cfu per material sphere on xylose lysine deoxycholate agar | 4                                   | ± | 2 |

Availability: Each vial contains one material sphere of *Salmonella enteritidis* (NCTC 12694).



### IRMM-354: *Candida albicans* in material spheres

|   | Number of colony forming unit (cfu) |   |     |
|---|-------------------------------------|---|-----|
| cfu per material sphere on nutrient agar                                    | 917                                 | ± | 168 |
| cfu per material sphere on Oxytetracyclin-Glucose-Yeast Extract agar (OGYE) | 912                                 | ± | 173 |

Availability: Each vial contains one material sphere of *Candida albicans* (NCPF 3179).

### IRMM-355: *Enterococcus faecalis* in material spheres

|   | Number of colony forming unit (cfu) |   |     |
|---|-------------------------------------|---|-----|
| cfu per material sphere on horse blood agar         | 890                                 | ± | 135 |
| cfu per material sphere on Slanetz and Bartley agar | 823                                 | ± | 126 |

Availability: Each vial contains one material sphere of *Enterococcus faecalis* (CIP 106877).

### IRMM-447: Genomic DNA (gDNA) of *Listeria monocytogenes* (strain 4B, NCTC 11994) with certified identity

|  | Indicative value (µg) |   |      |
|--|-----------------------|---|------|
| Mass of genomic DNA <i>Listeria monocytogenes</i> per vial | (1.1                  | ± | 0.7) |

Values in brackets are not certified.

Availability: Vial containing approximately 1.1 µg genomic DNA in lyophilised form and closed under argon atmosphere.

### IRMM-448: Genomic DNA (gDNA) of *Campylobacter Jejuni* (NCTC 11351) with certified identity

| Property                          |                               |   |     |
|-----------------------------------|-------------------------------|---|-----|
| Identity                          | Confirmed by <i>ceuE</i> gene |   |     |
| Mass of genomic DNA per vial (ng) | (71                           | ± | 39) |

Values in brackets are not certified.

Availability: Vial containing approximately 71 ng genomic DNA in lyophilised form and closed under argon atmosphere.

### IRMM-449: Genomic DNA (gDNA) of *Escherichia coli* O157 (strain EDL 933) with certified identity

|  | Indicative value (µg) |   |      |
|--|-----------------------|---|------|
| Mass of genomic DNA <i>Escherichia coli</i> per vial | (1.3                  | ± | 0.7) |

Values in brackets are not certified.

Availability: Vial containing approximately 1.3 µg genomic DNA in lyophilised form and closed under argon atmosphere.

## 2.2.6 CERTIFIED FOR VETERINARY DRUGS

|                | Description  | Substance   | Hormones in lyophilised bovine urine<br>Mass concentration in reconstituted sample (µg/L) |                                    |                                    |
|----------------|--------------|-------------|---|------------------------------------|------------------------------------|
|                |              |             | Content   | Relevant below the certified value | Relevant above the certified value |
| <b>BCR-502</b> | Bovine urine | Clenbuterol | < 0.1   |                                    |                                    |
|                |              | Salbutamol  | < 0.2   |                                    |                                    |
| <b>BCR-503</b> | Bovine urine | Clenbuterol | 2.5   | 0.4                                | 0.4                                |
|                |              | Salbutamol  | 2.3   | 0.6                                | 0.9                                |
| <b>BCR-504</b> | Bovine urine | Clenbuterol | 6.0   | 0.5                                | 0.7                                |
|                |              | Salbutamol  | 5.6   | 1.1                                | 1.9                                |

Value in brackets is not certified.

Availability: Units of lyophilised urine equivalent to about 5.0 mL in vials sealed under nitrogen.

|                                | Description  | Substance                 | Hormones in lyophilised bovine urine<br>Mass concentration in reconstituted sample<br>(µg/kg) |   |     |
|--------------------------------|--------------|---------------------------|---|---|-----|
| <b>ERM-BB386<sup>(1)</sup></b> | Bovine urine | Diethylstilboestrol (DES) | < 0.6   |   |     |
|                                |              | Dienoestrol (DE)          | < 0.6   |   |     |
|                                |              | Hexoestrol (HEX)          | < 0.4   |   |     |
| <b>ERM-BB389<sup>(2)</sup></b> | Bovine urine | Diethylstilboestrol (DES) | 1.1   | ± | 0.5 |
|                                |              | Dienoestrol (DE)          | 5.5   | ± | 1.4 |
|                                |              | Hexoestrol (HEX)          | 6.1   | ± | 0.9 |

Availability: <sup>(1)</sup> Vial containing approximately 0.36 g lyophilised bovine urine corresponding to 5.20 g of fresh bovine urine.

<sup>(2)</sup> Vial containing approximately 0.31 g lyophilised bovine urine corresponding to 5.18 g of fresh bovine urine.

|                | Description   | Substance          | Mass fraction in reconstituted sample<br>(µg/kg)* |   |     |
|----------------|---------------|--------------------|---|---|-----|
| <b>BCR-648</b> | Bovine liver  | Clenbuterol        | < 0.5   |   |     |
| <b>BCR-649</b> | Bovine liver  | Clenbuterol        | 1.2   | ± | 0.3 |
| <b>BCR-474</b> | Bovine liver  | 17 α-trenbolone    | < 0.5   |   |     |
| <b>BCR-475</b> | Bovine liver  | 17 α-trenbolone    | 7.6   | ± | 2.2 |
| <b>BCR-412</b> | Bovine muscle | Diethylstilbestrol | < 0.1   |   |     |
| <b>BCR-673</b> | Bovine eye    | Clenbuterol        | < 0.5   |   |     |
| <b>BCR-674</b> | Bovine eye    | Clenbuterol        | 9.4   | ± | 1.1 |

Availability: BCR-648 and -649 are provided in units of 10 g lyophilised bovine liver in vials sealed under argon. BCR-474 and -475 are sold as set and provided in brown glass vials in units of 2.8 g lyophilised liver corresponding to 10 g fresh liver. BCR-412 is provided in brown glass vials as lyophilised bovine muscle in units equivalent to about 5 g of fresh bovine tissue. BCR-673 and BCR-674 are provided in brown glass vials containing about 0.1 g of material.

|                 | <b>BCR-444</b><br>Porcine muscle (blank)<br>(µg/kg) | <b>ERM-BB130</b><br>Pork muscle<br>(µg/kg) |
|-----------------|---|--|
| Chloramphenicol | < 0.2   | 0.230 ± 0.021                              |

Availability: BCR-444 is provided in brown glass vials, ERM-BB130 in an amber glass bottle, each containing about 7 g of lyophilised pork muscle tissue.

|                | Description | Substance         | Mass fraction in reconstituted sample<br>(mg/kg) |   |      |
|----------------|-------------|-------------------|--|---|------|
| <b>BCR-695</b> | Pig liver   | Chlortetracycline | < 0.004  |   |      |
| <b>BCR-696</b> | Pig liver   | Chlortetracycline | 0.58   | ± | 0.11 |
| <b>BCR-697</b> | Pig muscle  | Chlortetracycline | < 0.006  |   |      |
| <b>BCR-706</b> | Pig kidney  | Chlortetracycline | < 0.005  |   |      |
| <b>BCR-707</b> | Pig kidney  | Chlortetracycline | 1.30   | ± | 0.20 |

Availability: These CRMs are provided in sealed glass vials containing lyophilised tissue equivalent to 5 g of fresh tissue.

|                  | Description | Substance  | (µg/kg) |   |    |
|------------------|-------------|--|---------|---|----|
| <b>ERM-BB492</b> | Milk powder | Sum of oxytetracycline and 4-epi-oxytetracycline | 101     | ± | 11 |
| <b>ERM-BB493</b> | Milk powder | Sum of oxytetracycline and 4-epi-oxytetracycline | < 5     |   |    |

Availability: ERM-BB492 and ERM-BB493: Units of approximately 5.5 g of spray-dried partially skimmed milk; sold as set of 1 unit ERM-BB492 and ERM-BB493 each.

|               | Substance | <b>BCR-725</b><br>Salmon tissue<br>(µg/kg) |
|---------------|-----------|--|
| Flumequine    |           | 1170 ± 210                                 |
| Oxolinic acid |           | 600 ± 100                                  |

Availability: BCR-725 is provided in amber glass vials containing 2.2 g of lyophilised salmon tissue material.

|  | Substance | <b>ERM-BB125</b><br>Egg powder<br>(mg/kg) |
|--|-----------|---|
| Fipronil sulfone   |           | 0.060 ± 0.005                             |
| Sum of fipronil and fipronil sulfone expressed as fipronil |           | 0.058 ± 0.005                             |

Availability: ERM-BB125 is provided in glass vials containing 5 g of egg powder in an atmosphere of dry argon..

|   | <b>ERM-BB124</b><br>Pork muscle |   |      |
|---|---------------------------------|---|------|
| Nitroimidazoles in the reconstituted material     | Mass fraction (µg/kg)           |   |      |
| Ronidazole (RNZ)                                  | 2.09                            | ± | 0.25 |
| Metronidazole (MNZ)                               | 1.93                            | ± | 0.15 |
| 2-hydroxymethyl-1-methyl-5-nitroimidazole (HMMNI) | 0.69                            | ± | 0.09 |
| Hydroxymetronidazole (MNZOH)                      | 6.2                             | ± | 0.9  |
| Hydroxyipronidazole (IPZOH)                       | 1.67                            | ± | 0.12 |
| Dimetridazole (DMZ)                               | < 0.25                          |   |      |

Availability: ERM-BB124 is provided in amber glass bottles containing 10 g of lyophilised pork muscle tissue.

## 2.2.7 CERTIFIED FOR IDENTITY

### Ewes'/Goats' Curd (BCR-599)

BCR-599 consists of a set of two freeze dried curd materials made from a mixture of ewes' and goats' milk, intended to detect adulteration by cows' milk in cheeses made from ewes' milk, goats' milk and mixtures thereof, according to the reference method described in Commission Regulation (EC) No. 1081/96. The 0 % material is not adulterated, the 1 % material is adulterated milk 1 % of cows' milk.

Availability: BCR-599 is available as a set of two brown glass vials containing each about 15 g of lyophilised curd powder under Argon atmosphere.

### Peanut Test Material Kit (IRMM-481)

The peanut test material is **not** a reference material, because it could not be tested for homogeneity and stability. The intention is to make a standard peanut matrix available to the research community who may wish to conduct wider studies on similar matrices pre-treated in different ways. At present only the nominal particle size and the pre-treatment applied to the peanuts before milling can be guaranteed as well as the tolerances of weighing of  $1.000 \pm 0.015$  g of each variety in the peanut mixture provided in the kit.

|                  | <b>Peanut variety, origin</b> | <b>Peanut treatment</b>       | <b>Nominal net weight of peanut powder</b> | <b>Colour code on cap</b> |
|------------------|-------------------------------|-------------------------------|--|---------------------------|
| <b>IRMM-481a</b> | Runners, Argentina            | blanched, strong air-roasting | 2 g  | blue                      |
| <b>IRMM-481b</b> | Common Natal, South-Africa    | raw, mild air-roasting        | 2 g  | green                     |
| <b>IRMM-481c</b> | Virginia, USA,                | blanched, strong oil roasting | 2 g  | gold                      |
| <b>IRMM-481d</b> | Virginia, China               | blanched, mild oil-roasting   | 2 g  | red                       |
| <b>IRMM-481e</b> | Jumbo Runners, USA,           | blanched only                 | 2 g  | brown                     |
| <b>IRMM-481f</b> | Mixture of 481a to 481e       | all above                     | 5 g (1 g of each variety 481a – 481e)      | silver                    |

Availability: IRMM-481 consists of a kit with six different vials containing non-salted peanut powders with a nominal particle size from 0.5 to 1.0 mm. Five of the vials are filled with approximately 2 g of each variety. The sixth vial contains a mixture of all five varieties provided in IRMM-481a to 481e. All vials have been filled with argon prior to capping to provide a protective atmosphere.

### Calibration kit for the detection of ruminant material in feed by PCR

The calibration kit for ruminant detection by PCR is a certified reference material and should be used to construct calibration curves at low copy number concentration to determine a cut-off value.

|                   | <b>Copy number concentration of the plasmid [cp/µL]</b> |   |    |
|-------------------|---|---|----|
| <b>ERM-AD482a</b> | 123   | ± | 30 |
| <b>ERM-AD482b</b> | 32  | ± | 7  |
| <b>ERM-AD482c</b> | 8   | ± | 3  |

Availability: ERM-AD482 consists of a kit of three plasmid solutions. Each of the three vials contains approximately 1000 µL of plasmid solution.

## Calibration kit for the detection of porcine material in feed by PCR

The calibration kit for porcine detection by PCR is a certified reference material and should be used to construct calibration curves at low copy number concentration to determine a cut-off value.

|                   | Copy number concentration of the plasmid<br>[cp/μL] |   |    |
|-------------------|---|---|----|
| <b>ERM-AD483a</b> | 126   | ± | 30 |
| <b>ERM-AD483b</b> | 34  | ± | 6  |
| <b>ERM-AD483c</b> | 9   | ± | 3  |

Availability: ERM-AD483 consists of a kit of three plasmid solutions. Each of the three vials contains approximately 1000 μL of plasmid solution.

## Identity of fish species

|                 | Certified value – Taxon <sup>1</sup>         |
|-----------------|--|
| <b>EURM-020</b> | Hippoglossus hippoglossus (Atlantic halibut) |

Availability: EURM-020 is available in glass vials containing at least 200 mg of dried Hippoglossus hippoglossus (Atlantic halibut) powder.

<sup>1</sup> Determined via genetic identification based upon the sequencing results of two specific regions of mitochondrial DNA (also called DNA barcodes): the cytochrome b gene (cytb) and the cytochrome c oxidase subunit I gene (COI).

## 2.2.8 OTHERS

| Substance  | <b>ERM-BD273</b><br>Toasted bread |   |    |
|------------|-----------------------------------|---|----|
|            | <u>Mass fraction</u><br>(ng/g)    |   |    |
| Acrylamide | 425                               | ± | 29 |

Availability: ERM-BD273 is available in a brown glass vial containing about 30 g of toasted bread powder.

| Radionuclide activity concentration<br>at reference date 1 January 2009, 00h00 UTC | <b>IRMM-426</b><br>Wild berries<br>(Bq kg <sup>-1</sup> ) |   |    |
|--|---|---|----|
| <sup>137</sup> Cs  | 780   | ± | 70 |
| <sup>90</sup> Sr   | 153   | ± | 29 |
| <sup>40</sup> K  | 253   | ± | 25 |

Availability: IRMM-426 is available in bottles containing about 100 g of material.

### 3 MATERIALS RELATED TO CLINICAL CHEMISTRY

#### 3.1 PURE STANDARDS AND SYNTHETIC MATERIALS

|                | Description                               | Purity (%) |
|----------------|---|------------|
| <b>BCR-546</b> | Formaldehyde 2,4-dinitrophenylhydrazone   | > 99.3     |
| <b>BCR-547</b> | Acetaldehyde 2,4-dinitrophenylhydrazone   | 98.3 ± 0.5 |
| <b>BCR-548</b> | Acrolein 2,4-dinitrophenylhydrazone       | > 97.9     |
| <b>BCR-549</b> | Acetone 2,4-dinitrophenylhydrazone        | > 99.6     |
| <b>BCR-550</b> | Glutaraldehyde 2,4-dinitrophenylhydrazone | > 98.1     |

Availability: Approximately 10 mg of crystals in glass vials.

| Compounds                               | <b>BCR-551</b><br>Acetonitrile solution<br>Mass concentration (µg/mL) | <b>BCR-552</b><br>Acetonitrile solution<br>(blank) (µg/mL) |
|---|---|--|
| Formaldehyde 2,4-Dinitrophenylhydrazone | 2.94 ± 0.05   | < 0.08   |
| Acetaldehyde 2,4-dinitrophenylhydrazone | 4.89 ± 0.07   | < 0.05   |
| Acrolein 2,4-dinitrophenylhydrazone     | 0.483 ± 0.011   | < 0.04   |
| Acetone 2,4-dinitrophenylhydrazone      | 4.96 ± 0.07   | < 0.05   |

Availability: Set BCR-551-2 consists of 4 samples of BCR-551 and 1 sample of BCR-552.

|   | <b>BCR-553</b><br>Glass fibre filters<br>Spiked mass per filter<br>(expressed as µg formaldehyde) | <b>BCR-554</b><br>Glass fibre filters<br>Mass per filter (blank)<br>(expressed as µg formaldehyde) |
|---|---|--|
| Formaldehyde 2,4-dinitrophenylhydrazone<br>on glass fibre filters | 4.96 ± 0.06   | < 0.1  |

Availability: Set BCR-553-4 consists of 2 samples of BCR-553 and 1 sample of BCR-554.

|                | Description                         | Latex spheres<br>Parameters of the calibration line |
|----------------|-------------------------------------|---|
| <b>BCR-165</b> | Nominal 2 µm latex (0.02 % solids)  | 2.223 ± 0.013                                       |
| <b>BCR-166</b> | Nominal 4.8 µm latex (0.2 % solids) | 4.821 ± 0.019                                       |
| <b>BCR-167</b> | Nominal 9.6 µm latex (1.4 % solids) | 9.475 ± 0.018                                       |

Availability: Vials containing 2 mL of an aqueous suspension of latex spheres.

|                 | Thyroxine (T <sub>4</sub> ) | 3,3',5-triiodothyronine (T <sub>3</sub> ) |
|-----------------|-----------------------------|---|
| <b>IRMM-468</b> | 98.6 ± 0.7                  | (0.51 ± 0.17)                             |
| <b>IRMM-469</b> | (1.50 ± 0.12)               | 97.1 ± 0.7                                |

Values in brackets are not certified.

Availability: The material consists of an off-white crystalline powder in an amber glass vial sealed under N<sub>2</sub> atmosphere. Each vial contains about 100 mg of the powder.

## 3.2 MATRIX MATERIALS

### 3.2.1 CERTIFIED FOR THE HORMONE CONTENT

#### Cortisol reference panel of fresh frozen human sera ERM-DA451/IFCC

| Serum No. | Certified value nmol/L | Uncertainty nmol/L | Serum No. | Certified value nmol/L | Uncertainty nmol/L |
|-----------|------------------------|--------------------|-----------|------------------------|--------------------|
| 1         | 361                    | 14                 | 18        | 146                    | 6                  |
| 2         | 432                    | 17                 | 19        | 166                    | 7                  |
| 3         | 288                    | 11                 | 20        | 83                     | 4                  |
| 4         | 152                    | 6                  | 21        | 89                     | 4                  |
| 5         | 329                    | 13                 | 22        | 180                    | 7                  |
| 6         | 278                    | 11                 | 23        | 387                    | 15                 |
| 7         | 515                    | 20                 | 24        | 384                    | 15                 |
| 8         | 163                    | 7                  | 25        | 315                    | 12                 |
| 9         | 287                    | 11                 | 26        | 215                    | 9                  |
| 10        | 230                    | 9                  | 27        | 497                    | 19                 |
| 11        | 334                    | 13                 | 28        | 299                    | 12                 |
| 12        | 261                    | 10                 | 29        | 265                    | 11                 |
| 13        | 430                    | 17                 | 30        | 114                    | 5                  |
| 14        | 626                    | 24                 | 31        | 764                    | 29                 |
| 15        | 246                    | 10                 | 32        | 623                    | 24                 |
| 16        | 211                    | 8                  | 33        | 264                    | 10                 |
| 17        | 366                    | 14                 | 34        | 390                    | 15                 |

Availability: As panel of 34 x 1 mL serum in screw capped cryo-vials.

|                  | Cortisol in human serum (concentration in the reconstituted material <sup>1)</sup> ) |   |     |          |   |    |
|------------------|--|---|-----|----------|---|----|
|                  | (µg/L)   |   |     | (nmol/L) |   |    |
| <b>ERM-DA192</b> | 98.8   | ± | 2.0 | 273      | ± | 6  |
| <b>ERM-DA193</b> | 277  | ± | 5   | 763      | ± | 14 |

Availability: In units of lyophilised material of a 1.25 mL portion of serum kept under nitrogen in sealed glass ampoules.

<sup>1)</sup> The sample is to be reconstituted with (1.25 ± 0.01) mL of distilled water.

|                  | Progesterone in human serum (concentration in the reconstituted material <sup>1)</sup> ) |   |      |          |   |      |
|------------------|--|---|------|----------|---|------|
|                  | (µg/L)   |   |      | (nmol/L) |   |      |
| <b>BCR-348R</b>  | 8.5  | ± | 0.4  | 26.9     | ± | 1.2  |
| <b>ERM-DA347</b> | 3.19   | ± | 0.07 | 10.13    | ± | 0.21 |

Availability: In units of lyophilised material of a 1 mL portion of serum kept under nitrogen in sealed glass ampoules.

<sup>1)</sup> The sample is to be reconstituted with (1.0 ± 0.01) mL of distilled water.

|                              | 17β-Estradiol in human serum (concentration in the reconstituted material)<br>Amount-of-substance concentration (nmol/L) |       |       |       |  |  |
|------------------------------|--|-------|-------|-------|--|--|
|                              | <b>BCR-576</b> <sup>1)</sup>   | 0.114 | ±     | 0.005 |  |  |
| <b>BCR-577</b> <sup>2)</sup> | 0.689  | ±     | 0.032 |       |  |  |
| <b>BCR-578</b> <sup>2)</sup> | 1.34   | ±     | 0.07  |       |  |  |

Availability: BCR-576, -577, -578 are lyophilised material of a 5 mL (BCR-576) or 1 mL (BCR-577 and BCR-578) portion of serum kept under nitrogen in sealed glass ampoules.

<sup>1)</sup> The sample is to be reconstituted with (5.00 ± 0.05) mL of distilled water.

<sup>2)</sup> The sample is to be reconstituted with (1.00 ± 0.01) mL of distilled water.

### 3.2.2 CERTIFIED FOR THE TOTAL ELEMENT CONTENT AND OTHER PROPERTIES

|                  | Description              | Substance        | Metal concentrations in the reconstituted material <sup>1)</sup><br>(µg/L) |   |                        |
|------------------|--------------------------|------------------|--|---|------------------------|
| <b>ERM-CE195</b> | Lyophilised bovine blood | Pb               | 416  | ± | 9                      |
|                  |                          | Cd <sup>2)</sup> | 5.06   | ± | 0.15                   |
| <b>ERM-CE196</b> | Lyophilised bovine blood | Pb               | 772  | ± | 11                     |
|                  |                          | Cd <sup>2)</sup> | 12.33  | ± | 0.20                   |
| <b>BCR-634</b>   | Lyophilised human blood  | Pb               | 46   | ± | 5                      |
|                  |                          | Cd               | 1.4  | ± | 0.4                    |
| <b>BCR-635</b>   | Lyophilised human blood  | Pb               | 210  | ± | 24                     |
|                  |                          | Cd               | 6.6  | ± | 0.6                    |
| <b>BCR-636</b>   | Lyophilised human blood  | Pb               | 0.52 · 10 <sup>3</sup>   | ± | 0.05 · 10 <sup>3</sup> |
|                  |                          | Cd               | 11.6   | ± | 0.6                    |

Availability: In units of lyophilised material equivalent to about 5.75 mL of bovine blood with additives kept under nitrogen in rubber stoppered vials.

BCR-634, BCR-635 and BCR-636 are available in lyophilised form in brown glass vials, containing approximately 0.6 g dry matter equivalent to 3.0 mL of fresh whole blood.

<sup>1)</sup> The sample is to be reconstituted with (5.00 ± 0.01) mL water.

<sup>2)</sup> Recertified by the JRC.

|                | Description             | Substance | Element concentration in the reconstituted material <sup>1)</sup><br>(mmol/L) |   |       |
|----------------|-------------------------|-----------|---|---|-------|
| <b>BCR-304</b> | Lyophilised human serum | Ca        | 2.201   | ± | 0.019 |
|                |                         | Li        | 0.985   | ± | 0.029 |
|                |                         | Mg        | 1.85  | ± | 0.03  |

Availability: In units of lyophilised material equivalent to about 5.3 mL of human serum kept under vacuum in rubber stoppered vials.

<sup>1)</sup> The sample is to be reconstituted with (5.00 ± 0.01) mL bi-distilled water.

|                | Description | Substance | Metal concentrations<br>(µg/L) |   |     |
|----------------|-------------|-----------|--------------------------------|---|-----|
| <b>BCR-637</b> | Human serum | Al        | 12.5                           | ± | 3.0 |
|                |             | Se        | 81                             | ± | 7   |
|                |             | Zn        | 1110                           | ± | 220 |
| <b>BCR-638</b> | Human serum | Al        | 55                             | ± | 7   |
|                |             | Se        | 104                            | ± | 7   |
|                |             | Zn        | 1430                           | ± | 210 |
| <b>BCR-639</b> | Human serum | Al        | 194                            | ± | 14  |
|                |             | Se        | 133                            | ± | 12  |
|                |             | Zn        | 2360                           | ± | 140 |

Availability: supplied in frozen form in white plastic vials containing approximately 4.5 mL serum.

| Substance | <b>ERM-DB001</b><br>Human hair<br>(mg/kg) |   |       |
|-----------|---|---|-------|
| As        | 0.044                                     | ± | 0.006 |
| Cd        | 0.125                                     | ± | 0.007 |
| Cu        | 33  | ± | 4     |
| Hg        | 0.365                                     | ± | 0.028 |
| Pb        | 2.14                                      | ± | 0.20  |
| Se        | 3.24                                      | ± | 0.24  |
| Zn,       | 209                                       | ± | 12    |

Availability: supplied in amber glass bottle, provided in aluminium sachet, and contains a minimum amount of 3.5 g of a human hair homogeneous powder

### 3.2.3 CERTIFIED FOR PROTEIN CONTENT

|                | Description                          | Mass concentration in the reconstituted material <sup>1)</sup><br>(g/L) |
|----------------|--------------------------------------|---|
| <b>BCR-393</b> | Lyophilised Apo A I from human serum | 1.06 ± 0.05   |

Availability: In units of lyophilised material equivalent to about 1.5 mL of Apolipoprotein solution in sealed glass ampoules under nitrogen.

<sup>1)</sup> The sample must be reconstituted with 1.0 mL of phosphate buffer.

|                | Description                      | Protein mass per ampoule <sup>1)</sup><br>(µg) |
|----------------|----------------------------------|--|
| <b>BCR-486</b> | Purified alphafoetoprotein (AFP) | 100 ± 9  |

Availability: BCR-486 is provided in sealed glass ampoules. Each sample is in lyophilised form and it contains purified AFP without additives.

The protein mass per ampoule is equivalent to (100 ± 9) µg when the material is reconstituted with 1.0 mL phosphate buffer according to the specified procedure.

<sup>1)</sup> Carbohydrate mass of the molecule is not included.

|                | Description   | Protein mass/ampoule |
|----------------|---|----------------------|
| <b>BCR-613</b> | Prostate specific antigen in the reconstituted material | 71 ± 7 µg            |

Availability: Lyophilised PSA in sealed glass ampoules kept under argon gas.

| ERM-DA470k<br>Human Serum Proteins     |   |                        |   |
|--|---|------------------------|---|
| Description                            | Mass concentration <sup>1)</sup><br>(g/L) | Description            | Mass concentration <sup>1)</sup><br>(g/L) |
| α <sub>2</sub> macroglobulin (A2M)     | 1.43 ± 0.06                               | Haptoglobin (HPT)      | 0.889 ± 0.021                             |
| α <sub>1</sub> acid glycoprotein (AAG) | 0.617 ± 0.013                             | Immunoglobulin A (IgA) | 1.80 ± 0.05                               |
| α <sub>1</sub> antitrypsin (AAT)       | 1.12 ± 0.03                               | Immunoglobulin G (IgG) | 9.17 ± 0.18                               |
| Albumin (ALB)                          | 37.2 ± 1.2                                | Immunoglobulin M (IgM) | 0.723 ± 0.027                             |
| β-2-microglobulin (B2M)                | 0.00217 ± 0.00007                         | Transferrin (TRF)      | 2.36 ± 0.08                               |
| Complement 3c (C3c)                    | 1.00 ± 0.04                               | Transthyretin (TTR)    | 0.220 ± 0.018                             |
| Complement 4 (C4)                      | 0.162 ± 0.007                             |                        |   |

Availability: Glass bottle containing lyophilised materials equivalent to about 1 mL of serum with additives kept under nitrogen.

<sup>1)</sup> Sample to be reconstituted with (1.00 ± 0.01) g water.

|                       | Description | Mass concentration<br>(mg/L) |
|-----------------------|-------------|------------------------------|
| <b>ERM-DA471/IFCC</b> | Cystatin C  | 5.48 ± 0.15                  |

Availability: Glass vial containing lyophilised human serum spiked <sup>1)</sup> with cystatin C.

|                       | Description              | Mass concentration<br>(mg/L) |
|-----------------------|--------------------------|------------------------------|
| <b>ERM-DA474/IFCC</b> | C-reactive protein (CRP) | 41.2 ± 2.5                   |

Availability: Glass ampoule containing at least 1 mL processed human serum spiked with CRP.



|                       | Description  | Mass concentration (mg/L) |
|-----------------------|--------------|---------------------------|
| <b>ERM-DA476/IFCC</b> | anti-MPO IgG | 84 ± 9                    |
| <b>ERM-DA483/IFCC</b> | IgG PR3 ANCA | 270 ± 29                  |

Availability: Glass vial containing lyophilised material equivalent to 1 mL of serum with additives kept under nitrogen.

|                       | Description  | Mass concentration (µg/L) |
|-----------------------|--|---------------------------|
| <b>ERM-DA480/IFCC</b> | Abeta 42 in cerebrospinal fluid (CSF) (low level)    | 0.45 ± 0.07               |
| <b>ERM-DA481/IFCC</b> | Abeta 42 in cerebrospinal fluid (CSF) (medium level) | 0.72 ± 0.11               |
| <b>ERM-DA482/IFCC</b> | Abeta 42 in cerebrospinal fluid (CSF) (high level)   | 1.22 ± 0.18               |

Availability: Microvial containing at least 0.5 mL frozen liquid.

|                | Description                                      | Absorbance at 540 nm and 10.00 mm pathlength | Mass concentration (mg/L) | Substance concentration (µmol/L) |
|----------------|--|--|---------------------------|----------------------------------|
| <b>BCR-522</b> | Haemiglobincyanide (HiCN) in bovine blood lysate | 0.5457 ± 0.0009                              | 800.3 ± 1.3               | 49.61 ± 0.08                     |

Availability: Bovine blood lysate in sealed brown glass ampoules (10 mL) equivalent to about 800.3 mg/L of haemiglobincyanide.

|                | Description               | Amount-of-substance concentration of creatinine (µmol/L) |
|----------------|---------------------------|--|
| <b>BCR-573</b> | Creatinine in human serum | 68.7 ± 1.4   |
| <b>BCR-574</b> | Creatinine in human serum | 105.0 ± 1.3  |
| <b>BCR-575</b> | Creatinine in human serum | 404.1 ± 7.1  |

Availability: BCR-573, -574, -575 are the lyophilised form of approximately 1 mL portion of serum, with no additives. The mass of the lyophilised material contained in the ampoule is about 0.09 g.

### BCR-573i (RM) Set of creatinine interfering substances

Availability: Consists of three vials with lyophilised solutions

- 0.025 mg calcium dobesilate / 1.2 mg cefoxitin;
- 0.044 mg sodium pyruvate;
- 0.108 mg bilirubin ditaurate.

|                      | Description                           | Amount-of-substance fraction (mmol/mol) |
|----------------------|---------------------------------------|---|
| <b>IRMM/IFCC-467</b> | Haemoglobin isolated from whole blood | HbA0/(HbA1c + HbA0) > 976               |

Availability: Provided in vials containing approximately 39 mg of a deep frozen buffered solution.

|                       | Description           | Amount-of-substance fraction (mmol/mol) |
|-----------------------|-----------------------|---|
| <b>ERM-AD500/IFCC</b> | Haemoglobin in buffer | HbA1c/(HbA1c + HbA0)                    |
|                       |                       | blank 0.0 ± -0.0; +0.4                  |
|                       |                       | Level 1 28.6 ± 0.9                      |
|                       |                       | Level 2 57.8 ± 1.3                      |
|                       |                       | Level 3 86.7 ± 2.2                      |
|                       |                       | Level 4 118.8 ± 2.6                     |
|                       |                       | Level 5 153 ± 5                         |

Availability: Provided in vials containing about 1mg of a deep frozen buffered solution.

### 3.2.4 CERTIFIED FOR CATALYTIC ACTIVITY

|                        | Description   | Catalytic concentration in reconstituted material |                 |
|------------------------|---|---|-----------------|
|                        |   | U/L   | Certified value |
| <b>BCR-647</b>         | Human adenosine deaminase (ADA1), from human erythrocytes <sup>2)</sup>         |   | 2.55 ± 0.09     |
| <b>BCR-693</b>         | Human pancreatic lipase from pancreatic juice <sup>4)</sup>                     |   | 28.9 ± 1.2      |
| <b>BCR-694</b>         | Human pancreatic lipase (recombinant) <sup>4)</sup>                             |   | 17.4 ± 1.0      |
| <b>ERM-AD452/IFCC</b>  | $\gamma$ -Glutamyltransferase partially purified, from pig kidney <sup>3)</sup> | 114.1 ± 2.4                                       | 1.90 ± 0.04     |
| <b>ERM-AD453k/IFCC</b> | Human lactate dehydrogenase isoenzyme 1 (LD1) <sup>3)</sup>                     | 330 ± 7   | 5.50 ± 0.12     |
| <b>ERM-AD454k/IFCC</b> | Alanine aminotransferase (ALT) <sup>3)</sup>                                    | 103.8 ± 2.6                                       | 1.73 ± 0.05     |
| <b>ERM-AD455k/IFCC</b> | Creatine kinase isoenzyme MM (CK-MM) <sup>3)</sup>                              | 314 ± 6   | 5.23 ± 0.10     |
| <b>ERM-AD456/IFCC</b>  | Pancreatic $\alpha$ -amylase <sup>3)</sup>                                      | 274 ± 7   | 4.58 ± 0.12     |
| <b>ERM-AD457/IFCC</b>  | Aspartate Transaminase (AST)  | 104.6 ± 2.7                                       | 1.74 ± 0.05     |

Availability: Sealed glass ampoules of lyophilised material equivalent to about 1 mL of a solution of enzyme stabilized by incorporation in serum albumin matrix of bovine (ERM-AD452/IFCC and ERM-AD457/IFCC) origin kept under dry nitrogen. BCR-647 has been stabilised by incorporation in a matrix of 50 mmol/L Tris/HCl buffer 9pH=7.4) and human serum albumin (30 g/L). ERM-AD456/IFCC is available in glass vials containing lyophilised powder from 1.0 mL of the alpha-amylase solution.

ERM-AD453k/IFCC, ERM-AD454k/IFCC and ERM-AD455k are available in glass vials containing lyophilised powder from 1 mL of buffer solution.

BCR-693 and BCR-694 are provided in ampoules of lyophilised material equivalent to about 1 mL of stabilised enzyme.

<sup>1)</sup> According to IFCC recommended method at 30 °C.

<sup>2)</sup> According to method specified in report.

<sup>3)</sup> According to IFCC recommended method at 37 °C.

<sup>4)</sup> According to method described in certification report at 37 °C.

### 3.2.5 CERTIFIED FOR DNA SEQUENCE AND MASS CONCENTRATION

#### CRMs for monitoring leukaemia (ERM-AD623)

| SET OF PLASMID SOLUTIONS       |  |                               |
|--------------------------------|--|-------------------------------|
|                                | Number of specific DNA fragments per plasmid |                               |
|                                | Certified value                              | Uncertainty                   |
| <i>BCR-ABL</i> b3a2 transcript | 1  | negligible                    |
| <i>BCR</i> transcript          | 1  | negligible                    |
| <i>GUSB</i> transcript         | 1  | negligible                    |
|                                | Copy number concentration of the plasmid     |                               |
|                                | Certified value [cp/ $\mu$ L]                | Uncertainty [cp/ $\mu$ L]     |
| <b>ERM-AD623a</b>              | 1.08 $\times$ 10 <sup>6</sup>                | 0.13 $\times$ 10 <sup>6</sup> |
| <b>ERM-AD623b</b>              | 1.08 $\times$ 10 <sup>5</sup>                | 0.11 $\times$ 10 <sup>5</sup> |
| <b>ERM-AD623c</b>              | 1.03 $\times$ 10 <sup>4</sup>                | 0.10 $\times$ 10 <sup>4</sup> |
| <b>ERM-AD623d</b>              | 1.02 $\times$ 10 <sup>3</sup>                | 0.09 $\times$ 10 <sup>3</sup> |
| <b>ERM-AD623e</b>              | 1.04 $\times$ 10 <sup>2</sup>                | 0.10 $\times$ 10 <sup>2</sup> |
| <b>ERM-AD623f</b>              | 10.0   | 1.5                           |

Availability: ERM-AD623 is a set of six plasmid solutions (a-f). Each of six vials contains approximately 600  $\mu$ L of plasmid solution.

## CRMS for quantifying mass concentration of Lambda DNA

| ERM-AD442K<br>Lambda DNA in a solution |                             |                           |
|--|-----------------------------|---------------------------|
|  | DNA mass concentration      |                           |
|  | Certified value<br>[ng/μL]  | Uncertainty<br>[ng/μL]    |
| Lambda DNA                             | 57.5                        | 1.1                       |
|  | Copy number concentration   |                           |
|  | Indicative value<br>[cp/μL] | Uncertainty<br>[cp/μL]    |
| Lambda DNA                             | (1.20 x 10 <sup>9</sup> )   | (0.17 x 10 <sup>9</sup> ) |

Values in brackets are not certified.

### 3.2.6 OTHERS

|                  | Description                       | Parameters of the calibration line |                 |  |
|------------------|-----------------------------------|------------------------------------|-----------------|--|
| <b>ERM-AD149</b> | Lyophilised rabbit thromboplastin | Slope                              | 1.257 ± 0.013   |  |
|                  |                                   | Intercept                          | - 0.242 ± 0.019 |  |

Availability: ERM-AD149 in sealed glass ampoules containing the lyophilised form of a 0.5 mL aliquot of the extract of rabbit brain tissue, without calcium ion added.

|                       | <b>BCR-665</b><br>Asbestos fibres in lung tissue<br>(Number of fibres of more than 1 μm in length in million per g dry tissue) | <b>BCR-666</b><br>Asbestos fibres in lung tissue<br>(Number of fibres of more than 1 μm in length in million per g dry tissue) |
|-----------------------|--|--|
| Amosite + crocidolite | 49 ± 16  | 2.3 ± 0.9  |
| Anthophyllite         | 1.8 ± 0.9  | 5.1 ± 1.5  |

Availability: Sealed vials with 100 mg of lung tissue.

|   | <b>IRMM-435</b><br>Pharmaceutical glass containers<br>Alkali leaching and release |
|---|---|
| Volume of titration solution 0.01 mol/L HCl per 50 mL of leachate | 0.38 ± 0.04 mL  |
| Sodium release per volume of leachate                             | 1.41 ± 0.14 mg/L  |
| Release of Na <sub>2</sub> O per volume of leachate               | 1.91 ± 0.19 mg/L  |

Availability: Each unit of IRMM-435 consists of 20 vials of 18.9 mL brimful capacity, made of a semi-durable type of glass, which screw caps.

## 4 MATERIALS CERTIFIED FOR PHYSICAL PROPERTIES

### 4.1 CERTIFIED FOR THERMAL PROPERTIES

#### Resin bonded glass fibre board IRMM-440

The certified thermal conductivity between  $-10\text{ }^{\circ}\text{C}$  and  $+50\text{ }^{\circ}\text{C}$  is given by

$$\lambda \text{ [W/(m.K)]} = 2.93949 \cdot 10^{-2} + \frac{T}{^{\circ}\text{C}} \cdot 1.060 \cdot 10^{-4} + \frac{T^2}{(^{\circ}\text{C})^2} \cdot 2.047 \cdot 10^{-7}$$

The uncertainty of the certified thermal conductivity is  $\pm 0.000\ 28\ \text{W/(m.K)}$  at the 95 % confidence level over the range  $[-10\text{ }^{\circ}\text{C} / +50\text{ }^{\circ}\text{C}]$ .

An indicative value for the thermal conductivity between  $-170\text{ }^{\circ}\text{C}$  and  $-10\text{ }^{\circ}\text{C}$  is given by

$$\lambda \text{ [W/(m.K)]} = 2.95 \cdot 10^{-2} + \frac{T}{^{\circ}\text{C}} \cdot 1.08 \cdot 10^{-4} + \frac{T^2}{(^{\circ}\text{C})^2} \cdot 2 \cdot 10^{-8}$$

The indicative uncertainty of thermal conductivity is  $\pm 5\%$  at the 95 % confidence level over the range  $[-170\text{ }^{\circ}\text{C} / -10\text{ }^{\circ}\text{C}]$ .

These equations are valid for a sample of the reference material within the density range  $[64\ \text{kg/m}^3 - 78\ \text{kg/m}^3]$ .

IRMM-440 is available in the following dimensions: (300 x 300 x 35) mm, (500 x 500 x 35) mm, (600 x 600 x 35) mm, (1000 x 1000 x 35) mm.

#### Glass-ceramic BCR-724

The certified thermal diffusivity between 298 K and 1025 K is given by

$$\alpha \text{ [m}^2\text{/s} \cdot 10^{-6}] = 4.406 - 1.351 \cdot 10^{-2} \cdot T + 2.133 \cdot 10^{-5} \cdot T^2 - 1.541 \cdot 10^{-8} \cdot T^3 + 4.147 \cdot 10^{-12} \cdot T^4$$

The uncertainty of the certified thermal diffusivity is  $\pm 6.1\ \text{[ \% ]}$  at the 95 % confidence level over the range from 298 K to 1025 K.

The certified thermal conductivity between 298 K and 1025 K is given by

$$\lambda \text{ [W/(m} \cdot \text{K)]} = 2.332 + 515.1 / T$$

The uncertainty of the certified thermal conductivity is  $\pm 6.5\ \text{[ \% ]}$  at the 95 % confidence level over the range from 298 K to 1025 K.

Availability: Glass-ceramic cylinders in different shapes (BCR-724A: diameter = 13.0 mm, height > 18 mm; BCR-724B: diameter = 13.9 mm, height > 21 mm; BCR-724D: diameter = 26.9 mm, height > 22 mm).

|                   | Description                  | Cold filter plugging point<br>CFPP Temperature ( $^{\circ}\text{C}$ ) |       |     | Cloud point<br>CP ( $^{\circ}\text{C}$ ) |       |     |
|-------------------|------------------------------|---|-------|-----|--|-------|-----|
|                   |                              |   | $\pm$ |     |  | $\pm$ |     |
| <b>ERM-FC395k</b> | Gasoil                       | - 7.9   | $\pm$ | 1.6 | - 7.2                                    | $\pm$ | 3.0 |
| <b>ERM-EF002</b>  | Biodiesel (B100<br>Rapeseed) | - 15.2  | $\pm$ | 1.3 | - 4.5                                    | $\pm$ | 1.0 |
| <b>ERM-EF004</b>  | Diesel (B7)                  | - 27.9  | $\pm$ | 2.7 | - 6.8                                    | $\pm$ | 0.4 |

Values in brackets are not certified.

Availability: ERM-FC395k consists of a set two amber glass ampoules, each containing 27 mL of gas oil.

ERM-EF002 consists of a set two amber glass ampoules, each containing 27 mL of biodiesel

ERM-EF004 consists of a set two amber glass ampoules, each containing 27 mL of diesel (B7)

| Substance                           | ERM-EF411<br>Hard coal |          | ERM-EF412<br>Brown coal |          | ERM-EF413<br>Furnace coke |            |
|-------------------------------------|------------------------|----------|-------------------------|----------|---------------------------|------------|
| Gross calorific value (GCV) (MJ/kg) | 29.0                   | ± 0.4    | 26.02                   | ± 0.22   | 29.5                      | ± 0.4      |
| Net calorific value (NCV) (MJ/kg)   | 28.0                   | ± 0.4    | 24.98                   | ± 0.25   | 29.4                      | ± 0.5      |
| Volatile matter (g/100 g)           | 38.1                   | ± 1.0    | 50.1                    | ± 0.7    |                           |            |
| Ash (g/100 g)                       | 8.3                    | ± 0.7    | 4.11                    | ± 0.23   |                           |            |
| C (g/100 g)                         | 71.4                   | ± 1.0    | 66.2                    | ± 0.7    | 87.8                      | ± 1.9      |
| Ca (g/kg)                           |                        |          | 9.8                     | ± 0.4    | 2.92                      | ± 0.22     |
| Cd (mg/kg)                          |                        |          | (0.012                  | ± 0.004) |                           |            |
| Cl (mg/kg)                          | 99                     | ± 19     |                         |          | (350                      | ± 130)     |
| Co (mg/kg)                          | (3.5                   | ± 0.8)   |                         |          |                           |            |
| Cu (mg/kg)                          |                        |          | (0.68                   | ± 0.22)  |                           |            |
| H (g/100 g)                         | 4.80                   | ± 0.14   | 4.88                    | ± 0.15   |                           |            |
| Hg (mg/kg)                          | (0.079                 | ± 0.015) | 0.071                   | ± 0.011  |                           |            |
| K (mg/kg)                           |                        |          | 229                     | ± 18     |                           |            |
| Mg (g/kg)                           |                        |          | (3.73                   | ± 0.16)  | (0.00123                  | ± 0.00019) |
| Mn (mg/kg)                          |                        |          | 48.6                    | ± 1.9    |                           |            |
| N (g/100 g)                         | 1.43                   | ± 0.10   | 0.74                    | ± 0.06   | 1.10                      | ± 0.07     |
| Na (g/kg)                           |                        |          | 2.20                    | ± 0.12   | 0.64                      | ± 0.07     |
| Pb (mg/kg)                          |                        |          | (0.25                   | ± 0.05)  | (8.41                     | ± 1.6)     |
| S (g/100 g)                         | 0.598                  | ± 0.017  | 0.360                   | ± 0.023  | 0.58                      | ± 0.12     |
| Sb (mg/kg)                          | (1.5                   | ± 0.4)   | (0.024                  | ± 0.004) |                           |            |
| Se (mg/kg)                          | 5.1                    | ± 1.0    | 0.96                    | ± 0.14   | 1.33                      | ± 0.26     |
| Tl (mg/kg)                          | (0.24                  | ± 0.07)  |                         |          |                           |            |
| V (mg/kg)                           | (22                    | ± 7)     | 0.57                    | ± 0.04   |                           |            |
| Zn (mg/kg)                          | (13                    | ± 4)     | (0.99                   | ± 0.18)  | 16.0                      | ± 2.5      |

Values in brackets are not certified.

Availability: ERM-EF411, ERM-EF412 and ERM-EF413 are available in units of about 50 g in aluminium-laminated sachets.

## 4.2 CERTIFIED FOR MECHANICAL PROPERTIES

### Shear testing of powders BCR-116

The flow of powders or granulated materials under the force of gravity affects the design and operation of silos used for their bulk storage. The European Federation of Chemical Engineering (EFCE) therefore developed a test method, based on the Jenike Shear Cell, to determine the shear strength of powders under different compaction and loading conditions. The complexity of this method is such that errors due to poor technique can easily arise. A reference material has therefore been produced with which laboratories can verify both their equipment and experimental technique.

Essentially the EFCE method consists of using a known load to compact a powder sample into a cylindrical Jenike Cell composed of two metal rings one upon the other. Having reached critical compaction of the powder, the steady state force necessary to displace the upper ring horizontally with respect to the lower one is determined with the compaction load still applied. Having established steady state shear the normal load on the powder is then reduced and the horizontal force necessary to continue to shear the powder is determined. It is this variation of the shear force as a function of the reduced normal load for a given compaction load which characterizes the powder.

The reference material consists of 3 kg of limestone powder packed in a polyethylene jar. It is accompanied by a certificate giving shear stress as a function of normal applied stress for four different powder compaction stresses.

## Creep BCR-425

Creep is the progressive deformation of a material under load. Metallic materials are usually tested at elevated temperatures for periods of 1 000 to 100 000 hours by surrounding them with a suitable constant temperature furnace. The need to operate under such conditions gives rise to problems of alignment, strain measurement, temperature measurement etc. which can result in considerable differences in results between laboratories.

BCR-425 was therefore developed to allow laboratories to validate their creep testing rigs and procedures as a whole within a reasonable time (500 to 600 hours) using a material whose properties are sensitive to test conditions.

The test piece is delivered in the form of a bar of 14 mm diameter and 500 mm length which must be machined by the laboratory to the required shape and size.

At a test temperature of 600 °C, using an applied stress of 160 Mpa the certified properties are as follows:

|                               |   |
|-------------------------------|---|
| Creep rate at 400 hours of    | (72 ± 5) 10 <sup>-6</sup> h <sup>-1</sup> |
| Time to a creep strain of 2 % | (278 ± 16) h                              |
| Time to a creep strain of 4 % | (557 ± 30) h                              |

## Nimonic 75 for ambient temperature tensile properties BCR-661

| Property                                 | Certified value |
|--|-----------------|
| 0.2 % proof stress R <sub>p0.2</sub>     | (300 ± 8) Mpa   |
| 0.5 % proof stress R <sub>p0.5</sub>     | (318 ± 7) Mpa   |
| Ultimate tensile strength R <sub>m</sub> | (750 ± 14) Mpa  |
| Elongation to fracture A                 | (40.9 ± 0.9) %  |
| Reduction in area Z                      | (60 ± 4) %      |

Availability: BCR-661B is supplied as 1 bar of 500 mm long, sufficient for the manufacture of three test-pieces of about 150 mm long.

## Scratch testing BCR-692

| Failure event   | Critical load           |                 |
|---|-------------------------|-----------------|
|   | Certified value (N)     | Uncertainty (N) |
| Forward chevron cracks at the borders of the scratch track.<br><i>(Lc<sub>1</sub> shall be taken at the closest end of the event to the scratch track start).</i>   | (Lc <sub>1</sub> ) 13.6 | 1.8             |
| Forward chevron cracks at the borders of the scratch track,<br>with local interfacial spallation or with gross interfacial spallation.<br><i>(Lc<sub>2</sub> shall be taken at the failure event that occurs first and at the closest end of the event to the scratch track start).</i> | (Lc <sub>2</sub> ) 17.0 | 2.1             |
| Gross interfacial shell-shaped spallation.<br><i>(Lc<sub>3</sub> shall be taken at the first point where the substrate can be seen at the <u>centre</u> of the track in a crescent that goes completely through the track).</i>   | (Lc <sub>3</sub> ) 28   | 2.9             |

Availability: The reference samples are (30x30x5) mm steel coupons coated with a diamond-like carbon coating (DLC) applied by plasma-assisted chemical vapour deposition. The coupons are distributed in a reusable plastic box containing desiccant.

## Impact toughness Charpy specimens

Impact toughness is the ability of a material to resist fracture under the effect of shock loading. It is determined by means of a conventional test defined in ISO and CEN Standards.

The test is sensitive to many sources of errors and therefore already 40 years ago, ASTM specification required testing machines to be verified periodically by reference specimens. The recent CEN standard (EN 10045-2: 1993) specifies that impact toughness machines should be certified by using the BCR certified reference Charpy specimens or other specimens traceable to the latter.

The reference specimens described here are supplied by groups of five. Their use must be done in accordance with the instructions given in the certification report, in particular with regard to degreasing. The fracture energy is certified for the CEN striker (knife of 2 mm radius).

Measurements generally need to be performed at 20°C, with the exception of ERM-FA013 where one batch has certified values at 0°C and 20°C to avoid jamming. We will deliver by default a batch certified by 20°C unless the order explicitly mentions the value at 0°C.

For each energy level there are several batches of slightly different values. The following table gives the nominal values, the certificate gives the actual values.

|                             |         |
|-----------------------------|---------|
| ERM-FA013 – Low Energy 20°C | 20-30 J |
| ERM-FA013 – Low Energy 0°C  | 20-30 J |
| ERM-FA015                   | 80 J    |
| ERM-FA016                   | 120 J   |
| ERM-FA415                   | 150J    |

## 4.3 CERTIFIED FOR MORPHOLOGICAL PROPERTIES

| Particle size distributions |                |                    |                 |               |
|-----------------------------|----------------|--------------------|-----------------|---------------|
|                             | Form of Quartz | Certified Property | Size Range (µm) | Unit Size (g) |
| <b>BCR-066</b>              | Powder         | Stokes' diameter   | 0.35 - 3.50     | 10            |
| <b>BCR-067</b>              | Powder         | Stokes' diameter   | 2.40 - 32.00    | 10            |
| <b>BCR-068</b>              | Sand           | Volume diameter    | 160.0 - 630.0   | 100           |
| <b>BCR-069</b>              | Powder         | Stokes' diameter   | 14.0 - 90.0     | 10            |
| <b>BCR-070</b>              | Powder         | Stokes' diameter   | 1.20 - 20.00    | 10            |

| Particle size distributions |                |                    |                 |               |
|-----------------------------|----------------|--------------------|-----------------|---------------|
|                             | Form of Quartz | Certified Property | Size Range (µm) | Unit Size (g) |
| <b>BCR-130</b>              | Powder         | Volume diameter    | 50 - 220        | 50            |
| <b>BCR-131</b>              | Powder         | Volume diameter    | 480 - 1800      | 200           |
| <b>BCR-132</b>              | Gravel         | Volume diameter    | 1400 - 5000     | 700           |

| Particle size distributions |  |                 |               |
|-----------------------------|--|-----------------|---------------|
| Corundum                    | Certified Property   | Size Range (µm) | Unit Size (g) |
| <b>ERM-FD066</b>            | Volume-weighted equivalent diameter by laser diffraction, Mie theory, wet dispersion | 1.44 - 7.45     | 20            |
|                             | Number-weighted equivalent diameter by scanning electron microscopy (SEM)            | 1.07 - 5.1      |               |
| <b>ERM-FD069</b>            | Volume-weighted equivalent diameter by laser diffraction, Fraunhofer approximation   | 13.9 - 79.8     | 40            |
|                             | Volume-weighted equivalent diameter by laser diffraction, Mie theory                 | 15.0 - 82       |               |
|                             | Number-weighted area-equivalent diameter by optical microscopy                       | 12.4 - 46       |               |

|                | Description      | Specific Surface Area (m <sup>2</sup> · g <sup>-1</sup> ) | Unit Size (g) |
|----------------|------------------|---|---------------|
| <b>BCR-169</b> | Alpha alumina    | 0.104 ± 0.012   | 60            |
| <b>BCR-170</b> | Alpha alumina    | 1.05 ± 0.05   | 60            |
| <b>BCR-171</b> | Alumina          | 2.95 ± 0.13   | 50            |
| <b>BCR-172</b> | Quartz           | 2.56 ± 0.10   | 10            |
| <b>BCR-173</b> | Titanium dioxide | 8.23 ± 0.21   | 46            |
| <b>BCR-175</b> | Tungsten         | 0.18 ± 0.04   | 200           |

### Mullite (3Al<sub>2</sub>O<sub>3</sub> · 2SiO<sub>2</sub>) BCR-301 (RM)

High crystallinity.

Vitreous phase 0.03 g/g. No other phase detected.

Impurities in g/kg:

|                                |       |                   |       |
|--------------------------------|-------|-------------------|-------|
| Fe <sub>2</sub> O <sub>3</sub> | < 2   | Na <sub>2</sub> O | < 1   |
| CaO                            | < 1.2 | K <sub>2</sub> O  | < 0.5 |
| MgO                            | < 0.5 | TiO <sub>2</sub>  | < 0.5 |

| Mullite <b>BCR-301 (RM)</b> |                      |                    |
|-----------------------------|----------------------|--------------------|
| Reflection                  | Lattice spacing (nm) | Relative intensity |
| [110]                       | 0.538 2              | 0.50               |
| [210]                       | 0.339 0              | 1                  |
| [220]                       | 0.269 5              | 0.40               |
| [121]                       | 0.220 6              | 0.59               |
| [331]                       | 0.152 4              | 0.36               |

|                | Description            | Micropore volume (cm <sup>3</sup> / g <sup>1</sup> ) | Median micropore width (nm) |
|----------------|------------------------|--|-----------------------------|
| <b>BCR-704</b> | Faujasite type zeolite | 0.205 ± 0.006  | 0.668 ± 0.019               |
| <b>BCR-705</b> | Linde type A zeolite   | 0.181 ± 0.006  | 0.592 ± 0.020               |

Availability: Glass bottle containing 10 g of pellets.

### Reference material for depth profiling by ion beam sputtering BCR-261T

In order to achieve the accuracy required when measuring compositional depth profiles using ion beam sputtering in association with Auger Electron Spectroscopy, a reference material of accurately known thickness on a stable substrate is required. BCR-261T is a tantalum pentoxide on tantalum foil reference material existing in two nominal thicknesses of 30 and 100 nm.

|                 | Nominal thickness (nm) | Certified values                             |                       |
|-----------------|------------------------|--|-----------------------|
|                 |                        | 10 <sup>21</sup> oxygen atoms/m <sup>2</sup> | oxide thickness ratio |
| <b>BCR-261T</b> | (30)                   | 1.72 ± 0.07                                  | 0.321 ± 0.013         |
|                 | (100)                  | 5.40 ± 0.12                                  |                       |

Values in brackets are not certified.

Availability: Four rectangular foils of 5 x 10 mm of each oxide thickness.

| <b>Colloidal Silica in water ERM-FD100</b>                 | Equivalent spherical diameter |                  |
|--|-------------------------------|------------------|
|  | Certified value (nm)          | Uncertainty (nm) |
| Intensity-weighted harmonic mean diameter (DLS)            | 19.0                          | 0.6              |
| Intensity-based modal Stokes diameter (CLS)                | 20.1                          | 1.3              |
| Number-based modal diameter (TEM/SEM)                      | 19.4                          | 1.3              |
| Intensity-weighted mean diameter (SAXS)                    | 21.8                          | 0.7              |
| Equivalent spherical diameter, volume-weighted mean (SAXS) | (20.4)                        | (1.6)            |
| Zeta Potential   | (- 43.0 mV)                   | (22 mV)          |

Values in brackets are not certified.

Availability: ERM-FD100 is available in 10 mL pre-scored amber glass ampoules containing approximately 9 mL of suspension.



| Colloidal Silica in aqueous solution ERM-FD304             | Equivalent spherical diameter |                  |
|--|-------------------------------|------------------|
|  | Certified value (nm)          | Uncertainty (nm) |
| Scattering intensity-weighted harmonic mean diameter (DLS) | 42.1                          | 0.6              |
| Extinction intensity-based modal Stokes (CLS)              | 33.0                          | 3.0              |
| Number-based modal diameter (TEM/SEM)                      | (27.8)                        | (1.5)            |

Values in brackets are not certified.

Availability: ERM-FD304 is available in 10 mL pre-scored amber glass ampoules containing approximately 9 mL of suspension.

| Mixture of Silica Nanoparticles in aqueous solution: ERM-FD102            | Equivalent diameter  |                  |                      |                  |
|---|----------------------|------------------|----------------------|------------------|
|   | Size class A         |                  | Size class B         |                  |
|   | Certified value (nm) | Uncertainty (nm) | Certified value (nm) | Uncertainty (nm) |
| Scattering intensity-weighted arithmetic mean hydrodynamic diameter (DLS) | 17.8                 | 1.5              | 88.5                 | 2.2              |
| Extinction intensity-weighted modal Stokes' diameter (CLS)                | 23.9                 | 2.0              | 88                   | 7                |
| Number-weighted modal area-equivalent diameter (TEM and SEM)              | 18.2                 | 1.6              | 84.0                 | 2.1              |
| Number-weighted median area-equivalent diameter (TEM and SEM)             | 18.3                 | 1.7              | 83.3                 | 2.3              |
| Number-weighted mean hydrodynamic diameter (PTA)                          | -                    | -                | (82)                 | (4)              |
| Number-weighted modal maximum particle height (ATM)                       | (16.9)               | (1.8)            | (80)                 | (6)              |

Values in brackets are not certified. More indicative & information values are given on the certificate

Availability: ERM-FD102 is available in 10 mL pre-scored amber glass ampoules containing approximately 9 mL of suspension.

| Mixture of Silica Nanoparticles in aqueous solution: ERM-FD101b      | Size distribution parameter: Weighting / Averaging                                    | Certified value [nm] | Uncertainty [nm] |
|--|---|----------------------|------------------|
| Hydrodynamic diameter from DLS (cumulants method)                    | Scattered light intensity-weighted / harmonic mean                                    | 89.5                 | 2.3              |
| Hydrodynamic diameter from DLS (distribution calculation algorithms) | Scattered light intensity-weighted / mean (arithmetic, harmonic, geometric) and modal | 93                   | 4                |
| Hydrodynamic diameter from PTA                                       | Number-weighted / modal   | 82                   | 4                |
|  | Number-weighted / arithmetic mean   | 87                   | 4                |
|  | Number-weighted / median  | 82                   | 4                |
| Stokes diameter from CLS <sup>1</sup> (turbidimetry)                 | Light extinction-weighted / modal   | 87                   | 8                |
| Area-equivalent diameter from EM                                     | Number-weighted / modal   | 83.7                 | 2.2              |
|  | Number-weighted / median  | 83.5                 | 2.2              |
| Mean particle diameter from SAXS (model fitting)                     | Scattered X-ray intensity-weighted / modal  | 82.5                 | 1.8              |
|  | Volume-weighted / modal   | 81.7                 | 1.8              |
|  | Number-weighted / modal   | 80.9                 | 1.7              |
| Mean particle diameter from SAXS (Guinier approximation)             | (Volume)-weighted / mean  | (87)                 | (6)              |

Values in brackets are not certified. More material information is given on the certificate

Availability: ERM-FD101b is available in 10 mL pre-scored amber glass ampoules containing approximately 9 mL of suspension.

## ERM-FD103: TITANIUM DIOXIDE NANORODS IN 1- BUTANOL

| Size parameter  | Weighting / Averaging    | Certified value [nm] | Uncertainty [nm] |
|---|--------------------------|----------------------|------------------|
| Minimum Feret diameter (F <sub>min</sub> )            | Number-weighted / mode   | 16.0                 | 0.9              |
|   | Number-weighted / Median | 16.1                 | 0.9              |
| Maximum Feret diameter (F <sub>max</sub> )            | Number-weighted / mode   | 53.5                 | 2.6              |
|   | Number-weighted / Median | 54.0                 | 2.4              |
| Maximum inscribed circle diameter                     | Number-weighted / mode   | 15.1                 | 0.7              |
|   | Number-weighted / Median | 15.1                 | 0.7              |
| Area-equivalent diameter (ECD)                        | Number-weighted / mode   | 29.8                 | 1.2              |
|   | Number-weighted / Median | 29.9                 | 1.3              |
| Shape parameter                                       | Weighting / Averaging    | Certified value      | Uncertainty      |
| Aspect ratio 1) (F <sub>min</sub> /F <sub>max</sub> ) | Number-weighted / mode   | 0.298                | 0.018            |
|   | Number-weighted / Median | 0.296                | 0.013            |

Values in brackets are not certified. More material information is given on the certificate

Availability: ERM-FD103 is available in 5 mL pre-scored amber glass ampoules containing approximately 2 mL of suspension.

## 5 MATERIALS RELATED TO INDUSTRIAL APPLICATIONS

### 5.1 CERTIFIED FOR COMPOSITION

| Certified Parameter                   | IRMM-441<br>n-Heptane<br>(g/kg) | IRMM-442<br>Isooctane<br>(g/kg) |
|---------------------------------------|---------------------------------|---------------------------------|
| Isooctane, purity by difference       |                                 | 999.85 ± 0.05                   |
| n-Heptane, purity by difference       | 999.85 ± 0.05                   |                                 |
| <b>Impurities</b>                     |                                 |                                 |
| Total organics (other than isooctane) |                                 | 0.11 ± 0.04                     |
| Total organics (other than n-Heptane) | 0.12 ± 0.05                     |                                 |
| Isooctane                             | 0.07 ± 0.02                     |                                 |
| n-Heptane                             |                                 | 0.02 ± 0.02                     |
| Water                                 | 0.03 ± 0.02                     | 0.04 ± 0.02                     |

Availability: IRMM-441 and -442 are supplied in ampoules of 100 mL.

| ERM-EF001 – Biodiesel certified for selected parameters specified in EN 14214 | Unit               | Certified values |
|---|--------------------|------------------|
| Ester content   | % (m/m)            | 98.9 ± 1.7       |
| Linolenic acid methyl ester content   | % (m/m)            | 8.82 ± 0.16      |
| Triglyceride content  | % (m/m)            | <0.1             |
| Density (at 15 °C)  | kg/m <sup>3</sup>  | 883.20 ± 0.04    |
| Viscosity (at 40 °C)  | mm <sup>2</sup> /s | 4.465 ± 0.005    |
| Oxidation stability (at 110 °C)   | h                  | 9.8 ± 0.5        |
| Iodine value  | g iodine/100 g     | 112 ± 4          |
| Flash point   | °C                 | 181 ± 14         |

Availability: Vials containing about 27 mL of biodiesel.

| ERM-EF003 - Diesel (B7) certified for selected parameters specified in EN 590 | Unit               | Certified values |
|---|--------------------|------------------|
| Fatty acid methyl ester content   | % (V/V)            | 6.88 ± 0.17      |
| Mono-aromatic hydrocarbon content   | % (m/m)            | 18.8 ± 0.7       |
| Di-aromatic hydrocarbon content   | % (m/m)            | 1.84 ± 0.19      |
| Polycyclic aromatic hydrocarbon content                                       | % (m/m)            | 2.01 ± 0.25      |
| Total aromatic hydrocarbon content  | % (m/m)            | 20.8 ± 0.9       |
| Density (at 15.0 °C)  | kg/m <sup>3</sup>  | 837.23 ± 0.07    |
| Kinematic viscosity (at 40.0 °C)  | mm <sup>2</sup> /s | 2.892 ± 0.012    |
| Lubricity   | µm                 | 220 ± 60         |

Availability: Vials containing about 27 mL of diesel (B7)

|                  | Description               | Cold filter plugging point<br>CFPP Temperature (°C) | Cloud point<br>CP (°C) |
|------------------|---------------------------|---|------------------------|
| <b>ERM-EF002</b> | Biodiesel (B100 Rapeseed) | - 15.2 ± 1.3  | - 4.5 ± 1.0            |
| <b>ERM-EF004</b> | Diesel (B7)               | - 27.9 ± 2.7  | - 6.8 ± 0.4            |

Availability: ERM-EF002 consists of a set of two amber glass ampoules, each containing 27 mL of biodiesel.

ERM-EF004 consists of a set of two amber glass ampoules, each containing 27 mL of diesel (B7).

|                | Description             | Substance                      | Certified values |        |       |        |
|----------------|-------------------------|--------------------------------|------------------|--------|-------|--------|
| <b>BCR-032</b> | Moroccan Phosphate rock | CaO                            | 518              | ±      | 4     | g/kg   |
|                |                         | P <sub>2</sub> O <sub>5</sub>  | 329.8            | ±      | 1.7   | g/kg   |
|                |                         | CO <sub>2</sub>                | 51.0             | ±      | 0.8   | g/kg   |
|                |                         | F                              | 40.4             | ±      | 0.6   | g/kg   |
|                |                         | SiO <sub>2</sub>               | 20.9             | ±      | 1.2   | g/kg   |
|                |                         | SO <sub>3</sub>                | 18.4             | ±      | 0.8   | g/kg   |
|                |                         | Al <sub>2</sub> O <sub>3</sub> | 5.5              | ±      | 0.6   | g/kg   |
|                |                         | MgO                            | 4.0              | ±      | 0.1   | g/kg   |
|                |                         | Fe <sub>2</sub> O <sub>3</sub> | 2.3              | ±      | 0.1   | g/kg   |
|                |                         | As                             | (9.5             | ±      | 0.5   | mg/kg) |
|                |                         | B                              | (22.6            | ±      | 2.2   | mg/kg) |
|                |                         | Cd                             | (20.8            | ±      | 0.7   | mg/kg) |
|                |                         | Cr                             | (257             | ±      | 16    | mg/kg) |
|                |                         | Co                             | (0.59            | ±      | 0.06  | mg/kg) |
|                |                         | Cu                             | (33.7            | ±      | 1.4   | mg/kg) |
|                |                         | Hg                             | (0.055           | ±      | 0.011 | mg/kg) |
|                |                         | Mn                             | (18.8            | ±      | 1.3   | mg/kg) |
|                |                         | Ni                             | (34.6            | ±      | 1.9   | mg/kg) |
| Ti             | (171                    | ±                              | 10               | mg/kg) |       |        |
| V              | (153                    | ±                              | 7                | mg/kg) |       |        |
| Zn             | (253                    | ±                              | 6                | mg/kg) |       |        |

Values in brackets are not certified.

Availability: Units of about 100 g in the form of fine powder.

|                | Description | Substance | Certified values (g/kg) |   |     |
|----------------|-------------|-----------|-------------------------|---|-----|
| <b>BCR-010</b> | Tin ore     | Sn        | 765.9                   | ± | 1.2 |

Availability: This CRM is contained in brown glass bottles. The approximate quantity per unit is 225 g.

|                | Description              | Substance           | Certified values (g/kg) |   |      |
|----------------|--------------------------|---------------------|-------------------------|---|------|
| <b>BCR-113</b> | Potassium Chloride       | K                   | 502.5                   | ± | 1.1  |
|                |                          | Cl                  | 478.0                   | ± | 0.9  |
|                |                          | Na                  | 15.3                    | ± | 0.2  |
|                |                          | Ca                  | 1.03                    | ± | 0.04 |
|                |                          | Mg                  | 0.24                    | ± | 0.01 |
| <b>BCR-114</b> | Potassium Sulphate       | water soluble K     | 501.3                   | ± | 0.7  |
|                |                          | K                   | 418.0                   | ± | 0.9  |
|                |                          | SO <sub>4</sub>     | 533                     | ± | 2    |
|                |                          | Cl                  | 18.5                    | ± | 0.1  |
|                |                          | Na                  | 11.0                    | ± | 0.1  |
|                |                          | Ca                  | 9.4                     | ± | 0.2  |
| <b>BCR-178</b> | Calcium Ammonium Nitrate | Mg                  | 0.74                    | ± | 0.01 |
|                |                          | water soluble K     | 417.6                   | ± | 0.8  |
|                |                          | NH <sub>4</sub> – N | 130.44                  | ± | 0.32 |
|                |                          | NO <sub>3</sub> – N | 130.15                  | ± | 0.57 |
| <b>BCR-179</b> | Urea                     | total – N           | 260.19                  | ± | 0.54 |
|                |                          | Ca                  | 88.82                   | ± | 0.27 |
|                |                          | total – N           | 465.4                   | ± | 0.8  |
|                |                          | Uric – n            | 460.9                   | ± | 0.9  |
|                |                          | Biuret              | 10.37                   | ± | 0.11 |

Availability: Units of about 100 g in the form of fine powder.

| Substance  | BCR-126A<br>Lead crystal glass<br>(cg/g) |   |                           | BCR-126B<br>Lead crystal glass<br>(cg/g) |   |                           |
|--|--|---|---------------------------|--|---|---------------------------|
|  |  | ± |                           |  | ± |                           |
| SiO <sub>2</sub>   | 57.80                                    | ± | 0.11                      | 57.87                                    | ± | 0.18                      |
| PbO  | 23.98                                    | ± | 0.06                      | 24.09                                    | ± | 0.13                      |
| K <sub>2</sub> O   | 9.99                                     | ± | 0.07                      | 9.98                                     | ± | 0.13                      |
| Al <sub>2</sub> O <sub>3</sub>                             | 0.126                                    | ± | 0.013                     | 0.137                                    | ± | 0.027                     |
| Fe <sub>2</sub> O <sub>3</sub>                             | 0.005 5                                  | ± | 0.001 2                   | 0.006 0                                  | ± | 0.001 6                   |
| Sb <sub>2</sub> O <sub>3</sub>                             | 0.291                                    | ± | 0.012                     | 0.291                                    | ± | 0.019                     |
| BaO  | 1.053                                    | ± | 0.030                     | 1.03                                     | ± | 0.05                      |
| CaO  | 1.033                                    | ± | 0.030                     | 1.01                                     | ± | 0.05                      |
| MgO  | 0.512                                    | ± | 0.013                     | 0.513                                    | ± | 0.023                     |
| ZnO  | 1.01                                     | ± | 0.04                      | 1.00                                     | ± | 0.04                      |
| Na <sub>2</sub> O  | 3.57                                     | ± | 0.07                      | 3.59                                     | ± | 0.11                      |
| Li <sub>2</sub> O  | 0.494                                    | ± | 0.016                     | 0.487                                    | ± | 0.015                     |
| Density at 20 °C   | 2.990 5                                  | ± | 0.001 6 g/cm <sup>3</sup> | 2.994 7                                  | ± | 0.002 6 g/cm <sup>3</sup> |
| Refractive index n <sub>D</sub> <sup>20 °C</sup> at 589 nm | 1.559 67                                 | ± | 0.000 22                  | 1.560 04                                 | ± | 0.000 18                  |

Availability: In the form of square plates (100 × 100 mm) and 10 mm thickness.

## 5.2 CERTIFIED FOR TRACE ELEMENT CONTENT

|                  | Material      | Certified value   | Form   | Unit   |
|------------------|---------------|---|--|--|
| <b>IRMM-521</b>  | Ni            | < 0.1 mg Co kg <sup>-1</sup>  | B: 0.5 mm wire<br>R: 0.1 mm foil                                     | 100 cm <sup>2</sup> (1.8 g)<br>75 cm <sup>2</sup> (6.7 g)                                |
| <b>IRMM-522</b>  | Cu            | < 0.05 mg Co kg <sup>-1</sup><br>0.95 ± 0.04 mg Ag kg <sup>-1</sup> | A: 0.1 mm foil<br>B: 1.0 mm foil<br>C: 0.5 mm wire<br>D: 1.0 mm wire | 100 cm <sup>2</sup> (8.9 g)<br>20 cm <sup>2</sup> (17.8 g)<br>1 m (1.8 g)<br>1 m (7.0 g) |
| <b>IRMM-523</b>  | Al            | < 0.1 mg Na kg <sup>-1</sup>  | A: 0.1 mm foil<br>B: 1.0 mm foil<br>C: 1.0 mm wire                   | 100 cm <sup>2</sup> (2.7 g)<br>20 cm <sup>2</sup> (5.4 g)<br>1 m (2.1 g)                 |
| <b>IRMM-524</b>  | Fe            | < 0.05 mg Co kg <sup>-1</sup><br>< 0.1 mg Mn kg <sup>-1</sup>       | A: 0.1 mm foil<br>B: 0.5 mm wire                                     | 100 cm <sup>2</sup> (7.9 g)<br>1 m (1.6 g)   |
| <b>IRMM-525</b>  | Nb            | 19.6 ± 1.8 mg Ta kg <sup>-1</sup>                                   | A: 0.02 mm foil<br>C: 0.5 mm wire                                    | 20 cm <sup>2</sup> (0.3 g)<br>1 m (1.7 g)  |
| <b>IRMM-526</b>  | Nb            | 0.30 ± 0.09 mg Ta kg <sup>-1</sup>                                  | A: 0.02 mm foil<br>B: 0.1 mm foil<br>C: 0.5 mm wire                  | 20 cm <sup>2</sup> (0.3 g)<br>20 cm <sup>2</sup> (1.7 g)<br>1 m (1.7 g)                  |
| <b>IRMM-529</b>  | Rh            | < 5 g Pt kg <sup>-1</sup><br>26.0 ± 0.6 g Ir kg <sup>-1</sup>       | 0.05 mm foil   | 20 cm <sup>2</sup> (1.2 g)   |
| <b>IRMM-531</b>  | Ti            | < 0.1 mg Sc kg <sup>-1</sup>  | A: 0.1 mm foil<br>B: 0.5 mm foil<br>C: 0.5 mm wire                   | 100 cm <sup>2</sup> (4.5 g)<br>20 cm <sup>2</sup> (4.5 g)<br>1 m (1 g)                   |
| <b>IRMM-527R</b> | Al – 0.1% Co  | 1.001 ± 0.024 g Co kg <sup>-1</sup>                                 | A: 0.1 mm foil<br>B: 0.5 mm wire<br>C: 1.0 mm wire                   | 100 cm <sup>2</sup> (2.7 g)<br>1 m (0.5 g)<br>1 m (2.1 g)                                |
| <b>IRMM-528R</b> | Al – 1.0% Co  | 10.02 ± 0.23 g Co kg <sup>-1</sup>                                  | A: 0.1 mm foil<br>C: 1.0 mm wire                                     | 100 cm <sup>2</sup> (2.7 g)<br>1 m (2.1 g)   |
| <b>IRMM-530R</b> | Al – 0.1% Au  | 1.003 ± 0.012 g Au kg <sup>-1</sup>                                 | A: 0.1 mm foil<br>C: 1.0 mm wire                                     | 100 cm <sup>2</sup> (2.7 g)<br>1 m (2.1 g)   |
| <b>ERM-EB530</b> | Al – 0.1% Au  | 1.005 ± 0.007 g Au kg <sup>-1</sup>                                 | A: 0.1 mm foil<br>B: 0.5 mm wire<br>C: 1.0 mm wire                   | 50 cm <sup>2</sup> (1.4 g)<br>1 m (0.5 g)<br>1 m (2.1 g)                                 |
| <b>IRMM-532</b>  | Al – 0.01% Co | 0.100 0 ± 0.002 5 g Co kg <sup>-1</sup>                             | A: 0.1 mm foil<br>B: 0.5 mm wire<br>C: 1.0 mm wire                   | 100 cm <sup>2</sup> (2.7 g)<br>1 m (0.5 g)<br>1 m (2.1 g)                                |
| <b>IRMM-533</b>  | Al – 0.1% Ag  | 0.996 ± 0.017 g Ag kg <sup>-1</sup>                                 | A: 0.1 mm foil<br>B: 0.5 mm wire<br>C: 1.0 mm wire                   | 100 cm <sup>2</sup> (2.7 g)<br>1 m (0.5 g)<br>1 m (2.1 g)                                |
| <b>IRMM-534</b>  | Al – 2.0% Sc  | 19.95 ± 0.20 g Sc kg <sup>-1</sup>                                  | A: 0.1 mm foil<br>B: 0.5 mm wire<br>C: 1.0 mm wire                   | 100 cm <sup>2</sup> (2.7 g)<br>1 m (0.5 g)<br>1 m (2.1 g)                                |

|  | Description                       | Substance | Certified value (mg/kg) | Form, dimensions <sup>1)</sup> and availability  |
|--|-----------------------------------|-----------|-------------------------|--|
| <b>BCR-017A</b><br><b>BCR-017B</b><br><b>BCR-022A</b>                                      | Copper                            | P         | 6.85 ± 0.29             | A: Ø 42 mm, h 30 mm<br>B: chips (bottle with 50 g)<br>Ø 26 mm, h 9 mm  |
| <b>BCR-022B</b>  | Copper (electrolytic tough pitch) | S         | 10.4 ± 0.6              |  |
| <b>BCR-054R</b><br><b>BCR-058</b>  | Copper (electrolytic tough pitch) | O         | 138 ± 7                 |  |
|  | Copper (low oxygen)               | O         | 138 ± 7                 |  |
|  | Copper (continuous cast)          | O         | 0.47 ± 0.07             |  |
| <b>BCR-024B</b><br><b>BCR-024C</b><br><b>BCR-059A</b><br><b>BCR-059B</b><br><b>BCR-318</b> | Titanium                          | N         | 117 ± 13                | B: 25 cubes of 0.4 g<br>C: 25 cubes of 0.2 g<br>A: Ø 26 mm, h 9 mm<br>B: 25 cubes of 0.2 g<br>Ø 7 mm, h 1 mm<br>(bottle with 75 approx. 100 discs) |
|  | Titanium alloy Ti6Al4V            | O         | 608 ± 23                |  |
|  |                                   | O         | 1750 ± 70               |  |
|  |                                   | N         | 172 ± 27                |  |
|  |                                   | H         | 12.2 ± 0.6              |  |
| <b>BCR-275</b>   | Zirconium alloy Zircaloy-4        | O         | 1670 ± 50               | Ø 13 mm, h 1 mm<br>(bottle with 10 discs)  |
|  |                                   | N         | 39.0 ± 1.7              |  |
|  |                                   | C         | 113 ± 4                 |  |
| <b>BCR-276</b>   | Zirconium alloy Zircaloy-4        | O         | 1540 ± 80               | Ø 4.5 mm, h 2 mm<br>(bottle with 75 approx. 100 discs)   |
|  |                                   | N         | 41 ± 9                  |  |
|  |                                   | C         | 108 ± 11                |  |
| <b>BCR-102</b>   | Tungsten carbide powder           | O         | 185 ± 4                 | Bottles containing 2 – 3 g powder, sealed under argon in an aluminium container  |

1) Ø = diameter, h = height

| Substance | <b>BCR-286</b><br>Electrolytically refined lead (mg/kg) | <b>BCR-287</b><br>Thermally refined lead (mg/kg) | <b>BCR-288</b><br>Lead with added impurities (mg/kg) |
|-----------|---|--|--|
| Ag        |   | 15.20 ± 0.21                                     |  |
| As        |   |  | 55.7 ± 1.6   |
| Bi        | 21.5 ± 0.5  | 67.3 ± 1.1                                       | 215.8 ± 2.4  |
| Cd        |   | 0.356 ± 0.024                                    | 33.3 ± 0.9   |
| Cu        |   | 0.98 ± 0.05                                      | 19.3 ± 0.4   |
| Sb        | 0.099 ± 0.021   | 0.040 ± 0.015                                    |  |
| Se        |   |  | < 0.2  |
| Te        |   |  | 32.8 ± 1.3   |
| Tl        | 2.47 ± 0.07   | 0.73 ± 0.04                                      | 2.26 ± 0.08  |
| Zn        | < 0.1   | < 0.1  | 8.2 ± 0.4  |

Availability: CRMs are available as follows: BCR-286A and -287A: blocks of 60 × 60 × 12 mm, BCR-286B, -287B and -288B: chips in bottles containing about 160 g.

| Substance | <b>BCR-321</b><br>Unalloyed zinc (mg/kg) | <b>ERM-EB322</b><br>Unalloyed zinc (mg/kg) | <b>ERM-EB323</b><br>Unalloyed zinc (mg/kg) | <b>ERM-EB324</b><br>Unalloyed zinc (mg/kg) | <b>ERM-EB325</b><br>Unalloyed zinc (mg/kg) | <b>BCR-326</b><br>Unalloyed zinc (mg/kg) | <b>BCR-327</b><br>Unalloyed zinc (mg/kg) |
|-----------|--|--|--|--|--|--|--|
| Al        | < 0.7                                    |  |  |  |  |  |  |
| Cd        | (0.23 ± 0.03)                            | 15.08 ± 0.30                               | 6.51 ± 0.21                                | 48.6 ± 1.1                                 | 94.7 ± 2.5                                 | 203.0 ± 2.0                              | 301.4 ± 2.3                              |
| Cu        | (0.97 ± 0.05)                            | 5.89 ± 0.15                                | 18.9 ± 0.4                                 | 9.87 ± 0.18                                | 47.5 ± 2.0                                 | 104.8 ± 2.7                              | (0.56 ± 0.11)                            |
| Fe        | (2.22 ± 0.14)                            | 19.1 ± 0.8                                 | 11.3 ± 0.7                                 | 58.5 ± 1.6                                 | 56.1 ± 3.3                                 | 264.8 ± 2.1                              | 144.0 ± 1.3                              |
| In        | < 0.2                                    |  |  |  |  |  |  |
| Pb        | 4.85 ± 0.20                              | 15.0 ± 0.5                                 | 48.6 ± 0.9                                 | 26.1 ± 0.5                                 | 142 ± 9                                    | 307.0 ± 1.6                              | 409.4 ± 2.3                              |
| Sn        | < 0.5                                    | 5.6 ± 0.6                                  | 18.7 ± 0.7                                 | 9.8 ± 0.5                                  | 46.1 ± 2.0                                 |  |  |
| Tl        | 0.78 ± 0.10                              | 5.28 ± 0.30                                | 10.8 ± 0.5                                 | 19.9 ± 0.5                                 | 36.8 ± 1.2                                 |  |  |

Values in brackets are not certified.

Availability: Discs of 80 mm diameter and 20 mm thickness (BCR-321, -326, -327) and 60 mm diameter, 30 mm thickness, respectively (ERM-EB322, EB323, EB324 and EB325).

| Substance | BCR-351<br>ZnAl4<br>(mg/kg)    | BCR-352<br>ZnAl4<br>(mg/kg)    | BCR-353<br>ZnAl4<br>(mg/kg)  | BCR-354<br>ZnAl4<br>(mg/kg)    | BCR-355<br>ZnAl4<br>(mg/kg)    |
|-----------|--------------------------------|--------------------------------|------------------------------|--------------------------------|--------------------------------|
| Al        | $[43.55 \pm 0.11] \times 10^3$ | $[41.50 \pm 0.10] \times 10^3$ | $[39.5 \pm 0.4] \times 10^3$ | $[37.27 \pm 0.16] \times 10^3$ | $[34.43 \pm 0.13] \times 10^3$ |
| Cd        | (0.21 $\pm$ 0.03)              | 2.88 $\pm$ 0.12                | 10.44 $\pm$ 0.16             | 29.7 $\pm$ 0.4                 | 58.1 $\pm$ 0.4                 |
| Cu        | 12.13 $\pm$ 0.15               | 31.26 $\pm$ 0.29               | 100.0 $\pm$ 0.8              | 312.3 $\pm$ 2.5                | 1035 $\pm$ 6                   |
| In        | < 0.2                          | 3.02 $\pm$ 0.28                | 2.55 $\pm$ 0.23              | 9.8 $\pm$ 0.9                  | 24.6 $\pm$ 1.4                 |
| Mg        | 131.0 $\pm$ 0.9                | 283.0 $\pm$ 1.8                | 452.5 $\pm$ 2.4              | 602 $\pm$ 5                    | 786 $\pm$ 6                    |
| Ni        | (1.9 $\pm$ 0.6)                | 6.74 $\pm$ 0.16                |                              | 83.1 $\pm$ 2.9                 | 268 $\pm$ 8                    |
| Pb        | 4.50 $\pm$ 0.20                | (6.4 $\pm$ 1.6)                | 24.4 $\pm$ 1.3               | 30.8 $\pm$ 1.2                 | 56.9 $\pm$ 1.9                 |
| Sn        | < 1                            | 3.0 $\pm$ 0.7                  | 5.6 $\pm$ 0.6                | 14.1 $\pm$ 1.1                 | 29.1 $\pm$ 2.0                 |
| Tl        | 0.74 $\pm$ 0.06                | 3.2 $\pm$ 0.4                  | 3.95 $\pm$ 0.22              | 11.01 $\pm$ 0.20               | 23.25 $\pm$ 0.28               |

Values in brackets ( ) are not certified.

Availability: Discs of 80 mm diameter and 20 mm thickness.

|    | BCR-356<br>ZnAl4Cu1<br>(mg/kg)  | BCR-357<br>ZnAl4Cu1<br>(mg/kg)  | BCR-360<br>ZnAl4Cu1<br>(mg/kg) | BCR-361<br>ZnAl4Cu1<br>(mg/kg) |
|----|---------------------------------|---------------------------------|--------------------------------|--------------------------------|
| Al | $[44.34 \pm 0.11] \times 10^3$  | $[42.27 \pm 0.11] \times 10^3$  | $[34.27 \pm 0.12] \times 10^3$ | $[40.68 \pm 0.19] \times 10^3$ |
| Cd | 0.73 $\pm$ 0.09                 | 2.83 $\pm$ 0.10                 | 59.5 $\pm$ 0.6                 | (0.80 $\pm$ 0.17)              |
| Cu | $[3.944 \pm 0.022] \times 10^3$ | $[5.849 \pm 0.021] \times 10^3$ | $[12.34 \pm 0.05] \times 10^3$ | $[7.98 \pm 0.04] \times 10^3$  |
| Fe | 31.5 $\pm$ 0.6                  | 25.7 $\pm$ 1.2                  |                                | 10.34 $\pm$ 0.26               |
| In | < 0.2                           | 3.30 $\pm$ 0.14                 | 29.8 $\pm$ 0.6                 | (< 0.2)                        |
| Mg | 132.3 $\pm$ 1.8                 | 273 $\pm$ 4                     | 705 $\pm$ 5                    |                                |
| Ni | 3.43 $\pm$ 0.19                 | 9.82 $\pm$ 0.25                 | 267 $\pm$ 8                    |                                |
| Pb | 9.87 $\pm$ 0.23                 | 13.8 $\pm$ 0.6                  | 73.9 $\pm$ 1.4                 | 5.31 $\pm$ 0.20                |
| Sn | (0.32 $\pm$ 0.16)               | 3.51 $\pm$ 0.14                 | 33.0 $\pm$ 0.8                 | 46.3 $\pm$ 0.9                 |
| Tl | 0.79 $\pm$ 0.05                 | 2.76 $\pm$ 0.05                 | 25.9 $\pm$ 0.7                 | 37.4 $\pm$ 0.5                 |

Values in brackets ( ) are not certified.

Availability: Discs of 80 mm diameter and 20 mm thickness.

| Substance | BCR-089<br>TiAl6V4<br>(mg/kg) |
|-----------|-------------------------------|
| Al        | 59700 $\pm$ 400               |
| C         | 38 $\pm$ 10                   |
| B         |                               |
| Co        |                               |
| Cr        | 122 $\pm$ 6                   |
| Cu        | 10.3 $\pm$ 1.2                |
| Fe        | 515 $\pm$ 16                  |
| H         | 31 $\pm$ 5                    |
| Hf        | 0.126 $\pm$ 0.011             |
| Mn        | 4.2 $\pm$ 0.6                 |
| Mo        | 15.2 $\pm$ 1.8                |
| N         | 212 $\pm$ 33                  |
| Nb        |                               |
| Ni        | 106 $\pm$ 7                   |
| O         | 1660 $\pm$ 60                 |
| Sb        | 1.94 $\pm$ 0.12               |
| Sn        | 10.4 $\pm$ 1.7                |
| Ta        | 0.30 $\pm$ 0.09               |
| V         | 39760 $\pm$ 290               |
| W         | 1.6 $\pm$ 0.4                 |
| Zr        | 2.8 $\pm$ 0.6                 |

Values in brackets are not certified.

Availability: BCR-089: Cylinder of 40 mm  $\varnothing$  and 20 mm height.

| Substance | ERM-EB090a                            |   |         | ERM-EB090b                            |   |         | BCR-090a, BCR-090b                    |   |        |
|-----------|---------------------------------------|---|---------|---------------------------------------|---|---------|---------------------------------------|---|--------|
|           | Titanium with added impurities [g/kg] |   |         | Titanium with added impurities [g/kg] |   |         | Titanium with added impurities [g/kg] |   |        |
| Al        | 0.78                                  | ± | 0.05    | 0.78                                  | ± | 0.05    |                                       |   |        |
| B         | (0.078                                | ± | 0.009)  | (0.078                                | ± | 0.007)  | 0.0282                                | ± | 0.0014 |
| Co        | 0.457                                 | ± | 0.017   | 0.457                                 | ± | 0.016   | 0.501                                 | ± | 0.014  |
| Cr        | 0.471                                 | ± | 0.011   | 0.471                                 | ± | 0.009   | 0.533                                 | ± | 0.011  |
| Cu        | 0.130                                 | ± | 0.007   | 0.130                                 | ± | 0.005   | 0.513                                 | ± | 0.009  |
| Fe        | 1.82                                  | ± | 0.05    | 1.82                                  | ± | 0.05    | 0.563                                 | ± | 0.016  |
| Hf        | 0.092                                 | ± | 0.026   | 0.092                                 | ± | 0.005   |                                       |   |        |
| La        | 0.0132                                | ± | 0.0013  | 0.0132                                | ± | 0.0015  |                                       |   |        |
| Mn        | 0.288                                 | ± | 0.012   | 0.288                                 | ± | 0.010   | 0.314                                 | ± | 0.010  |
| Mo        | 0.484                                 | ± | 0.022   | 0.484                                 | ± | 0.024   | 0.488                                 | ± | 0.011  |
| Nb        | 0.479                                 | ± | 0.028   | 0.479                                 | ± | 0.027   | (0.492                                | ± | 0.026) |
| Ni        | 0.406                                 | ± | 0.020   | 0.406                                 | ± | 0.018   | 0.667                                 | ± | 0.007  |
| Pd        | (0.108                                | ± | 0.015)  | (0.108                                | ± | 0.019)  |                                       |   |        |
| Ru        | 0.462                                 | ± | 0.021   | 0.462                                 | ± | 0.020   |                                       |   |        |
| Si        | (0.16                                 | ± | 0.06)   | (0.16                                 | ± | 0.06)   |                                       |   |        |
| Sn        | 0.483                                 | ± | 0.023   | 0.483                                 | ± | 0.021   | (0.71                                 | ± | 0.05)  |
| Ta        | 0.097                                 | ± | 0.005   | 0.097                                 | ± | 0.005   |                                       |   |        |
| V         | 0.672                                 | ± | 0.021   | 0.672                                 | ± | 0.022   |                                       |   |        |
| W         | 0.507                                 | ± | 0.021   | 0.507                                 | ± | 0.019   | (0.50                                 | ± | 0.04)  |
| Y         | (0.0110                               | ± | 0.0010) | (0.0110                               | ± | 0.0010) |                                       |   |        |
| Zr        | 0.509                                 | ± | 0.015   | 0.509                                 | ± | 0.015   | (0.436                                | ± | 0.013) |
| C         | 0.325                                 | ± | 0.022   | 0.325                                 | ± | 0.022   |                                       |   |        |
| H         | 0.043                                 | ± | 0.007   | 0.043                                 | ± | 0.005   |                                       |   |        |
| N         | 0.0155                                | ± | 0.030   | 0.0155                                | ± | 0.026   |                                       |   |        |
| O         | 3.57                                  | ± | 0.19    | 3.57                                  | ± | 0.19    |                                       |   |        |

Values in brackets are not certified.

Availability BCR-090A: Cylinder of 40 mm Ø and 20 mm height. BCR-090B: Cubes of about 0.2 g in bottles containing approximately 25 g. ERM-EB090a: Cylinder of 40 mm Ø and 20 mm height. ERM-EB090b 7 g chips of about 250 mg.

| Substance | BCR-098    |      |   |       |      |  |
|-----------|------------|------|---|-------|------|--|
|           | Zircaloy-4 |      |   |       |      |  |
| Cr        | 906        | µg/g | ± | 9     | µg/g |  |
| Fe        | 2143       | mg/g | ± | 0.020 | mg/g |  |
| Hf        | 77.6       | µg/g | ± | 3.0   | µg/g |  |
| Sn        | 14.60      | mg/g | ± | 0.09  | mg/g |  |

Availability: Bottles containing about 10 g of chips.

| Substance | BCR-074                            |         | ERM-EB074                   |        | ERM-EB075   |        |
|-----------|------------------------------------|---------|-----------------------------|--------|---|--------|
|           | Electrolytic copper (OFHC) (mg/kg) |         | Electrolytic copper (mg/kg) |        | Electrolytic copper with added impurities (mg/kg) |        |
| Ag        | 12.8                               | ± 0.7   | 1.03                        | ± 0.07 | 10.8  | ± 0.6  |
| Al        |                                    |         |                             |        | 2.3   | ± 0.4  |
| As        | 0.78                               | ± 0.14  | 1.23                        | ± 0.08 | 3.18  | ± 0.10 |
| Au        |                                    |         | 0.52                        | ± 0.06 | 1.46  | ± 0.14 |
| Be        |                                    |         | 0.31                        | ± 0.06 | 1.08  | ± 0.24 |
| Bi        | (0.10                              | ± 0.03) | 0.51                        | ± 0.04 | 1.79  | ± 0.11 |
| Cd        | < 0.02                             |         | 0.40                        | ± 0.04 | 2.69  | ± 0.09 |
| Co        | < 0.05                             |         | 0.83                        | ± 0.06 | 2.64  | ± 0.08 |
| Cr        | < 0.1                              |         | 0.37                        | ± 0.04 | 1.40  | ± 0.07 |
| Fe        | 1.14                               | ± 0.06  | 5.8                         | ± 0.8  | 9.3   | ± 0.4  |
| Hg        |                                    |         | (< 0.1)                     |        | (< 0.35)  |        |
| In        |                                    |         | 0.49                        | ± 0.07 | 1.83  | ± 0.10 |
| Mg        |                                    |         | 2.03                        | ± 0.27 | 7.0   | ± 0.7  |
| Mn        | 1.27                               | ± 0.05  | 0.93                        | ± 0.07 | 1.35  | ± 0.07 |
| Ni        | 1.04                               | ± 0.11  | 0.61                        | ± 0.08 | 2.18  | ± 0.16 |
| P         |                                    |         | 1.53                        | ± 0.25 | 2.59  | ± 0.30 |
| Pb        | 0.97                               | ± 0.05  | 2.7                         | ± 0.4  | 4.8   | ± 0.9  |
| S         |                                    |         | (3.3                        | ± 1.0) | 25  | ± 4    |
| Sb        | 0.576                              | ± 0.030 | 0.57                        | ± 0.04 | 2.93  | ± 0.14 |
| Se        | 0.37                               | ± 0.04  | 0.55                        | ± 0.07 | 1.69  | ± 0.10 |
| Si        |                                    |         |                             |        | 2.6   | ± 0.4  |
| Sn        | < 0.07                             |         | (1.5                        | ± 0.4) | 2.13  | ± 0.11 |
| Te        | (0.21                              | ± 0.08) | 0.50                        | ± 0.06 | 1.78  | ± 0.12 |
| Ti        |                                    |         | 0.97                        | ± 0.18 | 3.2   | ± 0.5  |
| W         |                                    |         | (< 0.25)                    |        | (< 0.1)   |        |
| Zn        | 0.46                               | ± 0.07  | 2.2                         | ± 0.4  | 6.51  | ± 0.29 |
| Zr        |                                    |         | (8.8                        | ± 1.7) | (20   | ± 5)   |

Values in brackets are not certified.



Availability: CRMs are available as follows: BCR-074A: Cylinder of 40 mm Ø, 30 mm height. ERM-EB074A and ERM-EB075A: Disc of 39 mm Ø, 30 mm height. ERM-EB074B and ERM-EB075B: Cylinder of 8 mm Ø, 100 mm length. ERM-EB074C and ERM-EB075C: 50 g Chips of approximately 250 mg, in amber glass bottle

|                | Substance | Quaternary bronze (g/kg) | Brass (g/kg) | Arsenic-Copper (g/kg) | Lead-bronze (g/kg) | Tin-bronze (g/kg) |
|----------------|-----------|--------------------------|--------------|-----------------------|--------------------|-------------------|
| <b>BCR-691</b> | As        | 1.94 ± 0.10              | 0.99 ± 0.10  | 46.0 ± 2.7            | 2.85 ± 0.22        | 1.94 ± 0.20       |
|                | Pb        | 79 ± 7                   | 3.9 ± 0.4    | 1.75 ± 0.14           | 92 ± 17            | 2.04 ± 0.18       |
|                | Sn        | 71.6 ± 2.1               | 20.6 ± 0.7   | 2.02 ± 0.29           | 101 ± 8            | 70 ± 6            |
|                | Zn        | 60.2 ± 2.2               | 148 ± 5      | 0.55 ± 0.05           | 1.48 ± 0.24        | 1.57 ± 0.25       |

Availability: Set of five discs (one of each composition) of 35 mm Ø and 2 mm thickness, packed in a box.

|                | Description                   | Certified S content (g/kg) |        |
|----------------|-------------------------------|----------------------------|--------|
| <b>BCR-331</b> | Steam Coal                    | 4.99                       | ± 0.10 |
| <b>BCR-332</b> | High Volatile Industrial Coal | 9.61                       | ± 0.17 |
| <b>BCR-336</b> | High Volatile Steam Coal      | 32.90                      | ± 0.26 |

Availability: These CRMs are available in units of about 20 g in ampoules with argon atmosphere.

| Substance | <b>BCR-460</b><br>Total Fluorine in coal powder (mg/kg) |   |     |
|-----------|---|---|-----|
| Cl        | (59   | ± | 18) |
| F         | 225   | ± | 6   |

Values in brackets are not certified.

Availability: BCR-460 in glass bottles containing about 40 g.

| Substance | <b>BCR-461</b><br>Fluorine in clay (mg/kg) |   |    |
|-----------|--|---|----|
| F         | 568  | ± | 60 |

Availability: The samples are provided in units of 30 g in glass bottles.

|                  | Description | S content (g/kg) |           |
|------------------|-------------|------------------|-----------|
| <b>ERM-EF672</b> | Gasoil      | 0.203            | ± 0.006   |
| <b>ERM-EF671</b> | Gasoil      | 0.452            | ± 0.009   |
| <b>ERM-EF104</b> | Gasoil      | 1.019            | ± 0.019   |
| <b>BCR-105</b>   | Gasoil      | 3.63             | ± 0.10    |
| <b>BCR-106</b>   | Gasoil      | 5.02             | ± 0.08    |
| <b>BCR-107</b>   | Gasoil      | 10.40            | ± 0.15    |
| <b>ERM-EF211</b> | Petrol      | 0.048 8          | ± 0.001 7 |

Availability: The materials are available in dark glass ampoules sealed under nitrogen. ERM-EF104, -671 and -672 contain 8 mL, BCR-105, -106 and -107 contain 25 g. ERM-EF211 is available in clear borosilicate glass ampoules and contains 19 mL.

|                  | Description | Solvent Yellow 124 (SY124) content (mg/kg) |         |
|------------------|-------------|--|---------|
| <b>ERM-EF317</b> | Gasoil      | 0.141                                      | ± 0.018 |

Availability: ERM-EF317 is available in dark glass ampoules sealed under nitrogen, containing 20 mL.

|                   | Description | Solvent Yellow 124 (SY124) content (mg/kg) |        |
|-------------------|-------------|--|--------|
| <b>ERM-EF318k</b> | Gasoil      | 8.7  | ± 0.12 |

Availability: ERM-EF318k is available as a set of three dark glass ampoules sealed under nitrogen, containing 4.2 mL each.

| Certified Parameter                   | IRMM-441<br>n-Heptane<br>(%) |   |            | IRMM-442<br>Isooctane<br>(%) |   |          |
|---------------------------------------|------------------------------|---|------------|------------------------------|---|----------|
| n-Heptane, purity by difference       | 99.985                       | ± | 0.005      | 99.985                       | ± | 0.005    |
| Isooctane, purity by difference       |                              |   |            |                              |   |          |
| <u>Impurities</u>                     |                              |   |            |                              |   |          |
| Total organics (other than isooctane) |                              |   |            | 0.011                        | ± | 0.004    |
| Total organics (other than n-Heptane) | 0.012                        | ± | 0.005      |                              |   |          |
| Isooctane                             | 0.007                        | ± | 0.002      |                              |   |          |
| n-Heptane                             |                              |   |            | 0.002                        | ± | 0.002    |
| Water                                 | 0.003                        | ± | 0.002      | 0.004                        | ± | 0.002    |
| Lead                                  |                              |   | < 0.5 µg/L |                              |   | < 1 µg/L |

Availability: IRMM-441 and -442 are supplied in ampoules of 100 mL.

|                | Description       | Substance | Certified values (g/kg) |   |          |
|----------------|-------------------|-----------|-------------------------|---|----------|
| <b>BCR-109</b> | Zinc ore (blende) | Pb        | 7.38                    | ± | 0.03     |
|                |                   | Fe        | 145.1                   | ± | 0.6      |
|                |                   | Cu        | 9.46                    | ± | 0.08     |
|                |                   | Cd        | 4.61                    | ± | 0.09     |
|                |                   | Mg        | 0.20                    | ± | 0.01     |
|                |                   | F         | 0.081                   | ± | 0.004    |
|                |                   | Hg        | 0.00 96                 | ± | 0.000 12 |
| <b>BCR-110</b> | Zinc ore (blende) | Pb        | 97.8                    | ± | 0.4      |
|                |                   | Fe        | 5.46                    | ± | 0.10     |
|                |                   | Cu        | 16.28                   | ± | 0.12     |
|                |                   | Cd        | 10.51                   | ± | 0.07     |
|                |                   | Mg        | 1.36                    | ± | 0.04     |
|                |                   | F         | 0.055                   | ± | 0.003    |
|                |                   | Hg        | 0.148 4                 | ± | 0.002 5  |

Availability: These RMs are contained in brown glass bottles. The approximate quantity per unit is 200 g for BCR-109 and 75 g for BCR-110.

|                | Description             | Substance                      | Certified values (g/kg) |   |                         |
|----------------|-------------------------|--------------------------------|-------------------------|---|-------------------------|
| <b>BCR-032</b> | Moroccan Phosphate rock | CaO                            | 517.6                   | ± | 3.2                     |
|                |                         | P <sub>2</sub> O <sub>5</sub>  | 329.8                   | ± | 1.7                     |
|                |                         | CO <sub>2</sub>                | 51.0                    | ± | 0.8                     |
|                |                         | F                              | 40.4                    | ± | 0.6                     |
|                |                         | SiO <sub>2</sub>               | 20.9                    | ± | 1.2                     |
|                |                         | SO <sub>3</sub>                | 18.4                    | ± | 0.8                     |
|                |                         | Al <sub>2</sub> O <sub>3</sub> | 5.5                     | ± | 0.6                     |
|                |                         | MgO                            | 4.0                     | ± | 0.1                     |
|                |                         | Fe <sub>2</sub> O <sub>3</sub> | 2.3                     | ± | 0.1                     |
|                |                         | As                             | 9.5 × 10 <sup>-3</sup>  | ± | 0.5 × 10 <sup>-3</sup>  |
|                |                         | B                              | 22.6 × 10 <sup>-3</sup> | ± | 2.2 × 10 <sup>-3</sup>  |
|                |                         | Cd                             | 20.8 × 10 <sup>-3</sup> | ± | 0.7 × 10 <sup>-3</sup>  |
|                |                         | Cr                             | 257 × 10 <sup>-3</sup>  | ± | 16 × 10 <sup>-3</sup>   |
|                |                         | Co                             | 0.59 × 10 <sup>-3</sup> | ± | 0.06 × 10 <sup>-3</sup> |
|                |                         | Cu                             | 33.7 × 10 <sup>-3</sup> | ± | 1.4 × 10 <sup>-3</sup>  |
|                |                         | Hg                             | 55 × 10 <sup>-6</sup>   | ± | 11 × 10 <sup>-6</sup>   |
|                |                         | Mn                             | 18.8 × 10 <sup>-3</sup> | ± | 1.3 × 10 <sup>-3</sup>  |
|                |                         | Ni                             | 34.6 × 10 <sup>-3</sup> | ± | 1.9 × 10 <sup>-3</sup>  |
|                |                         | Ti                             | 171 × 10 <sup>-3</sup>  | ± | 10 × 10 <sup>-3</sup>   |
|                |                         | V                              | 153 × 10 <sup>-3</sup>  | ± | 7 × 10 <sup>-3</sup>    |
| Zn             | 253 × 10 <sup>-3</sup>  | ±                              | 6 × 10 <sup>-3</sup>    |   |                         |

Availability: Units of about 100 g in the form of fine powder.

| Substance | BCR-664<br>Glass<br>(mg/kg) |   |      |
|-----------|-----------------------------|---|------|
| As        | 5.9                         | ± | 0.4  |
| Ba        | 29.1                        | ± | 0.7  |
| Cd        | 5.7                         | ± | 0.4  |
| Cl        | 68                          | ± | 8    |
| Co        | 2.77                        | ± | 0.21 |
| Cr        | 2.65                        | ± | 0.13 |
| Pb        | 53.1                        | ± | 2.6  |
| Sb        | 24.3                        | ± | 1.0  |
| Se        | 8.6                         | ± | 0.5  |

Availability: Glass plate of (50 x 50 x 7) mm.

| Substance  | ERM-EC590<br>Polyethylene (LDPE)<br>g/kg |   |         | ERM-EC591<br>Polypropylene (PP)<br>g/kg |   |         |
|--|--|---|---------|---|---|---------|
|  |  | ± |         |   | ± |         |
| Br   | 2.13                                     | ± | 0.09    | 2.08                                    | ± | 0.07    |
| 2,4,4'-TriBDE (BDE-28)   |  |   |         | 0.0025                                  | ± | 0.0004  |
| 2,2',4,4'-TetraBDE (BDE-47)  | 0.23                                     | ± | 0.04    | 0.245                                   | ± | 0.023   |
| 2,2',4,4',5'-PentaBDE (BDE-99)   | 0.302                                    | ± | 0.030   | 0.32                                    | ± | 0.04    |
| 2,2',4,4',6'-PentaBDE (BDE-100)  | 0.063                                    | ± | 0.005   | 0.066                                   | ± | 0.007   |
| 2,2',4,4',5,5'-HexaBDE (BDE-153)                                       | 0.047                                    | ± | 0.006   | 0.044                                   | ± | 0.006   |
| 2,2',4,4',5,6'-HexaBDE (BDE-154)                                       | 0.0257                                   | ± | 0.0026  | 0.026                                   | ± | 0.004   |
| 2,2',3,4,4',5,6'-HeptaBDE (BDE-183)                                    | 0.132                                    | ± | 0.012   | 0.087                                   | ± | 0.008   |
| 2,2',3,3',4,4',6,6'-OctaBDE + 2,2',3,4,4',5,6,6'-OctaBDE (BDE-197+204) | 0.076                                    | ± | 0.010   | 0.052                                   | ± | 0.009   |
| DecaBDE (BDE-209)  | 0.65                                     | ± | 0.10    | 0.78                                    | ± | 0.09    |
| DecaBB (BB-209)  | 0.63                                     | ± | 0.10    | 0.74                                    | ± | 0.08    |
| Sb   | (0.756)                                  | ± | (0.025) | (0.713)                                 | ± | (0.022) |

Values in brackets are not certified.

Availability: Brown glass bottle with 20 g granulate.

| Substance | ERM-EC680m<br>Polyethylene<br>(low level)<br>mg/kg |   |      | ERM-EC681m<br>Polyethylene<br>(high level) |   |           |
|-----------|--|---|------|--|---|-----------|
|           |  | ± |      |  | ± |           |
| As        | 4.7  | ± | 0.4  | 17.0                                       | ± | 1.2 mg/kg |
| Br        | 181  | ± | 9    | 1.43                                       | ± | 0.08 g/kg |
| Cd        | 20.8   | ± | 0.9  | 146  | ± | 5 mg/kg   |
| Cl        | (84  | ± | 11)  | 0.38                                       | ± | 0.06 g/kg |
| Cr        | 9.6  | ± | 0.5  | 45.1                                       | ± | 1.9 mg/kg |
| Hg        | 2.56   | ± | 0.16 | 9.9  | ± | 0.8 mg/kg |
| Pb        | 11.3   | ± | 0.4  | 69.7                                       | ± | 2.5 mg/kg |
| S         | 86   | ± | 9    | 0.64                                       | ± | 0.10 g/kg |
| Sb        | 9.6  | ± | 0.7  | 86   | ± | 7 mg/kg   |
| Sn        | 20.7   | ± | 1.6  | 99   | ± | 6 mg/kg   |
| Zn        | 194  | ± | 12   | 1.17                                       | ± | 0.04 g/kg |

Values in brackets are not certified

Availability: Brown glass bottle with 100 g granulate.

### Cd in polyethylene (VDA 001-004)

A set of four certified reference materials for Cd in polyethylene (40.9 mg/kg, 75.9 mg/kg, 197.9 mg/kg and 407 mg/kg) has been certified by the JRC on behalf of VDA (Verband der Automobilindustrie e.V., Frankfurt). Information can be obtained from JRC, Geel (B).

## 5.3 OTHERS

### Antimony implanted in silicon ERM-EG001 (BAM-L001)

| Certified quantity   | Certified value<br>( $10^{16} \cdot \text{cm}^{-2}$ ) |
|--|---|
| Areal density of Sb atoms                                      | 4.81 ± 0.06   |
| Isotope amount ratio $n(^{121}\text{Sb}) / n(^{123}\text{Sb})$ | 1.435 ± 0.006   |

Availability: The sample is a 10 mm x 10 mm silicon chip with a thermally grown surface oxide layer and Sb ions implanted with an energy of 400 keV. The certified value for the areal density of Sb atoms is valid for fractions of the chip surface down to 0.15 mm<sup>2</sup> in size.

### Cementite Grains in Carburised Pure Iron (IRMM-471)

|  | Certified value (g/kg) |
|--|------------------------|
| Carbon mass fraction in cementite grains | 66.9 ± 2.7             |

Availability: 4-5 mm long rod with 5 mm diameter.

## 6 MATERIALS RELATED TO ISOTOPIC MEASUREMENTS

### 6.1 CERTIFIED FOR ISOTOPE ABUNDANCE RATIO (AMOUNT RATIO)

| BCR-123<br>Ethanol  |   |   |  |
|---------------------|---|---|--|
| Parameter           | Ethanol H                                       | Ethanol M                                       | Ethanol L                                      |
| (D/H) <sub>I</sub>  | $109.65 \times 10^{-6} \pm 0.20 \times 10^{-6}$ | $101.69 \times 10^{-6} \pm 0.17 \times 10^{-6}$ | $90.30 \times 10^{-6} \pm 0.18 \times 10^{-6}$ |
| (D/H) <sub>II</sub> | $119.76 \times 10^{-6} \pm 0.25 \times 10^{-6}$ | $130.94 \times 10^{-6} \pm 0.21 \times 10^{-6}$ | $122.20 \times 10^{-6} \pm 0.4 \times 10^{-6}$ |
| R                   | 2.184 ± 0.005                                   | 2.575 ± 0.006                                   | 2.708 ± 0.009                                  |

Availability: Units of 3 sealed NMR tubes containing respectively H-, M-, and L-ethanols, to which the tetramethylurea internal standard and the C<sub>6</sub>F<sub>6</sub> lock substance are added. 10 mm (BCR-123A) or 15 mm (BCR-123B) O.D. NRM tubes can be supplied.

| Parameter                                  | Unit  | BCR-656<br>(96% ethanol) | BCR-657<br>(Sugar) | BCR-660<br>(Ethanol in water) |
|--|-------|--------------------------|--------------------|-------------------------------|
| (D/H) <sub>I</sub> by <sup>2</sup> H-NMR   | ppm   | 102.84 ± 0.20            |                    | 102.90 ± 0.16                 |
| (D/H) <sub>II</sub> by <sup>2</sup> H-NMR  | ppm   | 132.07 ± 0.30            |                    | 131.95 ± 0.23                 |
| R by <sup>2</sup> H-NMR                    |       | 2.570 ± 0.005            |                    | 2.567 ± 0.005                 |
| δ <sup>13</sup> C <sub>V/PDB</sub> by IRMS | ‰     | -26.91 ± 0.07            | -10.76 ± 0.04      | -26.72 ± 0.09                 |
| (D/H) <sub>w</sub> of water (IRMS)         | ppm   |                          |                    | 148.68 ± 0.14                 |
| Alcoholic grade t <sub>D</sub>             | w/w % | (94)                     |                    | 11.96 ± 0.06 <sup>1)</sup>    |

1) in v/v %

Value in brackets is not certified.

Availability: BCR-656: Units of 25 mL of 96 % vol. neutral ethanol from wine in glass bottle;

BCR-657: Units of 81pprox.. 1 g of dry glucose in a sealed amber vial;

BCR-660: Units of 450 mL of aqueous ethanol solution in glass bottle.

| Code       | Description            | Isotope amount content   | Amount ratios                         |                                       |                                       |                                       |                                       | Unit size |
|------------|------------------------|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|-----------|
|            |                        |  | $n(^{68}\text{Zn})/n(^{67}\text{Zn})$ | $n(^{66}\text{Zn})/n(^{64}\text{Zn})$ | $n(^{67}\text{Zn})/n(^{64}\text{Zn})$ | $n(^{68}\text{Zn})/n(^{64}\text{Zn})$ | $n(^{70}\text{Zn})/n(^{64}\text{Zn})$ |           |
| IRMM-007/1 | 0.5 M HNO <sub>3</sub> | 148.261 (49) · 10 <sup>-9</sup> mol<br>( <sup>64</sup> Zn)·g <sup>-1</sup> | 1.070 00 (47)                         | 0.004 679 7(58)                       | 0.021 337 4 (98)                      | 0.022 830 9 (89)                      | 0.000 067 57 (32)                     | 5 mL      |
| 007/2      |                        | 142.842 (47) · 10 <sup>-9</sup> mol<br>( <sup>64</sup> Zn)·g <sup>-1</sup> | 1.033 83 (45)                         | 0.005 275 8 (57)                      | 0.043 039 (20)                        | 0.044 495 (18)                        | 0.000 083 00 (31)                     |           |
| 007/3      |                        | 125.44 (25) · 10 <sup>-9</sup> mol<br>( <sup>64</sup> Zn)·g <sup>-1</sup>  | 1.012 45 (45)                         | 0.007 057 4 (57)                      | 0.107 896 (50)                        | 0.109 239 (45)                        | 0.000 129 11 (32)                     |           |
| 007/4      |                        | 107.096 (40) · 10 <sup>-9</sup> mol<br>( <sup>64</sup> Zn)·g <sup>-1</sup> | 1.005 44 (45)                         | 0.009 954 0 (60)                      | 0.213 339 (99)                        | 0.214 499 (88)                        | 0.000 204 07 (44)                     |           |
| 007/5      |                        | 79.518 (32) · 10 <sup>-9</sup> mol<br>( <sup>64</sup> Zn)·g <sup>-1</sup>  | 1.001 62 (45)                         | 0.016 608 8 (80)                      | 0.455 60 (21)                         | 0.456 34 (19)                         | 0.000 376 29 (90)                     |           |
| 007/6      |                        | 45.821 (19) · 10 <sup>-9</sup> mol<br>( <sup>64</sup> Zn)·g <sup>-1</sup>  | 0.999 61 (45)                         | 0.035 323 (17)                        | 1.136 83 (52)                         | 1.136 39 (46)                         | 0.000 860 6 (23)                      |           |

| Code        | Description                     | Amount ratios                         | Unit size |
|-------------|---------------------------------|---------------------------------------|-----------|
|             |                                 | $n(^{41}\text{Ca})/n(^{40}\text{Ca})$ |           |
| ERM-AE701/1 | 0.6 M HNO <sub>3</sub> solution | 1.011 4(68) · 10 <sup>-6</sup>        | 25 mL     |
| ERM-AE701/2 |                                 | 1.023 5(69) · 10 <sup>-7</sup>        |           |
| ERM-AE701/3 |                                 | 1.018 1(69) · 10 <sup>-8</sup>        |           |
| ERM-AE701/4 |                                 | 1.047 9(71) · 10 <sup>-9</sup>        |           |
| ERM-AE701/5 |                                 | 1.052 0(71) · 10 <sup>-10</sup>       |           |
| ERM-AE701/6 |                                 | 1.091 3(74) · 10 <sup>-11</sup>       |           |
| ERM-AE701/7 |                                 | 1.054 9(72) · 10 <sup>-12</sup>       |           |
| ERM-AE701/8 |                                 | 1.052 4(71) · 10 <sup>-13</sup>       |           |

| Code      | Description                           | Isotope amount fraction (-100) |                  |                  |                   |                   |                   | Amount ratios                           |   |                                       | Unit size       |                                       |                                       |   |   |   |
|-----------|---------------------------------------|--------------------------------|------------------|------------------|-------------------|-------------------|-------------------|---|---|---------------------------------------|-----------------|---------------------------------------|---------------------------------------|---|---|---|
|           |                                       | <sup>24</sup> Mg               | <sup>25</sup> Mg | <sup>26</sup> Mg | <sup>190</sup> Pt | <sup>192</sup> Pt | <sup>194</sup> Pt | <sup>195</sup> Pt                       | <sup>196</sup> Pt                       | <sup>198</sup> Pt                     |                 | $n(^{25}\text{Mg})/n(^{24}\text{Mg})$ | $n(^{26}\text{Mg})/n(^{24}\text{Mg})$ | $n(^{190}\text{Pt})/n(^{195}\text{Pt})$ | $n(^{192}\text{Pt})/n(^{195}\text{Pt})$ | $n(^{194}\text{Pt})/n(^{195}\text{Pt})$ |
| IRMM-009  | 0.2 M HNO <sub>3</sub> solution       | 78.992(25)                     | 10.003(9)        | 11.005(19)       |                   |                   |                   |   |   |                                       | 0.126 63(13)    | 0.139 32(26)                          |                                       |   |   | 4 mL                                    |
| IRMM-010  | Pt metal                              | 0.011 7(11)                    | 0.782(17)        | 32.86(27)        | 33.78(16)         | 25.21(23)         | 7.356(82)         | 0.000 347(34)                           | 0.023 15(48)                            | 0.973(11)                             |                 |                                       |                                       |   |   | 30 mg (wire)                            |
|           |                                       |                                |                  |                  |                   |                   |                   | $n(^{196}\text{Pt})/n(^{195}\text{Pt})$ | $n(^{198}\text{Pt})/n(^{195}\text{Pt})$ |                                       | 0.746 4(82)     | 0.217 8(24)                           |                                       |   |   |   |
| IRMM-011  | H <sub>3</sub> BO <sub>3</sub> solid  | 19.824 (20)                    | 80.176(20)       |                  |                   |                   |                   | $n(^{10}\text{B})/n(^{11}\text{B})$     |   |                                       | 0.247 26(32)    |                                       |                                       |   |   | 1 g                                     |
| IRMM-012  | 1 M HCl solution                      | 4.345(9)                       | 83.789(2)        | 9.501(11)        | 2.365(5)          |                   |                   | $n(^{50}\text{Cr})/n(^{52}\text{Cr})$   | $n(^{53}\text{Cr})/n(^{52}\text{Cr})$   | $n(^{54}\text{Cr})/n(^{52}\text{Cr})$ | 0.051 86(10)    | 0.113 39(15)                          | 0.028 22(06)                          |   |   | 5 mL                                    |
| IRMM-016  | Li <sub>2</sub> CO <sub>3</sub> solid | 7.588 9(75)                    | 92.411 1(75)     |                  |                   |                   |                   | $n(^6\text{Li})/n(^7\text{Li})$         |   |                                       | 0.082 121(87)   |                                       |                                       |   |   | 1 g                                     |
| IRMM-018* | SiO <sub>2</sub> solid                | 92.220 36(49)                  | 4.687 30(36)     | 3.092 34(37)     |                   |                   |                   | $n(^{28}\text{Si})/n(^{29}\text{Si})$   | $n(^{30}\text{Si})/n(^{28}\text{Si})$   |                                       | 0.050 827 2(40) | 0.033 532 0(42)                       |                                       |   |   | 5 g                                     |

## 6.2 CERTIFIED FOR ISOTOPE AMOUNT CONTENT

| Code      | Description  | Isotope amount content                              | Isotope enrichment   | Unit size |
|-----------|--|---|--|-----------|
| IRMM-610  | H <sub>3</sub> BO <sub>3</sub><br>aqueous solution | 3.683 11 (88) μmol <sup>10</sup> B·g <sup>-1</sup>  | $n(^{10}\text{B})/n(^{11}\text{B}) = 18.80 (2)$  | 5 mL      |
| IRMM-611  | H <sub>3</sub> BO <sub>3</sub><br>aqueous solution | 4.025 (40) μmol <sup>11</sup> B·g <sup>-1</sup>     | $n(^{10}\text{B})/n(^{11}\text{B}) = 0.247 26 (32)$  | 5 mL      |
| IRMM-615  | 0.5 M HCl<br>solution                              | 3.850 (14) μmol <sup>6</sup> Li·g <sup>-1</sup>     | $n(^6\text{Li})/n(^7\text{Li}) = 21.897 (44)$  | 5 mL      |
| IRMM-618  | 0.5 M HNO <sub>3</sub><br>solution                 | 112.13 (17) μmol <sup>87</sup> Rb·kg <sup>-1</sup>  | $n(^{85}\text{Rb})/n(^{87}\text{Rb}) = 0.20 498 (24)$  | 5 mL      |
| IRMM-619  | 0.5 M HNO <sub>3</sub><br>solution                 | 85.00 (24) μmol <sup>85</sup> Rb·kg <sup>-1</sup>   | $n(^{85}\text{Rb})/n(^{87}\text{Rb}) = 2.593 0 (20)$   | 5 mL      |
| IRMM-620  | 4.5 M HCl<br>solution                              | 173.35 (16) μmol <sup>57</sup> Fe·kg <sup>-1</sup>  | $n(^{54}\text{Fe})/n(^{57}\text{Fe}) = < 0.0001$<br>$n(^{56}\text{Fe})/n(^{57}\text{Fe}) = 0.025 39 (31)$<br>$n(^{58}\text{Fe})/n(^{57}\text{Fe}) = 0.025 16 (18)$   | 5 mL      |
| IRMM-621  | 1 M HNO <sub>3</sub><br>solution                   | 97.35 (15) μmol <sup>111</sup> Cd·kg <sup>-1</sup>  | $n(^{106}\text{Cd})/n(^{111}\text{Cd}) = < 0.000 05$<br>$n(^{108}\text{Cd})/n(^{111}\text{Cd}) = < 0.000 05$<br>$n(^{110}\text{Cd})/n(^{111}\text{Cd}) = 0.004 44 (42)$<br>$n(^{112}\text{Cd})/n(^{111}\text{Cd}) = 0.021 74 (10)$<br>$n(^{113}\text{Cd})/n(^{111}\text{Cd}) = 0.005 818 (56)$<br>$n(^{114}\text{Cd})/n(^{111}\text{Cd}) = 0.010 875 (88)$<br>$n(^{116}\text{Cd})/n(^{111}\text{Cd}) = 0.001 629 (44)$ | 4 mL      |
| IRMM-622  | 1 M HNO <sub>3</sub><br>solution                   | 9.739 (18) μmol <sup>111</sup> Cd·kg <sup>-1</sup>  | $n(^{106}\text{Cd})/n(^{111}\text{Cd}) = < 0.000 05$<br>$n(^{108}\text{Cd})/n(^{111}\text{Cd}) = < 0.000 05$<br>$n(^{110}\text{Cd})/n(^{111}\text{Cd}) = 0.004 44 (42)$<br>$n(^{112}\text{Cd})/n(^{111}\text{Cd}) = 0.021 74 (10)$<br>$n(^{113}\text{Cd})/n(^{111}\text{Cd}) = 0.005 818 (56)$<br>$n(^{114}\text{Cd})/n(^{111}\text{Cd}) = 0.010 875 (88)$<br>$n(^{116}\text{Cd})/n(^{111}\text{Cd}) = 0.001 629 (44)$ | 4 mL      |
| IRMM-624  | 1 M HCl<br>solution                                | 174.84 (42) μmol <sup>50</sup> Cr·kg <sup>-1</sup>  | $n(^{52}\text{Cr})/n(^{50}\text{Cr}) = 0.066 41 (50)$<br>$n(^{53}\text{Cr})/n(^{50}\text{Cr}) = 0.000 323 (64)$<br>$n(^{54}\text{Cr})/n(^{50}\text{Cr}) = 0.000 11 (11)$   | 5 mL      |
| IRMM-625  | 1 M HCl<br>solution                                | 144.233 (90) μmol <sup>52</sup> Cr·kg <sup>-1</sup> | $n(^{50}\text{Cr})/n(^{52}\text{Cr}) = 0.051 85 (20)$<br>$n(^{53}\text{Cr})/n(^{52}\text{Cr}) = 0.113 33 (38)$<br>$n(^{54}\text{Cr})/n(^{52}\text{Cr}) = 0.028 35 (34)$  | 5 mL      |
| IRMM-632  | 1 M HNO <sub>3</sub><br>solution                   | 0.096 84 (41) μmol <sup>65</sup> Cu·g <sup>-1</sup> | $n(^{63}\text{Cu})/n(^{65}\text{Cu}) = 0.002 892 1 (92)$   | 5 mL      |
| ERM-AE633 | 1 M HNO <sub>3</sub><br>solution                   | 5.998 (36) μmol <sup>63</sup> Cu·g <sup>-1</sup>    | $n(^{65}\text{Cu})/n(^{63}\text{Cu}) = 0.445 63 (42)$  | 4 – 5 mL  |
| IRMM-634  | 1.8 M HCl<br>solution                              | 163.61 (38) μmol <sup>56</sup> Fe·kg <sup>-1</sup>  | $n(^{54}\text{Fe})/n(^{56}\text{Fe}) = 0.063 70 (27)$<br>$n(^{57}\text{Fe})/n(^{56}\text{Fe}) = 0.023 096 (72)$<br>$n(^{58}\text{Fe})/n(^{56}\text{Fe}) = 0.003 071 (29)$  | 5 mL      |
| ERM-AE637 | 0.2 M HNO <sub>3</sub><br>solution                 | 0.791 37(30) μmol <sup>24</sup> Mg·g <sup>-1</sup>  | $n(^{26}\text{Mg})/n(^{24}\text{Mg}) = 0.139 68 (32)$<br>$n(^{25}\text{Mg})/n(^{24}\text{Mg}) = 0.126 86 (18)$   | 5 mL      |
| ERM-AE638 | 0.1 M HNO <sub>3</sub><br>solution                 | 0.857 4 (34) μmol <sup>26</sup> Mg·g <sup>-1</sup>  | $n(^{24}\text{Mg})/n(^{26}\text{Mg}) = 0.003 104 (26)$<br>$n(^{25}\text{Mg})/n(^{26}\text{Mg}) = 0.001 084 (11)$   | 5 mL      |
| ERM-AE639 | 0.5 M HCl<br>solution                              | 11.891 (50) μmol <sup>202</sup> Hg·g <sup>-1</sup>  | $n(^{196}\text{Hg})/n(^{202}\text{Hg}) = 0.004 972 (46)$<br>$n(^{198}\text{Hg})/n(^{202}\text{Hg}) = 0.330 6 (21)$<br>$n(^{199}\text{Hg})/n(^{202}\text{Hg}) = 0.561 9 (28)$<br>$n(^{200}\text{Hg})/n(^{202}\text{Hg}) = 0.770 5 (28)$<br>$n(^{201}\text{Hg})/n(^{202}\text{Hg}) = 0.441 26 (88)$<br>$n(^{204}\text{Hg})/n(^{202}\text{Hg}) = 0.230 27 (75)$   | 5 mL      |

|                  |   |                |  |  |          |
|------------------|---|----------------|--|--|----------|
| <b>ERM-AE640</b> | 0.5 M HCl solution  | 14.71 (11)     | nmol <sup>202</sup> Hg·g <sup>-1</sup>                   | $n(^{196}\text{Hg})/n(^{202}\text{Hg}) = 0.000\ 018\ 09\ (38)$<br>$n(^{198}\text{Hg})/n(^{202}\text{Hg}) = 0.000\ 623\ (11)$<br>$n(^{199}\text{Hg})/n(^{202}\text{Hg}) = 0.001\ 603\ (16)$<br>$n(^{200}\text{Hg})/n(^{202}\text{Hg}) = 0.005\ 499\ (34)$<br>$n(^{201}\text{Hg})/n(^{202}\text{Hg}) = 0.013\ 351\ (52)$<br>$n(^{204}\text{Hg})/n(^{202}\text{Hg}) = 0.002\ 595\ (21)$ | 5 mL     |
| <b>ERM-AE641</b> | Cl in water   | 18.959 (15)    | μmol <sup>35</sup> Cl·g <sup>-1</sup>                    | $n(^{37}\text{Cl})/n(^{35}\text{Cl}) = 0.319\ 77\ (83)$  | 4 – 5 mL |
| <b>ERM-AE642</b> | Cl in water   | 4.375 (26)     | μmol <sup>37</sup> Cl·g <sup>-1</sup>                    | $n(^{35}\text{Cl})/n(^{37}\text{Cl}) = 0.019\ 14\ (48)$  | 4 – 5 mL |
| <b>IRMM-643</b>  | 2.8 M HNO <sub>3</sub> solution                                   | 334.33 (84)    | μmol <sup>32</sup> S·kg <sup>-1</sup>                    | $n(^{33}\text{S})/n(^{32}\text{S}) = 0.007\ 877\ 6\ (58)$<br>$n(^{34}\text{S})/n(^{32}\text{S}) = 0.044\ 149\ 3\ (78)$<br>$n(^{36}\text{S})/n(^{32}\text{S}) = 0.000\ 153\ 40\ (94)$   | 5 mL     |
| <b>IRMM-644</b>  | 3.2 M HNO <sub>3</sub> solution                                   | 326.28 (80)    | μmol <sup>32</sup> S·kg <sup>-1</sup>                    | $n(^{33}\text{S})/n(^{32}\text{S}) = 0.007\ 969\ 8\ (70)$<br>$n(^{34}\text{S})/n(^{32}\text{S}) = 0.045\ 162\ 2\ (82)$<br>$n(^{36}\text{S})/n(^{32}\text{S}) = 0.000\ 170\ 0\ (58)$  | 5 mL     |
| <b>IRMM-645</b>  | 2.8 M HNO <sub>3</sub> solution                                   | 371.96 (57)    | μmol <sup>32</sup> S·kg <sup>-1</sup>                    | $n(^{33}\text{S})/n(^{32}\text{S}) = 0.007\ 747\ 6\ (38)$<br>$n(^{34}\text{S})/n(^{32}\text{S}) = 0.042\ 747\ 3\ (62)$<br>$n(^{36}\text{S})/n(^{32}\text{S}) = 0.000\ 145\ 1\ (42)$  | 5 mL     |
| <b>IRMM-646</b>  | 2.8 M HNO <sub>3</sub> solution                                   | 4586 (27)      | μmol <sup>34</sup> S·kg <sup>-1</sup>                    | $n(^{32}\text{S})/n(^{34}\text{S}) = 0.038\ 314\ 9\ (31)$<br>$n(^{33}\text{S})/n(^{34}\text{S}) = 0.000\ 470\ 88\ (15)$<br>$n(^{36}\text{S})/n(^{34}\text{S}) = 0.000\ 018\ 1\ (37)$   | 5 mL     |
| <b>ERM-AE647</b> | 1 M HNO <sub>3</sub> solution                                     | 134.974 (73)   | μmol <sup>63</sup> Cu·g <sup>-1</sup>                    | $n(^{65}\text{Cu})/n(^{63}\text{Cu}) = 0.445\ 60\ (74)$  | 4 mL     |
| <b>ERM-AE649</b> | 1 M HNO <sub>3</sub> solution                                     | 0.836 88 (27)  | μmol <sup>205</sup> Tl·g <sup>-1</sup>                   | $n(^{203}\text{Tl})/n(^{205}\text{Tl}) = 0.418\ 91\ (18)$  | 4 – 5 mL |
| <b>IRMM-651</b>  | 0.5 M HNO <sub>3</sub> solution                                   | 0.077 506 (30) | μmol <sup>64</sup> Zn·g <sup>-1</sup>                    | $n(^{66}\text{Zn})/n(^{64}\text{Zn}) = 0.557\ 17\ (30)$<br>$n(^{67}\text{Zn})/n(^{64}\text{Zn}) = 0.080\ 702\ (34)$<br>$n(^{68}\text{Zn})/n(^{64}\text{Zn}) = 0.366\ 27\ (12)$<br>$n(^{70}\text{Zn})/n(^{64}\text{Zn}) = 0.011\ 981\ (22)$   | 5 mL     |
| <b>IRMM-652</b>  | 0.5 M HNO <sub>3</sub> solution                                   | 0.156 000 (50) | μmol <sup>64</sup> Zn·g <sup>-1</sup>                    | $n(^{66}\text{Zn})/n(^{64}\text{Zn}) = 0.004\ 107\ 3\ (59)$<br>$n(^{67}\text{Zn})/n(^{64}\text{Zn}) = 0.000\ 499\ 87\ (96)$<br>$n(^{68}\text{Zn})/n(^{64}\text{Zn}) = 0.002\ 029\ 5\ (23)$<br>$n(^{70}\text{Zn})/n(^{64}\text{Zn}) = 0.000\ 052\ 76\ (34)$   | 5 mL     |
| <b>IRMM-653</b>  | 0.5 M HNO <sub>3</sub> solution                                   | 0.138 014 (60) | μmol <sup>67</sup> Zn·g <sup>-1</sup>                    | $n(^{64}\text{Zn})/n(^{67}\text{Zn}) = 0.013\ 191\ 5\ (81)$<br>$n(^{66}\text{Zn})/n(^{67}\text{Zn}) = 0.024\ 551\ 6\ (70)$<br>$n(^{68}\text{Zn})/n(^{67}\text{Zn}) = 0.051\ 086\ (36)$<br>$n(^{70}\text{Zn})/n(^{67}\text{Zn}) = 0.000\ 527\ 8\ (18)$  | 5 mL     |
| <b>IRMM-654</b>  | 0.5 M HNO <sub>3</sub> solution                                   | 0.146 098 (48) | μmol <sup>68</sup> Zn·g <sup>-1</sup>                    | $n(^{64}\text{Zn})/n(^{68}\text{Zn}) = 0.00\ 489\ 4\ (38)$<br>$n(^{66}\text{Zn})/n(^{68}\text{Zn}) = 0.003\ 186\ 8\ (46)$<br>$n(^{67}\text{Zn})/n(^{68}\text{Zn}) = 0.001\ 411\ 3\ (17)$<br>$n(^{70}\text{Zn})/n(^{68}\text{Zn}) = 0.000\ 194\ 98\ (78)$   | 5 mL     |
| <b>ERM-AE671</b> | CH <sub>3</sub> <sup>202</sup> HgCl in 2 % ethanol/water solution | 0.015 1 (7)    | μmol CH <sub>3</sub> <sup>202</sup> HgCl·g <sup>-1</sup> | $n(^{196}\text{Hg})/n(^{202}\text{Hg}) = 0.000\ 018$<br>$n(^{198}\text{Hg})/n(^{202}\text{Hg}) = 0.000\ 62$<br>$n(^{199}\text{Hg})/n(^{202}\text{Hg}) = 0.001\ 60$<br>$n(^{200}\text{Hg})/n(^{202}\text{Hg}) = 0.005\ 50$<br>$n(^{201}\text{Hg})/n(^{202}\text{Hg}) = 0.013\ 4$<br>$n(^{204}\text{Hg})/n(^{202}\text{Hg}) = 0.002\ 60$   | 5 g      |
| <b>IRMM-3702</b> | 1 M HNO <sub>3</sub> solution                                     | 1.512 (30)     | μmol <sup>64</sup> Zn·g <sup>-1</sup>                    | $n(^{66}\text{Zn})/n(^{64}\text{Zn}) = 0.563\ 97\ (30)$<br>$n(^{67}\text{Zn})/n(^{64}\text{Zn}) = 0.082\ 166\ (35)$<br>$n(^{68}\text{Zn})/n(^{64}\text{Zn}) = 0.375\ 19\ (16)$<br>$n(^{70}\text{Zn})/n(^{64}\text{Zn}) = 0.012\ 418\ (23)$   | 3 mL     |

## INDEX

### NUMERICAL LIST

| ERM / CRM       | DESIGNATION   | PAGE NO. |
|-----------------|---|----------|
| ERM-AC051       | BENZO[A]PYRENE (purity)                                 | 5        |
| ERM-AC053       | INDENO[1,2,3-CD]PYRENE (purity)                         | 5        |
| ERM-AC057       | AFLATOXIN B1 IN ACETONITRILE                            | 30       |
| ERM-AC058       | AFLATOXIN B2 IN ACETONITRILE                            | 30       |
| ERM-AC059       | AFLATOXIN G1 IN ACETONITRILE                            | 30       |
| ERM-AC060       | AFLATOXIN G2 IN ACETONITRILE                            | 30       |
| ERM-AC082       | 6-METHYLCHRYSENE (purity)                               | 5        |
| ERM-AC213       | PAHs IN ACETONITRILE / TOLUENE                          | 12       |
| ERM-AC626       | ARSENOBETAINE IN WATER                                  | 29       |
| ERM-AC699       | ZEARALENONE IN ACETONITRILE                             | 30       |
| ERM-AD149       | THROMBOPLASTIN RABBIT (prothrombin time)                | 64       |
| ERM-AD413       | PLASMID DNA FRAGMENTS OF MON 810 MAIZE                  | 32       |
| ERM-AD415       | PLASMID DNA FRAGMENTS OF NK603 MAIZE                    | 33       |
| ERM-AD425       | PLASMID DNA FRAGMENTS OF 356043 SOYBEAN                 | 36       |
| ERM-AD427       | PLASMID DNA FRAGMENTS OF 98140 MAIZE                    | 37       |
| ERM-AD442k      | LAMBDA DNA  | 64       |
| ERM-AD452/IFCC  | $\gamma$ -GLUTAMYLTRANSFERASE (catalytic concentration) | 63       |
| ERM-AD453k/IFCC | LACTATE DEHYDROGENASE ISOENZYME 1 (LD1)                 | 63       |
| ERM-AD454k/IFCC | ALANINE AMINOTRANSFERASE (ALT)                          | 63       |
| ERM-AD455k/IFCC | CREATINE KINASE ISOENZYME MM (CK-MM)                    | 63       |
| ERM-AD456/IFCC  | PANCREATIC ALPHA AMYLASE                                | 63       |
| ERM-AD457/IFCC  | ASPARTATE TRANSAMINASE (AST)                            | 63       |
| ERM-AD482       | RUMINANT pDNA CALIBRANT                                 | 56       |
| ERM-AD483       | PORCINE pDNA CALIBRANT                                  | 57       |
| ERM-AD500/IFCC  | HAEMOGLOBIN IN BUFFER                                   | 62       |
| ERM-AD623       | BCR-ABL pDNA CALIBRANT                                  | 63       |
| ERM-AD624       | LISTERIA MONOCYTOGENES DNA AGAROSE PLUG                 | 53       |
| ERM-AE633       | COPPER (natural) spike, nitrate solution                | 83       |
| ERM-AE637       | MAGNESIUM (natural) spike, nitrate solution             | 83       |
| ERM-AE638       | MAGNESIUM-26 spike, nitrate solution                    | 83       |
| ERM-AE639       | MERCURY (natural) spike, chloride solution              | 83       |
| ERM-AE640       | MERCURY-202 spike, chloride solution                    | 84       |
| ERM-AE641       | CHLORIDE (natural) spike, chloride solution             | 84       |
| ERM-AE642       | CHLORIDE-37 spike, chloride solution                    | 84       |
| ERM-AE647       | COPPER-63, nitrate solution                             | 84       |
| ERM-AE649       | THALLIUM (natural) spike, nitrate solution              | 84       |
| ERM-AE671       | METHYLMERCURY IN 2 % ETHANOL/WATER SOLUTION             | 84       |
| ERM-AE701       | CALCIUM-41 isotopic, nitrate solution (set of 8 units)  | 82       |
| ERM-BB124       | PORK MUSCLE   | 56       |
| ERM-BB125       | EGG POWDER  | 55       |
| ERM-BB130       | PORK MUSCLE   | 55       |
| ERM-BB184       | BOVINE MUSCLE (trace elements)                          | 45       |
| ERM-BB185       | BOVINE LIVER (trace elements)                           | 45       |
| ERM-BB186       | PIG KIDNEY (trace elements)                             | 45       |
| ERM-BB350       | FISH OIL  | 41       |



|            |  |        |
|------------|--|--------|
| ERM-BB384  | PORK MUSCLE  | 47, 50 |
| ERM-BB386  | BOVINE URINE (diethylstilboestrol, dienooestrol and hexooestrol) (blank) | 55     |
| ERM-BB389  | BOVINE URINE (diethylstilboestrol, dienooestrol and hexooestrol)         | 55     |
| ERM-BB422  | FISH MUSCLE (trace elements)   | 45     |
| ERM-BB430  | PORK FAT (pesticides)  | 42     |
| ERM-BB444  | NATURAL PORK FAT (blank)   | 41     |
| ERM-BB445  | SPIKED PORK FAT (very low level)   | 41     |
| ERM-BB446  | SPIKED PORK FAT (low level)  | 41     |
| ERM-BB492  | MILK POWDER (oxytetracycline)  | 55     |
| ERM-BB493  | MILK POWDER (oxytetracycline) (blank)                                    | 55     |
| ERM-BC190  | RAPESEED (colza) (S, total glucosinolate, medium level)                  | 43     |
| ERM-BC211  | RICE (As species)  | 24     |
| ERM-BC366  | RAPESEED (colza) (S, total glucosinolate, low level)                     | 43     |
| ERM-BC367  | RAPESEED (colza) (S, total glucosinolate, high level)                    | 43     |
| ERM-BC381  | RYE FLOUR  | 47, 50 |
| ERM-BC382  | WHEAT FLOUR  | 47, 50 |
| ERM-BC403  | CUCUMBER (pesticides)  | 44     |
| ERM-BC514  | HARICOTS BEANS (dietary fibre)   | 50     |
| ERM-BC515  | CARROT (dietary fibre)   | 50     |
| ERM-BC516  | APPLE (dietary fibre)  | 50     |
| ERM-BC517  | FULL FAT SOYA (dietary fibre)  | 50     |
| ERM-BC700  | SOYA BEAN  | 45     |
| ERM-BC716  | MAIZE  | 44     |
| ERM-BC717  | MAIZE  | 44     |
| ERM-BD001  | MILK POWDER (somatic cell count)   | 52     |
| ERM-BD150  | SKIMMED MILK POWDER (trace elements)                                     | 45     |
| ERM-BD151  | SKIMMED MILK POWDER (trace elements)                                     | 45     |
| ERM-BD273  | TOASTED BREAD  | 57     |
| ERM-BD282  | WHOLE MILK POWDER (aflatoxin M1, zero level)                             | 43     |
| ERM-BD283  | WHOLE MILK POWDER (aflatoxin M1, low level)                              | 43     |
| ERM-BD284  | WHOLE MILK POWDER (aflatoxin M1, high level)                             | 43     |
| ERM-BD286  | PAPRIKA POWDER (aflatoxin B1, G1)  | 43     |
| ERM-BD512  | DARK CHOCOLATE   | 47     |
| ERM-BD518  | BRAN BREAKFAST CEREAL (dietary fibre)                                    | 50     |
| ERM-BD600  | WHOLE MILK POWDER (vitamins)   | 49     |
| ERM-BE375  | COMPOUND FEEDINGSTUFF (very low level)                                   | 43     |
| ERM-BE376  | COMPOUND FEEDINGSTUFF (high level)                                       | 43     |
| ERM-BF410p | GENETICALLY MODIFIED ROUNDUP READY SOYA                                  | 31     |
| ERM-BF411  | GENETICALLY MODIFIED Bt-176 MAIZE  | 31     |
| ERM-BF412k | GENETICALLY MODIFIED Bt-11 MAIZE   | 32     |
| ERM-BF413k | GENETICALLY MODIFIED MON 810 MAIZE                                       | 32     |
| ERM-BF414  | GENETICALLY MODIFIED GA21 MAIZE  | 33     |
| ERM-BF415  | GENETICALLY MODIFIED NK603 MAIZE   | 33     |
| ERM-BF416  | GENETICALLY MODIFIED MON 863 MAIZE                                       | 33     |
| ERM-BF417  | GENETICALLY MODIFIED MON 863 x MON 810 MAIZE                             | 34     |
| ERM-BF418  | GENETICALLY MODIFIED 1507 MAIZE  | 34     |
| ERM-BF419  | GENETICALLY MODIFIED H7-1 SUGAR BEET                                     | 34     |
| ERM-BF420  | GENETICALLY MODIFIED 3272 MAIZE  | 34     |
| ERM-BF421  | GENETICALLY MODIFIED EH92-527-1 POTATO                                   | 35     |
| ERM-BF422  | GENETICALLY MODIFIED 281-24-236 X 3006-210-23 COTTON SEED                | 35     |
| ERM-BF423  | GENETICALLY MODIFIED MIR604 MAIZE  | 35     |
| ERM-BF424  | GENETICALLY MODIFIED 59122 MAIZE   | 35     |
| ERM-BF425  | GENETICALLY MODIFIED SOYA 356043   | 36     |
| ERM-BF426  | GENETICALLY MODIFIED SOYA 305423   | 36     |
| ERM-BF427  | GENETICALLY MODIFIED 98140 MAIZE   | 36     |

|                 |  |        |
|-----------------|--|--------|
| ERM-BF428       | GENETICALLY MODIFIED GHB119 COTTON                         | 37     |
| ERM-BF429       | GENETICALLY MODIFIED T304-40 COTTON                        | 37     |
| ERM-BF430       | GENETICALLY MODIFIED AM04-1020 POTATO                      | 37     |
| ERM-BF431       | GENETICALLY MODIFIED AV43-6-G7 POTATO                      | 38     |
| ERM-BF432       | GENETICALLY MODIFIED SOYA DAS-68416-4                      | 38     |
| ERM-BF433       | GENETICALLY MODIFIED DAS-40278-9 MAIZE                     | 38     |
| ERM-BF434       | GENETICALLY MODIFIED 73496 RAPESEED                        | 38     |
| ERM-BF435       | GENETICALLY MODIFIED PH05-026-0048 POTATO                  | 39     |
| ERM-BF436       | GENETICALLY MODIFIED DAS-44406-6 SOYA                      | 39     |
| ERM-BF437       | GENETICALLY MODIFIED DAS-81419-2 SOYA                      | 39     |
| ERM-BF438       | GENETICALLY MODIFIED VCO-Ø1981-5 MAIZE                     | 39     |
| ERM-BF439       | GENETICALLY MODIFIED DP-ØØ4114-3 MAIZE                     | 40     |
| ERM-BF440       | GENETICALLY MODIFIED DAS-81910-7 COTTON                    | 40     |
| ERM-CA100       | SURFACE WATER  | 28     |
| ERM-CA400       | SEAWATER (Hg)  | 21     |
| ERM-CA403       | SEAWATER   | 21     |
| ERM-CA408       | SIMULATED RAINWATER (major components)                     | 20     |
| ERM-CA615       | GROUND WATER   | 21     |
| ERM-CA616       | GROUND WATER   | 20     |
| ERM-CA713       | WASTE WATER  | 21     |
| ERM-CC141       | LOAM SOIL  | 13     |
| ERM-CC144       | SEWAGE SLUDGE  | 13     |
| ERM-CC537a      | FRESHWATER SEDIMENT  | 28     |
| ERM-CC580       | ESTUARINE SEDIMENT (Hg, methylmercury)                     | 14, 23 |
| ERM-CC690       | CALCAREOUS SOIL  | 13     |
| ERM-CD200       | BLADDERWRACK ( <i>Fucus vesiculosus</i> ) (trace elements) | 17     |
| ERM-CD281       | RYE GRASS  | 16     |
| ERM-CE100       | FISH TISSUE  | 28     |
| ERM-CE101       | TROUT MUSCLE   | 18, 47 |
| ERM-CE102       | FISH TISSUE (PBDEs fish in tissue)                         | 28     |
| ERM-CE195       | BOVINE BLOOD (Pb, Cd)                                      | 60     |
| ERM-CE196       | BOVINE BLOOD (Pb, Cd)                                      | 60     |
| ERM-CE278k      | MUSSEL TISSUE (elements)                                   | 18     |
| ERM-CE464       | TUNA FISH (total and methylmercury)                        | 19, 24 |
| ERM-CE477       | MUSSEL TISSUE (butyltins)                                  | 24     |
| ERM-CZ100       | FINE DUST (PM <sub>10</sub> -like) (PAHs)                  | 24     |
| ERM-CZ120       | FINE DUST (PM <sub>10</sub> -like) (elements)              | 15     |
| ERM-DA192       | HUMAN SERUM (cortisol unspiked)                            | 59     |
| ERM-DA193       | HUMAN SERUM (cortisol spiked)                              | 59     |
| ERM-DA347       | HUMAN SERUM (progesterone)                                 | 59     |
| ERM-DA451/IFCC  | CORTISOL REFERENCE SERUM PANEL                             | 59     |
| ERM-DA470k/IFCC | HUMAN SERUM (proteins)                                     | 61     |
| ERM-DA471/IFCC  | HUMAN SERUM (cystatin C)                                   | 61     |
| ERM-DA474/IFCC  | HUMAN SERUM (CRP)  | 61     |
| ERM-DA476/IFCC  | IgG ANTI-MPO IN HUMAN SERUM                                | 61     |
| ERM-DA480/IFCC  | ABETA 42 IN CEREBROSPINAL FLUID (CSF) (low level)          | 61     |
| ERM-DA481/IFCC  | ABETA 42 IN CEREBROSPINAL FLUID (CSF) (medium level)       | 61     |
| ERM-DA482/IFCC  | ABETA 42 IN CEREBROSPINAL FLUID (CSF) (high level)         | 61     |
| ERM-DA483/IFCC  | IgG PR3 ANCA IN HUMAN SERUM                                | 61     |
| ERM-DB001       | HUMAN HAIR (trace elements)                                | 60     |
| ERM-EB074A-B-C  | ELECTROLYTIC COPPER (trace elements)                       | 77     |
| ERM-EB075A-B-C  | ELECTROLYTIC COPPER WITH ADDED IMPURITIES (trace elements) | 77     |
| ERM-EB090a,b    | TITANIUM (impurities)                                      | 77     |
| ERM-EB322       | UNALLOYED ZINC (trace elements)                            | 75     |

|             |  |        |
|-------------|--|--------|
| ERM-EB323   | UNALLOYED ZINC (trace elements)                      | 75     |
| ERM-EB324   | UNALLOYED ZINC (trace elements)                      | 75     |
| ERM-EB325   | UNALLOYED ZINC (trace elements)                      | 75     |
| ERM-EB530A  | Al-0.1 % Au (0.1 mm foil)                            | 74     |
| ERM-EB530B  | Al-0.1 % Au (0.5 mm wire)                            | 74     |
| ERM-EB530C  | Al-0.1 % Au (1.0 mm wire)                            | 74     |
| ERM-EC590   | POLYETHYLENE (LDPE)                                  | 80     |
| ERM-EC591   | POLYPROPYLENE (PP)                                   | 80     |
| ERM-EC680m  | POLYETHYLENE (low level)                             | 80     |
| ERM-EC681m  | POLYETHYLENE (high level)                            | 80     |
| ERM-EF001   | BIODIESEL  | 72     |
| ERM-EF002   | BIODIESEL (B100 Rapeseed)                            | 65, 72 |
| ERM-EF003   | DIESEL (B7)  | 72     |
| ERM-EF004   | DIESEL (B7)  | 65, 72 |
| ERM-EF104   | GAS OIL (0.1019 % S)                                 | 78     |
| ERM-EF211   | PETROL   | 78     |
| ERM-EF317   | GAS OIL (Solvent Yellow 124)                         | 78     |
| ERM-EF318k  | GAS OIL (Solvent Yellow 124)                         | 78     |
| ERM-EF411   | HARD COAL  | 66     |
| ERM-EF412   | BROWN COAL   | 66     |
| ERM-EF413   | FURNACE COKE   | 66     |
| ERM-EF671   | GAS OIL (0.0452 % S)                                 | 78     |
| ERM-EF672   | GAS OIL (0.0203 % S)                                 | 78     |
| ERM-EG001   | ANTIMONY IMPLANTED IN SILICON                        | 81     |
| ERM-FA013   | CHARPY SPECIMENS Low Energy 20°C (impact toughness)  | 68     |
| ERM-FA013   | CHARPY SPECIMENS Low Energy 0°C (impact toughness)   | 68     |
| ERM-FA015   | CHARPY SPECIMENS 80 J (impact toughness)             | 68     |
| ERM-FA016   | CHARPY SPECIMENS 120 J (impact toughness)            | 68     |
| ERM-FA415   | CHARPY SPECIMENS 150 J (impact toughness)            | 68     |
| ERM-FC395k  | GAS OIL (CFPP and CP)                                | 65     |
| ERM-FD066   | CORUNDUM   | 68     |
| ERM-FD069   | CORUNDUM   | 68     |
| ERM-FD100   | COLLOIDAL SILICA (particle size)                     | 69     |
| ERM-FD101b  | COLLOIDAL SILICA IN AQUEOUS SOLUTION (nanoparticles) | 70     |
| ERM-FD102   | COLLOIDAL SILICA IN AQUEOUS SOLUTION (particle size) | 70     |
| ERM-FD103   | SUSPENSION OF TiO2 NANORODS                          | 71     |
| ERM-FD304   | COLLOIDAL SILICA (particle size)                     | 70     |
|             |  |        |
| BCR-010     | TIN ORE CONCENTRATE (Sn)                             | 73     |
| BCR-017A, B | COPPER (S, P)  | 75     |
| BCR-022A, B | ELECTROLYTIC TOUGH PITCH COPPER (O)                  | 75     |
| BCR-024B, C | TITANIUM (O, N)                                      | 75     |
| BCR-032     | MOROCCAN PHOSPHATE ROCK (trace elements)             | 71, 79 |
| BCR-038     | FLY ASH FROM PULVERISED COAL (trace elements)        | 15     |
| BCR-046     | BENZO[b]CHRYSENE (purity)                            | 4      |
| BCR-047     | BENZO[b]FLUORANTHENE (purity)                        | 4      |
| BCR-048R    | BENZO[k]FLUORANTHENE (purity)                        | 4      |
| BCR-049     | BENZO[j]FLUORANTHENE (purity)                        | 4      |
| BCR-050     | BENZO[e]PYRENE (purity)                              | 4      |
| BCR-052     | BENZO[gh]PERYLENE (purity)                           | 4      |
| BCR-054R    | COPPER (O)   | 75     |
| BCR-058     | CONTINUOUS CAST COPPER (O)                           | 75     |
| BCR-059A, B | Ti 6AL 4V ALLOY (O)                                  | 75     |
| BCR-066     | QUARTZ (particle size 0.35 – 3.50 microns)           | 68     |
| BCR-067     | QUARTZ (particle size 2.40 – 32.00 microns)          | 68     |

|             |   |        |
|-------------|---|--------|
| BCR-068     | QUARTZ (particle size 160 – 630 microns)              | 68     |
| BCR-069     | QUARTZ (particle size 14 – 90 microns)                | 68     |
| BCR-070     | QUARTZ (1.20 – 20.00 microns)                         | 68     |
| BCR-074A    | ELECTROLYTIC COPPER (trace elements)                  | 77     |
| BCR-077R    | 1-METHYLCHRYSENE (purity)                             | 4      |
| BCR-078R    | 2-METHYLCHRYSENE (purity)                             | 4      |
| BCR-079R    | 3-METHYLCHRYSENE (purity)                             | 4      |
| BCR-080R    | 4-METHYLCHRYSENE (purity)                             | 4      |
| BCR-081R    | 5-METHYLCHRYSENE (purity)                             | 4      |
| BCR-089     | TiAl6V4 (Al, V)                                       | 76     |
| BCR-090A, B | TITANIUM (impurities)                                 | 77     |
| BCR-091     | ANTHANTHRENE (purity)                                 | 4      |
| BCR-092     | 10-AZABENZO[a]PYRENE (purity)                         | 4      |
| BCR-093R    | 1-METHYLBENZ[a]ANTHRACENE (purity)                    | 4      |
| BCR-094     | DIBENZ[a,c]ANTHRACENE (purity)                        | 4      |
| BCR-095     | DIBENZ[a,j]ANTHRACENE (purity)                        | 4      |
| BCR-096     | DIBENZO[a,l]PYRENE (89mylas)                          | 4      |
| BCR-097     | BENZO[a]FLUORANTHENE (purity)                         | 4      |
| BCR-098     | ZIRCALOY-4 (trace element impurities)                 | 77     |
| BCR-102     | TUNGSTEN CARBIDE POWDER (O)                           | 75     |
| BCR-105     | GAS OIL (0.363 % S)                                   | 78     |
| BCR-106     | GAS OIL (0.502 % S)                                   | 78     |
| BCR-107     | GAS OIL (1.040 % S)                                   | 78     |
| BCR-109     | ZINC ORE CONCENTRATE (trace elements)                 | 79     |
| BCR-110     | ZINC ORE CONCENTRATE (trace elements)                 | 79     |
| BCR-113     | POTASSIUM CHLORIDE FERTILIZER (elemental composition) | 73     |
| BCR-114     | POTASSIUM SULPHATE FERTILIZER (elemental composition) | 73     |
| BCR-115     | ANIMAL FEED (Organochlorine pesticides)               | 42     |
| BCR-116     | LIMESTONE POWDERS (for shear testing)                 | 66     |
| BCR-121     | WHOLEMEAL FLOUR (vitamins)                            | 49     |
| BCR-122     | MARGARINE (vitamins)                                  | 49     |
| BCR-123A, B | 3 REFERENCE ETHANOLS (H, M, L) (for SNIF-NMR)         | 29, 81 |
| BCR-126A/B  | LEAD GLASS (composition/refractive index)             | 74     |
| BCR-129     | HAY POWDER (elements)                                 | 16     |
| BCR-130     | QUARTZ (particle size 50 – 220 microns)               | 68     |
| BCR-131     | QUARTZ (particle size 480 – 1800 microns)             | 68     |
| BCR-132     | QUARTZ (particle size 1400 – 5000 microns)            | 68     |
| BCR-133     | DIBENZO[a,e]PYRENE (89mylas)                          | 4      |
| BCR-134     | BENZO[c]PHENANTHRENE (purity)                         | 4      |
| BCR-136R    | BENZO[b]NAPHTHO[2,3-d]THIOPHENE (purity)              | 4      |
| BCR-137R    | BENZO[b]NAPHTHO[1,2-d]THIOPHENE (purity)              | 4      |
| BCR-138     | DIBENZO[a,h]ANTHRACENE (purity)                       | 4      |
| BCR-139     | BENZO[ghi]FLUORANTHENE (purity)                       | 4      |
| BCR-140     | BENZO[c]CHRYSENE (purity)                             | 4      |
| BCR-142R    | LIGHT SANDY SOIL (trace elements)                     | 13     |
| BCR-143R    | SEWAGE SLUDGE AMENDED SOIL (trace elements)           | 13     |
| BCR-145R    | SEWAGE SLUDGE (mixed origin) (trace elements)         | 14     |
| BCR-146R    | SEWAGE SLUDGE (industrial origin) (trace elements)    | 14     |
| BCR-152     | DIBENZ[a,l]ACRIDINE (89mylas)                         | 4      |
| BCR-153R    | DIBENZ[a,h]ACRIDINE (purity)                          | 4      |
| BCR-154     | DIBENZ[a,j]ACRIDINE (purity)                          | 4      |
| BCR-155     | DIBENZ[a,c]ACRIDINE (89mylas)                         | 4      |
| BCR-156R    | DIBENZ[c,h]ACRIDINE (purity)                          | 4      |
| BCR-157     | BENZ[a]ACRIDINE (purity)                              | 4      |
| BCR-158     | BENZ[c]ACRIDINE (purity)                              | 4      |

|              |   |    |
|--------------|---|----|
| BCR-159      | DIBENZO[a,h]PYRENE (90mylas)  | 4  |
| BCR-160R     | FLUORANTHENE (purity)   | 4  |
| BCR-162R     | SOYA-MAIZE OIL BLEND (fatty acid profile)                                   | 48 |
| BCR-163      | BEEF-PORK FAT BLEND (fatty acid profile)                                    | 48 |
| BCR-165      | LATEX SPHERES (particle diameter 2 microns)                                 | 58 |
| BCR-166      | LATEX SPHERES (particle diameter 4.8 microns)                               | 58 |
| BCR-167      | LATEX SPHERES (particle diameter 9.6 microns)                               | 58 |
| BCR-168      | PICENE (purity)   | 4  |
| BCR-169      | ALPHA ALUMINA (0.10 m <sup>2</sup> /g) (nitrogen BET specific surface area) | 69 |
| BCR-170      | ALPHA ALUMINA (1.05 m <sup>2</sup> /g) (nitrogen BET specific surface area) | 69 |
| BCR-171      | ALUMINA (2.95 m <sup>2</sup> /g) (nitrogen BET specific surface area)       | 69 |
| BCR-172      | QUARTZ (2.50 m <sup>2</sup> /g) (nitrogen BET specific surface area)        | 69 |
| BCR-173      | TITANIA (8.23 m <sup>2</sup> /g) (nitrogen BET specific surface area)       | 69 |
| BCR-175      | TUNGSTEN (0.18 m <sup>2</sup> /g) (nitrogen BET specific surface area)      | 69 |
| BCR-176R     | FLY ASH (trace elements)  | 15 |
| BCR-177R     | PYRENE (purity)   | 4  |
| BCR-178      | CALCIUM AMMONIUM NITRATE FERTILIZER (composition)                           | 73 |
| BCR-179      | UREA FERTILIZER (composition)   | 73 |
| BCR-185R     | BOVINE LIVER (trace elements)   | 45 |
| BCR-187      | NATURAL MILK POWDER (pesticides)  | 42 |
| BCR-188      | SPIKED MILK POWDER (pesticides)   | 42 |
| BCR-191      | BROWN BREAD (trace elements)  | 46 |
| BCR-261T     | TANTALUM PENTOXIDE ON TANTALUM FOIL   | 69 |
| BCR-262R     | DEFATTED PEANUT MEAL (aflatoxin B1, blank)                                  | 43 |
| BCR-263R     | DEFATTED PEANUT MEAL (aflatoxin B1, medium level)                           | 43 |
| BCR-264      | DEFATTED PEANUT MEAL (aflatoxin B1, high level)                             | 43 |
| BCR-265      | DIBENZO[a,e]FLUORANTHENE (90mylas)  | 4  |
| BCR-266      | 7H-DIBENZO (c.g) CARBAZOLE (purity)   | 4  |
| BCR-267      | INDENO[1,2,3-cd]FLUORANTHENE (purity)                                       | 4  |
| BCR-269      | CHRYSENE (purity)   | 4  |
| BCR-270      | TRIPHENYLENE (purity)   | 4  |
| BCR-271      | BENZ[a]ANTHRACENE (purity)  | 4  |
| BCR-272      | CORONENE (purity)   | 4  |
| BCR-273      | SINGLE CELL PROTEIN (major elements)  | 46 |
| BCR-274      | SINGLE CELL PROTEIN (trace elements)  | 46 |
| BCR-275      | ZIRCALOY (C, N, O)  | 75 |
| BCR-276      | ZIRCALOY (C, N, O)  | 75 |
| BCR-277R     | ESTUARINE SEDIMENT (trace elements)   | 14 |
| BCR-280R     | LAKE SEDIMENT (trace elements)  | 14 |
| BCR-286A, B  | ELECTROLYTICALLY REFINED LEAD (trace elements)                              | 75 |
| BCR-287A, B  | THERMALLY REFINED LEAD (trace elements)                                     | 75 |
| BCR-288B     | LEAD WITH ADDED IMPURITIES (trace elements)                                 | 75 |
| BCR-289      | 2,4'-DICHLOROBIPHENYL (IUPAC No. 8) (purity)                                | 5  |
| BCR-290      | 2,3,3'-TRICHLOROBIPHENYL (IUPAC No. 20) (purity)                            | 5  |
| BCR-291      | 2,4,4'-TRICHLOROBIPHENYL (IUPAC No. 28) (purity)                            | 5  |
| BCR-293      | 2,2',5,5'-TETRACHLOROBIPHENYL (IUPAC No. 52) (purity)                       | 5  |
| BCR-296      | 2,2',3,4,4',5'-HEXACHLOROBIPHENYL (IUPAC No. 138) (purity)                  | 5  |
| BCR-297      | 2,2',4,4',5,5'-HEXACHLOROBIPHENYL (IUPAC No. 153) (purity)                  | 5  |
| BCR-298      | 2,2',3,4,4',5,5'-HEPTACHLOROBIPHENYL (IUPAC No. 180) (purity)               | 5  |
| BCR-301 (RM) | MULLITE (lattice spacing, other parameters)                                 | 69 |
| BCR-304      | HUMAN SERUM (Ca, Mg, Li)  | 60 |
| BCR-305      | 1-NITROPYRENE (purity)  | 5  |
| BCR-306      | 1-NITRONAPHTALENE (purity)  | 5  |
| BCR-307      | 2-NITRONAPHTALENE (purity)  | 5  |
| BCR-308      | 9-NITROANTHRACENE (purity)  | 5  |

|              |   |        |
|--------------|---|--------|
| BCR-309      | 6-NITROCHRYSENE (purity)                      | 5      |
| BCR-310      | 3-NITROFLUORANTHENE (purity)                  | 5      |
| BCR-311      | 6-NITROBENZO[a]PYRENE (purity)                | 5      |
| BCR-312      | 2-NITRO-7-METHOXYNAPHTHO[2,1-b]FURAN (purity) | 5      |
| BCR-318      | TITANIUM (H)                                  | 75     |
| BCR-320R     | CHANNEL SEDIMENT (trace elements)             | 14     |
| BCR-321      | UNALLOYED ZINC (trace elements)               | 75     |
| BCR-326      | UNALLOYED ZINC (disc) (trace elements)        | 75     |
| BCR-327      | UNALLOYED ZINC (disc) (trace elements)        | 75     |
| BCR-331      | LOW VOLATILE STEAM COAL (S)                   | 78     |
| BCR-332      | HIGH VOLATILE INDUSTRIAL COAL (S)             | 78     |
| BCR-336      | HIGH VOLATILE STEAM COAL (S)                  | 78     |
| BCR-337      | DIBENZO[b,d]FURAN (purity)                    | 5      |
| BCR-339      | BENZO[c,d]PYREN-6-ONE (purity)                | 5      |
| BCR-340      | BENZO[b]NAPHTHO (1,2-d) FURAN (purity)        | 5      |
| BCR-341      | BENZO[b]NAPHTHO (2,1-d) FURAN (purity)        | 5      |
| BCR-342      | BENZO[a]FLUORENONE (purity)                   | 5      |
| BCR-348R     | HUMAN SERUM (high progesterone)               | 59     |
| BCR-349      | COD LIVER OIL (PCBs)                          | 41     |
| BCR-351      | ZnAl4 (trace elements)                        | 76     |
| BCR-352      | ZnAl4 (trace elements)                        | 76     |
| BCR-353      | ZnAl4 (trace elements)                        | 76     |
| BCR-354      | ZnAl4 (trace elements)                        | 76     |
| BCR-355      | ZnAl4 (trace elements)                        | 76     |
| BCR-356      | ZnAl4Cu1 (trace elements)                     | 76     |
| BCR-357      | ZnAl4Cu1 (trace elements)                     | 76     |
| BCR-360      | ZnAl4Cu1 (trace elements)                     | 76     |
| BCR-361      | ZnAl4Cu1 (trace elements)                     | 76     |
| BCR-365      | PCB STANDARD SOLUTION                         | 5      |
| BCR-375      | COMPOUND FEED (aflatoxin B1 blank)            | 43     |
| BCR-377      | MAIZE FLOUR (deoxynivalenol blank)            | 43     |
| BCR-383      | HARICOTS VERTS (major nutrients)              | 47, 50 |
| BCR-385R     | PEANUT BUTTER (aflatoxins low level)          | 43     |
| BCR-393      | HUMAN APOLIPOPROTEIN A I (mass concentration) | 61     |
| BCR-396      | WHEAT FLOUR (deoxynivalenol blank)            | 43     |
| BCR-401R     | PEANUT BUTTER (aflatoxins very low level)     | 43     |
| BCR-402      | WHITE CLOVER (trace elements)                 | 16     |
| BCR-412      | BOVINE MUSCLE (diethylstilbestrol blank)      | 55     |
| BCR-414      | PLANKTON (trace elements)                     | 17     |
| BCR-420      | WASTE MINERAL OIL (low PCB level)             | 27     |
| BCR-423 (RM) | AFLATOXIN M1 STANDARD SOLUTION                | 29     |
| BCR-425      | NIMONIC 75 FOR CREEP TESTING                  | 67     |
| BCR-431      | BRUSSELS SPROUT (vitamins)                    | 49     |
| BCR-444      | PORCINE MUSCLE (chloramphenicol blank)        | 55     |
| BCR-449      | WASTE MINERAL OIL (high PCB level)            | 27     |
| BCR-450      | NATURAL MILK POWDER (PCBs )                   | 41     |
| BCR-459      | COCONUT OIL (PAH blank)                       | 40     |
| BCR-460      | COAL (F)                                      | 78     |
| BCR-461      | CLAY (F)                                      | 78     |
| BCR-462      | COASTAL SEDIMENT (butyltins)                  | 23     |
| BCR-465      | RICE FLOUR (amylose, low level)               | 49     |
| BCR-466      | RICE FLOUR (amylose, medium level)            | 49     |
| BCR-467      | RICE FLOUR (amylose, high level)              | 49     |
| BCR-471      | WHEAT (ochratoxin A, blank)                   | 44     |
| BCR-474-5    | BOVINE LIVER (trenbolone blank and positive)  | 55     |

|          |   |    |
|----------|---|----|
| BCR-479  | FRESH WATER (nitrate, low level)  | 20 |
| BCR-480  | FRESH WATER (nitrate, high level)   | 20 |
| BCR-481  | INDUSTRIAL SOIL (PCBs )   | 25 |
| BCR-482  | LICHEN (trace elements)   | 17 |
| BCR-483  | SEWAGE SLUDGE AMENDED SOIL (trace elements)                               | 22 |
| BCR-484  | SEWAGE SLUDGE AMENDED (terra rossa) SOIL (trace elements)                 | 22 |
| BCR-485  | MIXED VEGETABLES (vitamins)   | 49 |
| BCR-486  | PURIFIED HUMAN ALFAFOETOPROTEIN (protein mass)                            | 61 |
| BCR-487  | PIG LIVER (vitamins)  | 49 |
| BCR-490  | FLY ASH (PCDDs and PCDFs)   | 26 |
| BCR-502  | BOVINE URINE (clenbuterol and salbutamol)                                 | 54 |
| BCR-503  | BOVINE URINE (clenbuterol and salbutamol)                                 | 54 |
| BCR-504  | BOVINE URINE (clenbuterol and salbutamol)                                 | 54 |
| BCR-505  | ESTUARINE WATER (trace elements)  | 19 |
| BCR-522  | BOVINE BLOOD LYSATE (haemoglobincyanide)                                  | 62 |
| BCR-524  | INDUSTRIAL SOIL (PAHs)  | 25 |
| BCR-528  | BACILLUS CEREUS (number of colony forming particles)                      | 52 |
| BCR-529  | INDUSTRIAL SANDY SOIL (PCDDs, PCDFs)                                      | 25 |
| BCR-530  | INDUSTRIAL CLAY SOIL (PCDDs, PCDFs)                                       | 25 |
| BCR-535  | FRESHWATER HARBOUR SEDIMENT (PAHs)  | 25 |
| BCR-536  | FRESHWATER HARBOUR SEDIMENT (PCBs)  | 25 |
| BCR-537  | PLASTIC FILM (OVERALL MIGRATION IN OLIVE OIL (film A)                     | 51 |
| BCR-539  | PLASTIC FILM (OVERALL MIGRATION IN OLIVE OIL (film C)                     | 51 |
| BCR-543  | MUSSEL (dc-saxitoxin)   | 44 |
| BCR-545  | WELDING DUST LOADED ON FILTER (Cr VI, Cr)                                 | 24 |
| BCR-546  | FORMALDEHYDE-2,4-DINITROPHENYLHYDRAZONE (purity)                          | 58 |
| BCR-547  | ACETALDEHYDE-2,4-DINITROPHENYLHYDRAZONE (purity)                          | 58 |
| BCR-548  | ACROLEIN-2,4-DINITROPHENYLHYDRAZONE (purity)                              | 58 |
| BCR-549  | ACETONE-2,4-DINITROPHENYLHYDRAZONE (purity)                               | 58 |
| BCR-550  | GLUTARALDEHYDE-2,4-DINITROPHENYLHYDRAZONE (purity)                        | 58 |
| BCR-551  | 2,4-DINITROPHENYLHYDRAZONES in ACETONITRILE                               | 58 |
| BCR-552  | 2,4-DINITROPHENYLHYDRAZONES in ACETONITRILE (blank)                       | 58 |
| BCR-553  | FORMALDEHYDE-2,4-DINITROPHENYLHYDRAZONE on filter                         | 58 |
| BCR-554  | FORMALDEHYDE-2,4-DINITROPHENYLHYDRAZONE on filter (blank)                 | 58 |
| BCR-573  | HUMAN SERUM (low creatinine)  | 62 |
| BCR-573i | CREATININE (interfering substances)                                       | 62 |
| BCR-574  | HUMAN SERUM (medium creatinine)   | 62 |
| BCR-575  | HUMAN SERUM (high creatinine)   | 62 |
| BCR-576  | HUMAN SERUM (17 $\beta$ -ESTRADIOL, low level)                            | 59 |
| BCR-577  | HUMAN SERUM (17 $\beta$ -ESTRADIOL, medium level)                         | 59 |
| BCR-578  | HUMAN SERUM (17 $\beta$ -ESTRADIOL, high level)                           | 59 |
| BCR-579  | COASTAL SEAWATER (Hg)   | 19 |
| BCR-596  | AQUATIC PLANT (Cr)  | 16 |
| BCR-598  | COD LIVER OIL (Organochlorine pesticides)                                 | 41 |
| BCR-599  | EWES'/GOATS' CURD (for adulteration with cows' milk) 0 and 1 % cows' milk | 56 |
| BCR-607  | MILK POWDER (PCDDs, PCDFs)  | 42 |
| BCR-611  | GROUND WATER (Br, high level)   | 20 |
| BCR-612  | GROUND WATER (Br, low level)  | 20 |
| BCR-613  | PROSTATE SPECIFIC ANTIGEN (protein mass)                                  | 61 |
| BCR-614  | POLYCHLORODIBENZO-P-DIOXINS (PCDD) AND POLYCHLORODIBENZOFURANS (PCDFS)    | 6  |
| BCR-615  | FLY ASH (LOW LEVEL) (PCDDs and PCDFs)                                     | 26 |
| BCR-627  | TUNA FISH TISSUE (As species)   | 24 |
| BCR-633  | ANHYDROUS BUTTER FAT (tracers)  | 48 |
| BCR-634  | HUMAN BLOOD (Pb, Cd)  | 60 |
| BCR-635  | HUMAN BLOOD (Pb, Cd)  | 60 |

|               |  |        |
|---------------|--|--------|
| BCR-636       | HUMAN BLOOD (Pb, Cd)                                       | 60     |
| BCR-637       | HUMAN SERUM (Al, Se, Zn)                                   | 60     |
| BCR-638       | HUMAN SERUM (Al, Se, Zn)                                   | 60     |
| BCR-639       | HUMAN SERUM (Al, Se, Zn)                                   | 60     |
| BCR-644       | ARTIFICIAL FOODSTUFF (major nutrients)                     | 49     |
| BCR-645       | ARTIFICIAL FOODSTUFF (major nutrients)                     | 49     |
| BCR-646       | FRESHWATER SEDIMENT (butyltin and phenyltin compounds)     | 23     |
| BCR-647       | HUMAN ADENOSINE DEAMINASE (ADA 1)                          | 63     |
| BCR-648       | BOVINE LIVER (CLENBUTEROL BLANK)                           | 55     |
| BCR-649       | BOVINE LIVER (CLENBUTEROL POSITIVE)                        | 55     |
| BCR-651       | BEER (EtOH, low level)                                     | 49     |
| BCR-652       | BEER (EtOH, very low level)                                | 49     |
| BCR-653       | WINE (EtOH, low level)                                     | 49     |
| BCR-656       | ISOTOPE RATIOS IN ABSOLUTE ALCOHOL                         | 29, 81 |
| BCR-657       | ISOTOPE RATIOS IN GLUCOSE                                  | 29, 81 |
| BCR-660       | ISOTOPE RATIOS IN ALCOHOLIC SOLUTION                       | 29, 81 |
| BCR-661       | NIMONIC 75 FOR TENSILE PROPERTIES                          | 67     |
| BCR-663       | SAXITOXIN IN ACETIC ACID                                   | 30     |
| BCR-664       | GLASS (trace elements)                                     | 80     |
| BCR-665       | LUNG TISSUE (asbestos fibres)                              | 64     |
| BCR-666       | LUNG TISSUE (asbestos fibres)                              | 64     |
| BCR-667       | ESTUARINE SEDIMENT   | 13     |
| BCR-668       | MUSSEL TISSUE  | 19     |
| BCR-670       | LEMNA MINOR (aquatic plant)                                | 18     |
| BCR-673       | BOVINE EYE (CLENBUTEROL BLANK)                             | 55     |
| BCR-674       | BOVINE EYE (CLENBUTEROL POSITIVE)                          | 55     |
| BCR-677       | SEWAGE SLUDGE (PCDDs and PCDFs)                            | 26     |
| BCR-679       | TRACE ELEMENTS IN WHITE CABBAGE                            | 46     |
| BCR-682       | MUSSEL TISSUE  | 27     |
| BCR-683       | BEECH WOOD   | 27     |
| BCR-684       | RIVER SEDIMENT (extractable phosphorous)                   | 22     |
| BCR-685       | SKIM MILK POWDER   | 50     |
| BCR-691       | COPPER ALLOYS  | 78     |
| BCR-692       | SCRATCH TESTING  | 67     |
| BCR-693       | HUMAN PANCREATIC LIPASE (from pancreatic juice)            | 63     |
| BCR-694       | HUMAN PANCREATIC LIPASE (recombinant)                      | 63     |
| BCR-695       | PIG LIVER (CTC free)                                       | 55     |
| BCR-696       | PIG LIVER (CTC incurred)                                   | 55     |
| BCR-697       | PIG MUSCLE (CTC free)                                      | 55     |
| BCR-700       | ORGANIC-RICH SOIL (extractable elements)                   | 22     |
| BCR-701       | LAKE SEDIMENT (trace elements)                             | 23     |
| BCR-704       | FAUJASITE TYPE ZEOLITE (micropore volume and width)        | 69     |
| BCR-705       | LINDE TYPE A ZEOLITE (micropore volume and width)          | 69     |
| BCR-706       | PIG KIDNEY (CTC free)                                      | 55     |
| BCR-707       | PIG KIDNEY (CTC incurred)                                  | 55     |
| BCR-708       | DAIRY FEED (nutritional properties)                        | 50     |
| BCR-718       | HERRING (PCBs)   | 27     |
| BCR-723       | ROAD DUST (trace elements)                                 | 15     |
| BCR-724A-D    | GLASS-CERAMIC  | 65     |
| BCR-725       | SALMON TISSUE  | 55     |
|               |  |        |
| EURM-020      | HIPPOGLOSSUS HIPPOGLOSSUS (ATLANTIC HALIBUT) - FISH POWDER | 57     |
|               |  |        |
| IRMM/IFCC-467 | HAEMOGLOBIN HbA0   | 62     |
| IRMM-007/1-6  | Zinc-64, nitrate solution                                  | 82     |



|           |  |        |
|-----------|--|--------|
| IRMM-009  | Mg, isotopic, nitrate solution   | 82     |
| IRMM-010  | PLATINUM, isotopic, metal  | 82     |
| IRMM-011  | BORIC ACID, isotopic, solid  | 82     |
| IRMM-012  | CHROMIUM, isotopic, chloride solution  | 82     |
| IRMM-016  | LITHIUM CARBONATE, isotopic, solid   | 82     |
| IRMM-018a | SILICON DIOXIDE, isotopic, solid   | 82     |
| IRMM-311  | Genomic DNA of Bacillus licheniformis DSM 5749                                 | 52     |
| IRMM-312  | Genomic DNA of Bacillus subtilis DSM 5750                                      | 52     |
| IRMM-313  | Genomic DNA of Campylobacter coli (CNET068) and Campylobacter jejuni (CNET112) | 53     |
| IRMM-315  | 4-DEOXYNIVALENOL in acetonitrile   | 31     |
| IRMM-316  | NIVALENOL in acetonitrile  | 31     |
| IRMM-351  | ESCHERICHIA COLI 0157 (NCTC 12900)   | 53     |
| IRMM-352  | SALMONELLA ENTERITIDIS (NCTC 12694)  | 53     |
| IRMM-354  | CANDIDA ALBICANS (NCPF 3179)   | 54     |
| IRMM-355  | ENTEROCOCCUS FAECALIS (CIP 106877)   | 54     |
| IRMM-359  | CHEESE (SEA)   | 44     |
| IRMM-3702 | ZINC-64 spike, nitrate solution  | 84     |
| IRMM-426  | WILD BERRIES   | 57     |
| IRMM-427  | PIKE-PERCH (PFASs in fish tissue)  | 27     |
| IRMM-428  | WATER (PFASs in water)   | 27     |
| IRMM-435  | PHARMACEUTICAL GLASS   | 64     |
| IRMM-440  | RESIN-BONDED FIBRE BOARD (thermal conductivity)                                | 65     |
| IRMM-441  | n-HEPTANE (purity)   | 72, 74 |
| IRMM-442  | ISOOCTANE (purity)   | 72, 74 |
| IRMM-447  | Genomic DNA of Listeria monocytogenes  | 54     |
| IRMM-448  | Genomic DNA of Campylobacter jejuni  | 54     |
| IRMM-449  | Genomic DNA of Escherichia coli  | 54     |
| IRMM-468  | THYROXINE (T4)   | 58     |
| IRMM-469  | 3,3',5 TRIIODOTHYRONINE (T3)   | 58     |
| IRMM-471  | CEMENTITE GRAINS IN CARBURISED PURE IRON                                       | 81     |
| IRMM-481  | Peanut Test Material Kit   | 56     |
| IRMM-521  | Ni   | 74     |
| IRMM-522  | Cu   | 74     |
| IRMM-523  | Al   | 74     |
| IRMM-524  | Fe   | 74     |
| IRMM-525  | Nb   | 74     |
| IRMM-526  | Nb   | 74     |
| IRMM-527R | Al-0.1 % Co  | 74     |
| IRMM-528R | Al-1.0 % Co  | 74     |
| IRMM-529  | Rh   | 74     |
| IRMM-530R | Al-0.1 % Au  | 74     |
| IRMM-531  | Ti   | 74     |
| IRMM-532  | Al-0.01 % Co   | 74     |
| IRMM-533  | Al-0.1 % Ag  | 74     |
| IRMM-534  | Al-2.0 % Sc  | 74     |
| IRMM-610  | BORON-10 spike, aqueous solution   | 83     |
| IRMM-611  | BORON (natural) spike, aqueous solution  | 83     |
| IRMM-615  | LITHIUM-6 spike, chloride solution   | 83     |
| IRMM-618  | RUBIDIUM-87 spike, nitrate solution  | 83     |
| IRMM-619  | RUBIDIUM (natural) spike, nitrate solution                                     | 83     |
| IRMM-620  | IRON-57 spike, chloride solution   | 83     |
| IRMM-621  | CADMIUM-111 spike, nitrate solution  | 83     |
| IRMM-622  | CADMIUM-111 spike, nitrate solution  | 83     |
| IRMM-624  | CHROMIUM-50 spike, chloride solution   | 83     |
| IRMM-625  | CHROMIUM (natural) spike, chloride solution                                    | 83     |

|             |  |    |
|-------------|--|----|
| IRMM-632    | COPPER-65 spike, nitrate solution        | 83 |
| IRMM-634    | IRON (natural) spike, chloride solution  | 83 |
| IRMM-643    | SULPHUR-32 spike, nitrate solution       | 84 |
| IRMM-644    | SULPHUR-32 spike, nitrate solution       | 84 |
| IRMM-645    | SULPHUR-32 spike, nitrate solution       | 84 |
| IRMM-646    | SULPHUR-34 spike, nitrate solution       | 84 |
| IRMM-651    | ZINC-64 spike, nitrate solution          | 84 |
| IRMM-652    | ZINC-64 spike, nitrate solution          | 84 |
| IRMM-653    | ZINC-67 spike, nitrate solution          | 84 |
| IRMM-654    | ZINC-68 spike, nitrate solution          | 84 |
| IRMM-801    | COCOA BUTTER                             | 48 |
| IRMM-804    | RICE FLOUR                               | 45 |
| STA-003m    | TETRAMETHYLUREA                          | 29 |
| VDA 001-004 | POLYETHYLENE (40, 75, 200, 400 mg/kg Cd) | 80 |

## ALPHABETICAL LIST

| DESIGNATION   | ERM / CRM      | PAGE NO. |
|---|----------------|----------|
| $\gamma$ -GLUTAMYLTRANSFERASE (catalytic concentration)       | ERM-AD452/IFCC | 63       |
| 10-AZABENZO[a]PYRENE (purity)                                 | BCR-092        | 4        |
| 1-METHYLBENZ[a]ANTHRACENE (purity)                            | BCR-093R       | 4        |
| 1-METHYLCHRYSENE (purity)                                     | BCR-077R       | 4        |
| 1-NITRONAPHTALENE (purity)                                    | BCR-306        | 5        |
| 1-NITROPYRENE (purity)  | BCR-305        | 5        |
| 2,2',3,4,4',5,5'-HEPTACHLOROBIPHENYL (IUPAC No. 180) (purity) | BCR-298        | 5        |
| 2,2',3,4,4',5'-HEXACHLOROBIPHENYL (IUPAC No. 138) (purity)    | BCR-296        | 5        |
| 2,2',4,4',5,5'-HEXACHLOROBIPHENYL (IUPAC No. 153) (purity)    | BCR-297        | 5        |
| 2,2',5,5'-TETRACHLOROBIPHENYL (IUPAC No. 52) (purity)         | BCR-293        | 5        |
| 2,3,3'-TRICHLOROBIPHENYL (IUPAC No. 20) (purity)              | BCR-290        | 5        |
| 2,4,4'-TRICHLOROBIPHENYL (IUPAC No. 28) (purity)              | BCR-291        | 5        |
| 2,4'-DICHLOROBIPHENYL (IUPAC No. 8) (purity)                  | BCR-289        | 5        |
| 2,4-DINITROPHENYLHYDRAZONES in ACETONITRILE                   | BCR-551        | 58       |
| 2,4-DINITROPHENYLHYDRAZONES in ACETONITRILE (blank)           | BCR-552        | 58       |
| 2-METHYLCHRYSENE (purity)                                     | BCR-078R       | 4        |
| 2-NITRO-7-METHOXYNAPHTHO[2,1-b]FURAN (purity)                 | BCR-312        | 5        |
| 2-NITRONAPHTALENE (purity)                                    | BCR-307        | 5        |
| 3 REFERENCE ETHANOLS (H, M, L) (for SNIF-NMR)                 | BCR-123A, B    | 29, 81   |
| 3,3',5 TRIIODOTHYRONINE (T3)                                  | IRMM-469       | 58       |
| 3-METHYLCHRYSENE (purity)                                     | BCR-079R       | 4        |
| 3-NITROFLUORANTHENE (purity)                                  | BCR-310        | 5        |
| 4-DEOXYNIVALENOL in acetonitrile                              | IRMM-315       | 31       |
| 4-METHYLCHRYSENE (purity)                                     | BCR-080R       | 4        |
| 5-METHYLCHRYSENE (purity)                                     | BCR-081R       | 4        |
| 6-METHYLCHRYSENE (purity)                                     | ERM-AC082      | 5        |
| 6-NITROBENZO[a]PYRENE (purity)                                | BCR-311        | 5        |
| 6-NITROCHRYSENE (purity)                                      | BCR-309        | 5        |
| 7H-DIBENZO (c.g) CARBAZOLE (purity)                           | BCR-266        | 4        |
| 9-NITROANTHRACENE (purity)                                    | BCR-308        | 5        |
| ABETA 42 IN CEREBROSPINAL FLUID (CSF) (high level)            | ERM-DA482/IFCC | 61       |
| ABETA 42 IN CEREBROSPINAL FLUID (CSF) (low level)             | ERM-DA480/IFCC | 61       |
| ABETA 42 IN CEREBROSPINAL FLUID (CSF) (medium level)          | ERM-DA481/IFCC | 61       |
| ACETALDEHYDE-2,4-DINITROPHENYLHYDRAZONE (purity)              | BCR-547        | 58       |
| ACETONE-2,4-DINITROPHENYLHYDRAZONE (purity)                   | BCR-549        | 58       |
| ACROLEIN-2,4-DINITROPHENYLHYDRAZONE (purity)                  | BCR-548        | 58       |
| AFLATOXIN B1 IN ACETONITRILE                                  | ERM-AC057      | 30       |
| AFLATOXIN B2 IN ACETONITRILE                                  | ERM-AC058      | 30       |
| AFLATOXIN G1 IN ACETONITRILE                                  | ERM-AC059      | 30       |
| AFLATOXIN G2 IN ACETONITRILE                                  | ERM-AC060      | 30       |
| AFLATOXIN M1 STANDARD SOLUTION                                | BCR-423 (RM)   | 29       |
| Al  | IRMM-523       | 74       |
| Al-0.01 % Co  | IRMM-532       | 74       |
| Al-0.1 % Ag   | IRMM-533       | 74       |
| Al-0.1 % Au   | IRMM-530R      | 74       |
| Al-0.1 % Au (0.1 mm foil)                                     | ERM-EB530A     | 74       |
| Al-0.1 % Au (0.5 mm wire)                                     | ERM-EB530B     | 74       |
| Al-0.1 % Au (1.0 mm wire)                                     | ERM-EB530C     | 74       |
| Al-0.1 % Co   | IRMM-527R      | 74       |

|   |                 |        |
|---|-----------------|--------|
| Al-1.0 % Co   | IRMM-528R       | 74     |
| Al-2.0 % Sc   | IRMM-534        | 74     |
| ALANINE AMINOTRANSFERASE (ALT)  | ERM-AD454k/IFCC | 63     |
| ALPHA ALUMINA (0.10 m <sup>2</sup> /g) (nitrogen BET specific surface area) | BCR-169         | 69     |
| ALPHA ALUMINA (1.05 m <sup>2</sup> /g) (nitrogen BET specific surface area) | BCR-170         | 69     |
| ALUMINA (2.95 m <sup>2</sup> /g) (nitrogen BET specific surface area)       | BCR-171         | 69     |
| ANHYDROUS BUTTER FAT (tracers)  | BCR-633         | 48     |
| ANIMAL FEED (Organochlorine pesticides)                                     | BCR-115         | 42     |
| ANTHANTHRENE (purity)   | BCR-091         | 4      |
| ANTIMONY IMPLANTED IN SILICON   | ERM-EG001       | 81     |
| APPLE (dietary fibre)   | ERM-BC516       | 50     |
| AQUATIC PLANT (Cr)  | BCR-596         | 16     |
| ARSENOBETAINE IN WATER  | ERM-AC626       | 29     |
| ARTIFICIAL FOODSTUFF (major nutrients)                                      | BCR-644         | 49     |
| ARTIFICIAL FOODSTUFF (major nutrients)                                      | BCR-645         | 49     |
| ASPARTATE TRANSAMINASE (AST)  | ERM-AD457/IFCC  | 63     |
| BACILLUS CEREUS (number of colony forming particles)                        | BCR-528         | 52     |
| BCR-ABL pDNA CALIBRANT  | ERM-AD623       | 63     |
| BEECH WOOD  | BCR-683         | 27     |
| BEEF-PORK FAT BLEND (fatty acid profile)                                    | BCR-163         | 48     |
| BEER (EtOH, low level)  | BCR-651         | 49     |
| BEER (EtOH, very low level)   | BCR-652         | 49     |
| BENZ[a]ACRIDINE (purity)  | BCR-157         | 4      |
| BENZ[a]ANTHRACENE (purity)  | BCR-271         | 4      |
| BENZ[c]ACRIDINE (purity)  | BCR-158         | 4      |
| BENZO[a]FLUORANTHENE (purity)   | BCR-097         | 4      |
| BENZO[a]FLUORENONE (purity)   | BCR-342         | 5      |
| BENZO[A]PYRENE (purity)   | ERM-AC051       | 5      |
| BENZO[b]CHRYSENE (purity)   | BCR-046         | 4      |
| BENZO[b]FLUORANTHENE (purity)   | BCR-047         | 4      |
| BENZO[b]NAPHTHO (1,2-d) FURAN (purity)                                      | BCR-340         | 5      |
| BENZO[b]NAPHTHO (2,1-d) FURAN (purity)                                      | BCR-341         | 5      |
| BENZO[b]NAPHTHO[1,2-d]THIOPHENE (purity)                                    | BCR-137R        | 4      |
| BENZO[b]NAPHTHO[2,3-d]THIOPHENE (purity)                                    | BCR-136R        | 4      |
| BENZO[c,d]PYREN-6-ONE (purity)  | BCR-339         | 5      |
| BENZO[c]CHRYSENE (purity)   | BCR-140         | 4      |
| BENZO[c]PHENANTHRENE (purity)   | BCR-134         | 4      |
| BENZO[e]PYRENE (purity)   | BCR-050         | 4      |
| BENZO[ghi]FLUORANTHENE (purity)   | BCR-139         | 4      |
| BENZO[ghi]PERYLENE (purity)   | BCR-052         | 4      |
| BENZO[j]FLUORANTHENE (purity)   | BCR-049         | 4      |
| BENZO[k]FLUORANTHENE (purity)   | BCR-048R        | 4      |
| BIODIESEL   | ERM-EF001       | 72     |
| BIODIESEL (B100 Rapeseed)   | ERM-EF002       | 65, 72 |
| BLADDERWRACK (Fucus vesiculosus) (trace elements)                           | ERM-CD200       | 17     |
| BORIC ACID, isotopic, solid   | IRMM-011        | 82     |
| BORON (natural) spike, aqueous solution                                     | IRMM-611        | 83     |
| BORON-10 spike, aqueous solution  | IRMM-610        | 83     |
| BOVINE BLOOD (Pb, Cd)   | ERM-CE195       | 60     |
| BOVINE BLOOD (Pb, Cd)   | ERM-CE196       | 60     |
| BOVINE BLOOD LYSATE (haemoglobincyanide)                                    | BCR-522         | 62     |
| BOVINE EYE (CLENBUTEROL BLANK)  | BCR-673         | 55     |
| BOVINE EYE (CLENBUTEROL POSITIVE)   | BCR-674         | 55     |
| BOVINE LIVER (CLENBUTEROL BLANK)  | BCR-648         | 55     |
| BOVINE LIVER (CLENBUTEROL POSITIVE)   | BCR-649         | 55     |

|  |             |    |
|--|-------------|----|
| BOVINE LIVER (trace elements)  | ERM-BB185   | 45 |
| BOVINE LIVER (trace elements)  | BCR-185R    | 45 |
| BOVINE LIVER (trenbolone blank and positive)                             | BCR-474-5   | 55 |
| BOVINE MUSCLE (diethylstilbestrol blank)                                 | BCR-412     | 55 |
| BOVINE MUSCLE (trace elements)   | ERM-BB184   | 45 |
| BOVINE URINE (diethylstilboestrol, dienooestrol and hexooestrol)         | ERM-BB389   | 55 |
| BOVINE URINE (diethylstilboestrol, dienooestrol and hexooestrol) (blank) | ERM-BB386   | 55 |
| BOVINE URINE (clenbuterol and salbutamol)                                | BCR-502     | 54 |
| BOVINE URINE (clenbuterol and salbutamol)                                | BCR-503     | 54 |
| BOVINE URINE (clenbuterol and salbutamol)                                | BCR-504     | 54 |
| BRAN BREAKFAST CEREAL (dietary fibre)                                    | ERM-BD518   | 50 |
| BROWN BREAD (trace elements)   | BCR-191     | 46 |
| BROWN COAL   | ERM-EF412   | 66 |
| BRUSSELS SPROUT (vitamins)   | BCR-431     | 49 |
| CADMIUM-111 spike, nitrate solution                                      | IRMM-621    | 83 |
| CADMIUM-111 spike, nitrate solution                                      | IRMM-622    | 83 |
| CALCAREOUS SOIL  | ERM-CC690   | 13 |
| CALCIUM AMMONIUM NITRATE FERTILIZER (composition)                        | BCR-178     | 73 |
| CALCIUM-41 isotopic, nitrate solution (set of 8 units)                   | ERM-AE701   | 82 |
| CANDIDA ALBICANS (NCPF 3179)   | IRMM-354    | 54 |
| CARROT (dietary fibre)   | ERM-BC515   | 50 |
| CEMENTITE GRAINS IN CARBURISED PURE IRON                                 | IRMM-471    | 81 |
| CHANNEL SEDIMENT (trace elements)  | BCR-320R    | 14 |
| CHARPY SPECIMENS 120 J (impact toughness)                                | ERM-FA016   | 68 |
| CHARPY SPECIMENS 150 J (impact toughness)                                | ERM-FA415   | 68 |
| CHARPY SPECIMENS 80 J (impact toughness)                                 | ERM-FA015   | 68 |
| CHARPY SPECIMENS Low Energy 0°C (impact toughness)                       | ERM-FA013   | 68 |
| CHARPY SPECIMENS Low Energy 20°C (impact toughness)                      | ERM-FA013   | 68 |
| CHEESE (SEA)   | IRMM-359    | 44 |
| CHLORIDE (natural) spike, chloride solution                              | ERM-AE641   | 84 |
| CHLORIDE-37 spike, chloride solution                                     | ERM-AE642   | 84 |
| CHROMIUM (natural) spike, chloride solution                              | IRMM-625    | 83 |
| CHROMIUM, isotopic, chloride solution                                    | IRMM-012    | 82 |
| CHROMIUM-50 spike, chloride solution                                     | IRMM-624    | 83 |
| CHRYSENE (purity)  | BCR-269     | 4  |
| CLAY (F)   | BCR-461     | 78 |
| COAL (F)   | BCR-460     | 78 |
| COASTAL SEAWATER (Hg)  | BCR-579     | 19 |
| COASTAL SEDIMENT (butyltins)   | BCR-462     | 23 |
| COCOA BUTTER   | IRMM-801    | 48 |
| COCONUT OIL (PAH blank)  | BCR-459     | 40 |
| COD LIVER OIL (Organochlorine pesticides)                                | BCR-598     | 41 |
| COD LIVER OIL (PCBs)   | BCR-349     | 41 |
| COLLOIDAL SILICA (particle size)   | ERM-FD100   | 69 |
| COLLOIDAL SILICA (particle size)   | ERM-FD304   | 70 |
| COLLOIDAL SILICA IN AQUEOUS SOLUTION (nanoparticles)                     | ERM-FD101b  | 70 |
| COLLOIDAL SILICA IN AQUEOUS SOLUTION (particle size)                     | ERM-FD102   | 70 |
| COMPOUND FEED (aflatoxin B1 blank)                                       | BCR-375     | 43 |
| COMPOUND FEEDINGSTUFF (high level)                                       | ERM-BE376   | 43 |
| COMPOUND FEEDINGSTUFF (very low level)                                   | ERM-BE375   | 43 |
| CONTINUOUS CAST COPPER (O)   | BCR-058     | 75 |
| COPPER (natural) spike, nitrate solution                                 | ERM-AE633   | 83 |
| COPPER (O)   | BCR-054R    | 75 |
| COPPER (S, P)  | BCR-017A, B | 75 |
| COPPER ALLOYS  | BCR-691     | 78 |

|  |                 |        |
|--|-----------------|--------|
| COPPER-63, nitrate solution  | ERM-AE647       | 84     |
| COPPER-65 spike, nitrate solution  | IRMM-632        | 83     |
| CORONENE (purity)  | BCR-272         | 4      |
| CORTISOL REFERENCE SERUM PANEL   | ERM-DA451/IFCC  | 59     |
| CORUNDUM   | ERM-FD066       | 68     |
| CORUNDUM   | ERM-FD069       | 68     |
| CREATINE KINASE ISOENZYME MM (CK-MM)                                     | ERM-AD455k/IFCC | 63     |
| CREATININE (interfering substances)                                      | BCR-573i        | 62     |
| Cu   | IRMM-522        | 74     |
| CUCUMBER (pesticides)  | ERM-BC403       | 44     |
| DAIRY FEED (nutritional properties)                                      | BCR-708         | 50     |
| DARK CHOCOLATE   | ERM-BD512       | 47     |
| DEFATTED PEANUT MEAL (aflatoxin B1, blank)                               | BCR-262R        | 43     |
| DEFATTED PEANUT MEAL (aflatoxin B1, high level)                          | BCR-264         | 43     |
| DEFATTED PEANUT MEAL (aflatoxin B1, medium level)                        | BCR-263R        | 43     |
| DIBENZ[a,c]ACRIDINE (99mylas)  | BCR-155         | 4      |
| DIBENZ[a,h]ACRIDINE (purity)   | BCR-153R        | 4      |
| DIBENZ[a,l]ACRIDINE (99mylas)  | BCR-152         | 4      |
| DIBENZ[a,j]ACRIDINE (purity)   | BCR-154         | 4      |
| DIBENZ[a,c]ANTHRACENE (purity)   | BCR-094         | 4      |
| DIBENZ[a,j]ANTHRACENE (purity)   | BCR-095         | 4      |
| DIBENZ[c,h]ACRIDINE (purity)   | BCR-156R        | 4      |
| DIBENZO[a,e]FLUORANTHENE (99mylas)                                       | BCR-265         | 4      |
| DIBENZO[a,h]PYRENE (99mylas)   | BCR-159         | 4      |
| DIBENZO[a,e]PYRENE (99mylas)   | BCR-133         | 4      |
| DIBENZO[a,h]ANTHRACENE (purity)  | BCR-138         | 4      |
| DIBENZO[a,l]PYRENE (99mylas)   | BCR-096         | 4      |
| DIBENZO[b,d]FURAN (purity)   | BCR-337         | 5      |
| DIESEL (B7)  | ERM-EF003       | 72     |
| DIESEL (B7)  | ERM-EF004       | 65, 72 |
| EGG POWDER   | ERM-BB125       | 55     |
| ELECTROLYTIC COPPER WITH ADDED IMPURITIES (trace elements)               | ERM-EB075A-B-C  | 77     |
| ELECTROLYTIC COPPER (trace elements)                                     | ERM-EB074A-B-C  | 77     |
| ELECTROLYTIC COPPER (trace elements)                                     | BCR-074A        | 77     |
| ELECTROLYTIC TOUGH PITCH COPPER (O)                                      | BCR-022A, B     | 75     |
| ELECTROLYTICALLY REFINED LEAD (trace elements)                           | BCR-286A, B     | 75     |
| ENTEROCOCCUS FAECALIS (CIP 106877)                                       | IRMM-355        | 54     |
| ESCHERICHIA COLI 0157 (NCTC 12900)                                       | IRMM-351        | 53     |
| ESTUARINE SEDIMENT   | BCR-667         | 13     |
| ESTUARINE SEDIMENT (Hg, methylmercury)                                   | ERM-CC580       | 14, 23 |
| ESTUARINE SEDIMENT (trace elements)                                      | BCR-277R        | 14     |
| ESTUARINE WATER (trace elements)   | BCR-505         | 19     |
| EWES/GOATS' CURD (for adulteration with cows' milk) 0 and 1 % cows' milk | BCR-599         | 56     |
| FAUJASITE TYPE ZEOLITE (micropore volume and width)                      | BCR-704         | 69     |
| Fe   | IRMM-524        | 74     |
| FINE DUST (PM <sub>10</sub> -like) (elements)                            | ERM-CZ120       | 15     |
| FINE DUST (PM <sub>10</sub> -like) (PAHs)                                | ERM-CZ100       | 24     |
| FISH MUSCLE (trace elements)   | ERM-BB422       | 45     |
| FISH OIL   | ERM-BB350       | 41     |
| FISH TISSUE  | ERM-CE100       | 28     |
| FISH TISSUE (PBDEs fish in tissue)                                       | ERM-CE102       | 28     |
| FLUORANTHENE (purity)  | BCR-160R        | 4      |
| FLY ASH (LOW LEVEL) (PCDDs and PCDFs)                                    | BCR-615         | 26     |
| FLY ASH (PCDDs and PCDFs)  | BCR-490         | 26     |
| FLY ASH (trace elements)   | BCR-176R        | 15     |

|   |            |    |
|---|------------|----|
| FLY ASH FROM PULVERISED COAL (trace elements)             | BCR-038    | 15 |
| FORMALDEHYDE-2,4-DINITROPHENYLHYDRAZONE (purity)          | BCR-546    | 58 |
| FORMALDEHYDE-2,4-DINITROPHENYLHYDRAZONE on filter         | BCR-553    | 58 |
| FORMALDEHYDE-2,4-DINITROPHENYLHYDRAZONE on filter (blank) | BCR-554    | 58 |
| FRESH WATER (nitrate, high level)                         | BCR-480    | 20 |
| FRESH WATER (nitrate, low level)                          | BCR-479    | 20 |
| FRESHWATER HARBOUR SEDIMENT (PAHs)                        | BCR-535    | 25 |
| FRESHWATER HARBOUR SEDIMENT (PCBs)                        | BCR-536    | 25 |
| FRESHWATER SEDIMENT                                       | ERM-CC537a | 28 |
| FRESHWATER SEDIMENT (butyltin and phenyltin compounds)    | BCR-646    | 23 |
| FULL FAT SOYA (dietary fibre)                             | ERM-BC517  | 50 |
| FURNACE COKE  | ERM-EF413  | 66 |
| GAS OIL (0.0203 % S)                                      | ERM-EF672  | 78 |
| GAS OIL (0.0452 % S)                                      | ERM-EF671  | 78 |
| GAS OIL (0.1019 % S)                                      | ERM-EF104  | 78 |
| GAS OIL (0.363 % S)                                       | BCR-105    | 78 |
| GAS OIL (0.502 % S)                                       | BCR-106    | 78 |
| GAS OIL (1.040 % S)                                       | BCR-107    | 78 |
| GAS OIL (CFPP and CP)                                     | ERM-FC395k | 65 |
| GAS OIL (Solvent Yellow 124)                              | ERM-EF317  | 78 |
| GAS OIL (Solvent Yellow 124)                              | ERM-EF318k | 78 |
| GENETICALLY MODIFIED AM04-1020 POTATO                     | ERM-BF430  | 37 |
| GENETICALLY MODIFIED AV43-6-G7 POTATO                     | ERM-BF431  | 38 |
| GENETICALLY MODIFIED DAS-81910-7 COTTON                   | ERM-BF440  | 40 |
| GENETICALLY MODIFIED DP-ØØ4114-3 MAIZE                    | ERM-BF439  | 40 |
| GENETICALLY MODIFIED VCO-Ø1981-5 MAIZE                    | ERM-BF438  | 39 |
| GENETICALLY MODIFIED 1507 MAIZE                           | ERM-BF418  | 34 |
| GENETICALLY MODIFIED 281-24-236 X 3006-210-23 COTTON SEED | ERM-BF422  | 35 |
| GENETICALLY MODIFIED 3272 MAIZE                           | ERM-BF420  | 34 |
| GENETICALLY MODIFIED 59122 MAIZE                          | ERM-BF424  | 35 |
| GENETICALLY MODIFIED 73496 RAPESEED                       | ERM-BF434  | 38 |
| GENETICALLY MODIFIED 98140 MAIZE                          | ERM-BF427  | 36 |
| GENETICALLY MODIFIED Bt-11 MAIZE                          | ERM-BF412k | 32 |
| GENETICALLY MODIFIED Bt-176 MAIZE                         | ERM-BF411  | 31 |
| GENETICALLY MODIFIED DAS-40278-9 MAIZE                    | ERM-BF433  | 38 |
| GENETICALLY MODIFIED DAS-44406-6 SOYA                     | ERM-BF436  | 39 |
| GENETICALLY MODIFIED DAS-81419-2 SOYA                     | ERM-BF437  | 39 |
| GENETICALLY MODIFIED EH92-527-1 POTATO                    | ERM-BF421  | 35 |
| GENETICALLY MODIFIED GA21 MAIZE                           | ERM-BF414  | 33 |
| GENETICALLY MODIFIED GHB119 COTTON                        | ERM-BF428  | 37 |
| GENETICALLY MODIFIED H7-1 SUGAR BEET                      | ERM-BF419  | 34 |
| GENETICALLY MODIFIED MIR604 MAIZE                         | ERM-BF423  | 35 |
| GENETICALLY MODIFIED MON 810 MAIZE                        | ERM-BF413k | 32 |
| GENETICALLY MODIFIED MON 863 MAIZE                        | ERM-BF416  | 33 |
| GENETICALLY MODIFIED MON 863 x MON 810 MAIZE              | ERM-BF417  | 34 |
| GENETICALLY MODIFIED NK603 MAIZE                          | ERM-BF415  | 33 |
| GENETICALLY MODIFIED PH05-026-0048 POTATO                 | ERM-BF435  | 39 |
| GENETICALLY MODIFIED ROUNDUP READY SOYA                   | ERM-BF410p | 31 |
| GENETICALLY MODIFIED SOYA 305423                          | ERM-BF426  | 36 |
| GENETICALLY MODIFIED SOYA 356043                          | ERM-BF425  | 36 |
| GENETICALLY MODIFIED SOYA DAS-68416-4                     | ERM-BF432  | 38 |
| GENETICALLY MODIFIED T304-40 COTTON                       | ERM-BF429  | 37 |
| Genomic DNA of Bacillus licheniformis DSM 5749            | IRMM-311   | 52 |
| Genomic DNA of Bacillus subtilis DSM 5750                 | IRMM-312   | 52 |

|  |                 |        |
|--|-----------------|--------|
| Genomic DNA of Campylobacter coli (CNET068) and Campylobacter jejuni (CNET112) | IRMM-313        | 53     |
| Genomic DNA of Campylobacter jejuni  | IRMM-448        | 54     |
| Genomic DNA of Escherichia coli  | IRMM-449        | 54     |
| Genomic DNA of Listeria monocytogenes  | IRMM-447        | 54     |
| GLASS (trace elements)   | BCR-664         | 80     |
| GLASS-CERAMIC  | BCR-724A-D      | 65     |
| GLUTARALDEHYDE-2,4-DINITROPHENYLHYDRAZONE (purity)                             | BCR-550         | 58     |
| GROUND WATER   | ERM-CA615       | 21     |
| GROUND WATER   | ERM-CA616       | 20     |
| GROUND WATER (Br, high level)  | BCR-611         | 20     |
| GROUND WATER (Br, low level)   | BCR-612         | 20     |
| HAEMOGLOBIN HbA0   | IRMM/IFCC-467   | 62     |
| HAEMOGLOBIN IN BUFFER  | ERM-AD500/IFCC  | 62     |
| HARD COAL  | ERM-EF411       | 66     |
| HARICOTS BEANS (dietary fibre)   | ERM-BC514       | 50     |
| HARICOTS VERTS (major nutrients)   | BCR-383         | 47, 50 |
| HAY POWDER (elements)  | BCR-129         | 16     |
| HERRING (PCBs)   | BCR-718         | 27     |
| HIGH VOLATILE INDUSTRIAL COAL (S)  | BCR-332         | 78     |
| HIGH VOLATILE STEAM COAL (S)   | BCR-336         | 78     |
| HIPPOGLOSSUS HIPPOGLOSSUS (ATLANTIC HALIBUT) - FISH POWDER                     | EURM-020        | 57     |
| HUMAN ADENOSINE DEAMINASE (ADA 1)  | BCR-647         | 63     |
| HUMAN APOLIPOPROTEIN A I (mass concentration)                                  | BCR-393         | 61     |
| HUMAN BLOOD (Pb, Cd)   | BCR-634         | 60     |
| HUMAN BLOOD (Pb, Cd)   | BCR-635         | 60     |
| HUMAN BLOOD (Pb, Cd)   | BCR-636         | 60     |
| HUMAN HAIR (trace elements)  | ERM-DB001       | 60     |
| HUMAN PANCREATIC LIPASE (from pancreatic juice)                                | BCR-693         | 63     |
| HUMAN PANCREATIC LIPASE (recombinant)  | BCR-694         | 63     |
| HUMAN SERUM (17 $\beta$ -ESTRADIOL, high level)                                | BCR-578         | 59     |
| HUMAN SERUM (17 $\beta$ -ESTRADIOL, low level)                                 | BCR-576         | 59     |
| HUMAN SERUM (17 $\beta$ -ESTRADIOL, medium level)                              | BCR-577         | 59     |
| HUMAN SERUM (Al, Se, Zn)   | BCR-637         | 60     |
| HUMAN SERUM (Al, Se, Zn)   | BCR-638         | 60     |
| HUMAN SERUM (Al, Se, Zn)   | BCR-639         | 60     |
| HUMAN SERUM (Ca, Mg, Li)   | BCR-304         | 60     |
| HUMAN SERUM (cortisol spiked)  | ERM-DA193       | 59     |
| HUMAN SERUM (cortisol unspiked)  | ERM-DA192       | 59     |
| HUMAN SERUM (CRP)  | ERM-DA474/IFCC  | 61     |
| HUMAN SERUM (cystatin C)   | ERM-DA471/IFCC  | 61     |
| HUMAN SERUM (high creatinine)  | BCR-575         | 62     |
| HUMAN SERUM (high progesterone)  | BCR-348R        | 59     |
| HUMAN SERUM (low creatinine)   | BCR-573         | 62     |
| HUMAN SERUM (medium creatinine)  | BCR-574         | 62     |
| HUMAN SERUM (progesterone)   | ERM-DA347       | 59     |
| HUMAN SERUM (proteins)   | ERM-DA470k/IFCC | 61     |
| IgG ANTI-MPO IN HUMAN SERUM  | ERM-DA476/IFCC  | 61     |
| IgG PR3 ANCA IN HUMAN SERUM  | ERM-DA483/IFCC  | 61     |
| INDENO[1,2,3-cd]FLUORANTHENE (purity)  | BCR-267         | 4      |
| INDENO[1,2,3-CD]PYRENE (purity)  | ERM-AC053       | 5      |
| INDUSTRIAL CLAY SOIL (PCDDs, PCDFs)  | BCR-530         | 25     |
| INDUSTRIAL SANDY SOIL (PCDDs, PCDFs)   | BCR-529         | 25     |
| INDUSTRIAL SOIL (PAHs)   | BCR-524         | 25     |
| INDUSTRIAL SOIL (PCBs )  | BCR-481         | 25     |
| IRON (natural) spike, chloride solution  | IRMM-634        | 83     |



|   |                 |        |
|---|-----------------|--------|
| IRON-57 spike, chloride solution                  | IRMM-620        | 83     |
| ISOCTANE (purity)                                 | IRMM-442        | 72, 74 |
| ISOTOPE RATIOS IN ABSOLUTE ALCOHOL                | BCR-656         | 29, 81 |
| ISOTOPE RATIOS IN ALCOHOLIC SOLUTION              | BCR-660         | 29, 81 |
| ISOTOPE RATIOS IN GLUCOSE                         | BCR-657         | 29, 81 |
| LACTATE DEHYDROGENASE ISOENZYME 1 (LD1)           | ERM-AD453k/IFCC | 63     |
| LAKE SEDIMENT (trace elements)                    | BCR-280R        | 14     |
| LAKE SEDIMENT (trace elements)                    | BCR-701         | 23     |
| LAMBDA DNA  | ERM-AD442k      | 64     |
| LATEX SPHERES (particle diameter 2 microns)       | BCR-165         | 58     |
| LATEX SPHERES (particle diameter 4.8 microns)     | BCR-166         | 58     |
| LATEX SPHERES (particle diameter 9.6 microns)     | BCR-167         | 58     |
| LEAD GLASS (composition/refractive index)         | BCR-126A/B      | 74     |
| LEAD WITH ADDED IMPURITIES (trace elements)       | BCR-288B        | 75     |
| LEMNA MINOR (aquatic plant)                       | BCR-670         | 18     |
| LICHEN (trace elements)                           | BCR-482         | 17     |
| LIGHT SANDY SOIL (trace elements)                 | BCR-142R        | 13     |
| LIMESTONE POWDERS (for shear testing)             | BCR-116         | 66     |
| LINDE TYPE A ZEOLITE (micropore volume and width) | BCR-705         | 69     |
| LISTERIA MONOCYTOGENES DNA AGAROSE PLUG           | ERM-AD624       | 53     |
| LITHIUM CARBONATE, isotopic, solid                | IRMM-016        | 82     |
| LITHIUM-6 spike, chloride solution                | IRMM-615        | 83     |
| LOAM SOIL   | ERM-CC141       | 13     |
| LOW VOLATILE STEAM COAL (S)                       | BCR-331         | 78     |
| LUNG TISSUE (asbestos fibres)                     | BCR-665         | 64     |
| LUNG TISSUE (asbestos fibres)                     | BCR-666         | 64     |
| MAGNESIUM (natural) spike, nitrate solution       | ERM-AE637       | 83     |
| MAGNESIUM-26 spike, nitrate solution              | ERM-AE638       | 83     |
| MAIZE   | ERM-BC716       | 44     |
| MAIZE   | ERM-BC717       | 44     |
| MAIZE FLOUR (deoxynivalenol blank)                | BCR-377         | 43     |
| MARGARINE (vitamins)                              | BCR-122         | 49     |
| MERCURY (natural) spike, chloride solution        | ERM-AE639       | 83     |
| MERCURY-202 spike, chloride solution              | ERM-AE640       | 84     |
| METHYLMERCURY IN 2 % ETHANOL/WATER SOLUTION       | ERM-AE671       | 84     |
| Mg, isotopic, nitrate solution                    | IRMM-009        | 82     |
| MILK POWDER (oxytetracycline)                     | ERM-BB492       | 55     |
| MILK POWDER (oxytetracycline) (blank)             | ERM-BB493       | 55     |
| MILK POWDER (PCDDs, PCDFs)                        | BCR-607         | 42     |
| MILK POWDER (somatic cell count)                  | ERM-BD001       | 52     |
| MIXED VEGETABLES (vitamins)                       | BCR-485         | 49     |
| MOROCCAN PHOSPHATE ROCK (trace elements)          | BCR-032         | 71, 79 |
| MULLITE (lattice spacing, other parameters)       | BCR-301 (RM)    | 69     |
| MUSSEL (dc-saxitoxin)                             | BCR-543         | 44     |
| MUSSEL TISSUE                                     | BCR-668         | 19     |
| MUSSEL TISSUE                                     | BCR-682         | 27     |
| MUSSEL TISSUE (butyltins)                         | ERM-CE477       | 24     |
| MUSSEL TISSUE (elements)                          | ERM-CE278k      | 18     |
| NATURAL MILK POWDER (PCBs )                       | BCR-450         | 41     |
| NATURAL MILK POWDER (pesticides)                  | BCR-187         | 42     |
| NATURAL PORK FAT (blank)                          | ERM-BB444       | 41     |
| Nb  | IRMM-525        | 74     |
| Nb  | IRMM-526        | 74     |
| n-HEPTANE (purity)                                | IRMM-441        | 72, 74 |

|  |                |        |
|--|----------------|--------|
| Ni   | IRMM-521       | 74     |
| NIMONIC 75 FOR CREEP TESTING   | BCR-425        | 67     |
| NIMONIC 75 FOR TENSILE PROPERTIES                                      | BCR-661        | 67     |
| NIVALENOL in acetonitrile  | IRMM-316       | 31     |
| ORGANIC-RICH SOIL (extractable elements)                               | BCR-700        | 22     |
| PAHs IN ACETONITRILE / TOLUENE   | ERM-AC213      | 12     |
| PANCREATIC ALPHA AMYLASE   | ERM-AD456/IFCC | 63     |
| PAPRIKA POWDER (aflatoxin B1, G1)                                      | ERM-BD286      | 43     |
| PCB STANDARD SOLUTION  | BCR-365        | 5      |
| PEANUT BUTTER (aflatoxins low level)                                   | BCR-385R       | 43     |
| PEANUT BUTTER (aflatoxins very low level)                              | BCR-401R       | 43     |
| Peanut Test Material Kit   | IRMM-481       | 56     |
| PETROL   | ERM-EF211      | 78     |
| PHARMACEUTICAL GLASS   | IRMM-435       | 64     |
| PICENE (purity)  | BCR-168        | 4      |
| PIG KIDNEY (CTC free)  | BCR-706        | 55     |
| PIG KIDNEY (CTC incurred)  | BCR-707        | 55     |
| PIG KIDNEY (trace elements)  | ERM-BB186      | 45     |
| PIG LIVER (CTC free)   | BCR-695        | 55     |
| PIG LIVER (CTC incurred)   | BCR-696        | 55     |
| PIG LIVER (vitamins)   | BCR-487        | 49     |
| PIG MUSCLE (CTC free)  | BCR-697        | 55     |
| PIKE-PERCH (PFASs in fish tissue)                                      | IRMM-427       | 27     |
| PLANKTON (trace elements)  | BCR-414        | 17     |
| PLASMID DNA FRAGMENTS OF 356043 SOYBEAN                                | ERM-AD425      | 36     |
| PLASMID DNA FRAGMENTS OF 98140 MAIZE                                   | ERM-AD427      | 37     |
| PLASMID DNA FRAGMENTS OF MON 810 MAIZE                                 | ERM-AD413      | 32     |
| PLASMID DNA FRAGMENTS OF NK603 MAIZE                                   | ERM-AD415      | 33     |
| PLASTIC FILM (OVERALL MIGRATION IN OLIVE OIL (film A)                  | BCR-537        | 51     |
| PLASTIC FILM (OVERALL MIGRATION IN OLIVE OIL (film C)                  | BCR-539        | 51     |
| PLATINUM, isotopic, metal  | IRMM-010       | 82     |
| POLYCHLORODIBENZO-P-DIOXINS (PCDD) AND POLYCHLORODIBENZOFURANS (PCDFS) | BCR-614        | 6      |
| POLYETHYLENE (40, 75, 200, 400 mg/kg Cd)                               | VDA 001-004    | 80     |
| POLYETHYLENE (high level)  | ERM-EC681m     | 80     |
| POLYETHYLENE (LDPE)  | ERM-EC590      | 80     |
| POLYETHYLENE (low level)   | ERM-EC680m     | 80     |
| POLYPROPYLENE (PP)   | ERM-EC591      | 80     |
| PORCINE MUSCLE (chloramphenicol blank)                                 | BCR-444        | 55     |
| PORCINE pDNA CALIBRANT   | ERM-AD483      | 57     |
| PORK FAT (pesticides)  | ERM-BB430      | 42     |
| PORK MUSCLE  | ERM-BB124      | 56     |
| PORK MUSCLE  | ERM-BB130      | 55     |
| PORK MUSCLE  | ERM-BB384      | 47, 50 |
| POTASSIUM CHLORIDE FERTILIZER (elemental composition)                  | BCR-113        | 73     |
| POTASSIUM SULPHATE FERTILIZER (elemental composition)                  | BCR-114        | 73     |
| PROSTATE SPECIFIC ANTIGEN (protein mass)                               | BCR-613        | 61     |
| PURIFIED HUMAN ALFAFOETOPROTEIN (protein mass)                         | BCR-486        | 61     |
| PYRENE (purity)  | BCR-177R       | 4      |
| QUARTZ (1.20 – 20.00 microns)  | BCR-070        | 68     |
| QUARTZ (2.50 m <sup>2</sup> /g) (nitrogen BET specific surface area)   | BCR-172        | 69     |
| QUARTZ (particle size 0.35 – 3.50 microns)                             | BCR-066        | 68     |
| QUARTZ (particle size 14 – 90 microns)                                 | BCR-069        | 68     |
| QUARTZ (particle size 1400 – 5000 microns)                             | BCR-132        | 68     |
| QUARTZ (particle size 160 – 630 microns)                               | BCR-068        | 68     |
| QUARTZ (particle size 2.40 – 32.00 microns)                            | BCR-067        | 68     |

|   |             |        |
|---|-------------|--------|
| QUARTZ (particle size 480 – 1800 microns)                 | BCR-131     | 68     |
| QUARTZ (particle size 50 – 220 microns)                   | BCR-130     | 68     |
| RAPSEED (colza) (S, total glucosinolate, high level)      | ERM-BC367   | 43     |
| RAPSEED (colza) (S, total glucosinolate, low level)       | ERM-BC366   | 43     |
| RAPSEED (colza) (S, total glucosinolate, medium level)    | ERM-BC190   | 43     |
| RESIN-BONDED FIBRE BOARD (thermal conductivity)           | IRMM-440    | 65     |
| Rh  | IRMM-529    | 74     |
| RICE (As species)   | ERM-BC211   | 24     |
| RICE FLOUR  | IRMM-804    | 45     |
| RICE FLOUR (amylose, high level)                          | BCR-467     | 49     |
| RICE FLOUR (amylose, low level)                           | BCR-465     | 49     |
| RICE FLOUR (amylose, medium level)                        | BCR-466     | 49     |
| RIVER SEDIMENT (extractable phosphorous)                  | BCR-684     | 22     |
| ROAD DUST (trace elements)                                | BCR-723     | 15     |
| RUBIDIUM (natural) spike, nitrate solution                | IRMM-619    | 83     |
| RUBIDIUM-87 spike, nitrate solution                       | IRMM-618    | 83     |
| RUMINANT pDNA CALIBRANT                                   | ERM-AD482   | 56     |
| RYE FLOUR   | ERM-BC381   | 47, 50 |
| RYE GRASS   | ERM-CD281   | 16     |
| SALMON TISSUE   | BCR-725     | 55     |
| SALMONELLA ENTERITIDIS (NCTC 12694)                       | IRMM-352    | 53     |
| SAXITOXIN IN ACETIC ACID                                  | BCR-663     | 30     |
| SCRATCH TESTING   | BCR-692     | 67     |
| SEAWATER  | ERM-CA403   | 21     |
| SEAWATER (Hg)   | ERM-CA400   | 21     |
| SEWAGE SLUDGE   | ERM-CC144   | 13     |
| SEWAGE SLUDGE (industrial origin) (trace elements)        | BCR-146R    | 14     |
| SEWAGE SLUDGE (mixed origin) (trace elements)             | BCR-145R    | 14     |
| SEWAGE SLUDGE (PCDDs and PCDFs)                           | BCR-677     | 26     |
| SEWAGE SLUDGE AMENDED (terra rossa) SOIL (trace elements) | BCR-484     | 22     |
| SEWAGE SLUDGE AMENDED SOIL (trace elements)               | BCR-143R    | 13     |
| SEWAGE SLUDGE AMENDED SOIL (trace elements)               | BCR-483     | 22     |
| SILICON DIOXIDE, isotopic, solid                          | IRMM-018a   | 82     |
| SIMULATED RAINWATER (major components)                    | ERM-CA408   | 20     |
| SINGLE CELL PROTEIN (major elements)                      | BCR-273     | 46     |
| SINGLE CELL PROTEIN (trace elements)                      | BCR-274     | 46     |
| SKIM MILK POWDER  | BCR-685     | 50     |
| SKIMMED MILK POWDER (trace elements)                      | ERM-BD150   | 45     |
| SKIMMED MILK POWDER (trace elements)                      | ERM-BD151   | 45     |
| SOYA BEAN   | ERM-BC700   | 45     |
| SOYA-MAIZE OIL BLEND (fatty acid profile)                 | BCR-162R    | 48     |
| SPIKED MILK POWDER (pesticides)                           | BCR-188     | 42     |
| SPIKED PORK FAT (low level)                               | ERM-BB446   | 41     |
| SPIKED PORK FAT (very low level)                          | ERM-BB445   | 41     |
| SULPHUR-32 spike, nitrate solution                        | IRMM-643    | 84     |
| SULPHUR-32 spike, nitrate solution                        | IRMM-644    | 84     |
| SULPHUR-32 spike, nitrate solution                        | IRMM-645    | 84     |
| SULPHUR-34 spike, nitrate solution                        | IRMM-646    | 84     |
| SURFACE WATER   | ERM-CA100   | 28     |
| SUSPENSION OF TiO2 NANORODS                               | ERM-FD103   | 71     |
| TANTALUM PENTOXIDE ON TANTALUM FOIL                       | BCR-261T    | 69     |
| TETRAMETHYLUREA   | STA-003m    | 29     |
| THALLIUM (natural) spike, nitrate solution                | ERM-AE649   | 84     |
| THERMALLY REFINED LEAD (trace elements)                   | BCR-287A, B | 75     |
| THROMBOPLASTIN RABBIT (prothrombin time)                  | ERM-AD149   | 64     |

|  |              |        |
|--|--------------|--------|
| THYROXINE (T4)   | IRMM-468     | 58     |
| Ti   | IRMM-531     | 74     |
| Ti 6AL 4V ALLOY (O)  | BCR-059A, B  | 75     |
| TiAl6V4 (Al, V)  | BCR-089      | 76     |
| TIN ORE CONCENTRATE (Sn)   | BCR-010      | 73     |
| TITANIA (8.23 m <sup>2</sup> /g) (nitrogen BET specific surface area)  | BCR-173      | 69     |
| TITANIUM (H)   | BCR-318      | 75     |
| TITANIUM (impurities)  | ERM-EB090a,b | 77     |
| TITANIUM (impurities)  | BCR-090A, B  | 77     |
| TITANIUM (O, N)  | BCR-024B, C  | 75     |
| TOASTED BREAD  | ERM-BD273    | 57     |
| TRACE ELEMENTS IN WHITE CABBAGE  | BCR-679      | 46     |
| TRIPHENYLENE (purity)  | BCR-270      | 4      |
| TROUT MUSCLE   | ERM-CE101    | 18, 47 |
| TUNA FISH (total and methylmercury)                                    | ERM-CE464    | 19, 24 |
| TUNA FISH TISSUE (As species)  | BCR-627      | 24     |
| TUNGSTEN (0.18 m <sup>2</sup> /g) (nitrogen BET specific surface area) | BCR-175      | 69     |
| TUNGSTEN CARBIDE POWDER (O)  | BCR-102      | 75     |
| UNALLOYED ZINC (disc) (trace elements)                                 | BCR-326      | 75     |
| UNALLOYED ZINC (disc) (trace elements)                                 | BCR-327      | 75     |
| UNALLOYED ZINC (trace elements)  | ERM-EB322    | 75     |
| UNALLOYED ZINC (trace elements)  | ERM-EB323    | 75     |
| UNALLOYED ZINC (trace elements)  | ERM-EB324    | 75     |
| UNALLOYED ZINC (trace elements)  | ERM-EB325    | 75     |
| UNALLOYED ZINC (trace elements)  | BCR-321      | 75     |
| UREA FERTILIZER (composition)  | BCR-179      | 73     |
| WASTE MINERAL OIL (high PCB level)                                     | BCR-449      | 27     |
| WASTE MINERAL OIL (low PCB level)                                      | BCR-420      | 27     |
| WASTE WATER  | ERM-CA713    | 21     |
| WATER (PFASs in water)   | IRMM-428     | 27     |
| WELDING DUST LOADED ON FILTER (Cr VI, Cr)                              | BCR-545      | 24     |
| WHEAT (ochratoxin A, blank)  | BCR-471      | 44     |
| WHEAT FLOUR  | ERM-BC382    | 47, 50 |
| WHEAT FLOUR (deoxynivalenol blank)                                     | BCR-396      | 43     |
| WHITE CLOVER (trace elements)  | BCR-402      | 16     |
| WHOLE MILK POWDER (aflatoxin M1, high level)                           | ERM-BD284    | 43     |
| WHOLE MILK POWDER (aflatoxin M1, low level)                            | ERM-BD283    | 43     |
| WHOLE MILK POWDER (aflatoxin M1, zero level)                           | ERM-BD282    | 43     |
| WHOLE MILK POWDER (vitamins)   | ERM-BD600    | 49     |
| WHOLEMEAL FLOUR (vitamins)   | BCR-121      | 49     |
| WILD BERRIES   | IRMM-426     | 57     |
| WINE (EtOH, low level)   | BCR-653      | 49     |
| ZEARALENONE IN ACETONITRILE  | ERM-AC699    | 30     |
| ZINC ORE CONCENTRATE (trace elements)                                  | BCR-109      | 79     |
| ZINC ORE CONCENTRATE (trace elements)                                  | BCR-110      | 79     |
| ZINC-64 spike, nitrate solution  | IRMM-3702    | 84     |
| ZINC-64 spike, nitrate solution  | IRMM-651     | 84     |
| ZINC-64 spike, nitrate solution  | IRMM-652     | 84     |
| Zinc-64, nitrate solution  | IRMM-007/1-6 | 82     |
| ZINC-67 spike, nitrate solution  | IRMM-653     | 84     |
| ZINC-68 spike, nitrate solution  | IRMM-654     | 84     |
| ZIRCALOY (C, N, O)   | BCR-275      | 75     |
| ZIRCALOY (C, N, O)   | BCR-276      | 75     |
| ZIRCALOY-4 (trace element impurities)                                  | BCR-098      | 77     |
| ZnAl4 (trace elements)   | BCR-351      | 76     |

|                           |         |    |
|---------------------------|---------|----|
| ZnAl4 (trace elements)    | BCR-352 | 76 |
| ZnAl4 (trace elements)    | BCR-353 | 76 |
| ZnAl4 (trace elements)    | BCR-354 | 76 |
| ZnAl4 (trace elements)    | BCR-355 | 76 |
| ZnAl4Cu1 (trace elements) | BCR-356 | 76 |
| ZnAl4Cu1 (trace elements) | BCR-357 | 76 |
| ZnAl4Cu1 (trace elements) | BCR-360 | 76 |
| ZnAl4Cu1 (trace elements) | BCR-361 | 76 |

06/05/2020