# QUASIMEME

**Quality assurance of information for marine environmental monitoring**

## Certificate of Analysis

**Biota**

**REFERENCE MATERIAL**

**Biota sample 354**

WAGENINGEN UNIVERSITY & RESEARCH

# Certificate of Analysis Biota 354

## General Information

In this report an overview is given of analytical data for this sample collected in our proficiency testing program. The consensus values are calculated using a robust statistical model. With this NDA model mean and standard deviation are calculated using all reported data when at least 4 results are left after removal of reported 'lower than' (<) and 0 (= zero) values. No outliers are removed.

This report is divided into two sections: Consensus Values and Indicative Values. The division is made on the reliability of the data. Consensus Values are based on at least 10 results while the relative uncertainty is smaller than 6.25%. Indicative Values are based on a relative uncertainty of maximum 35% with at least 4 and less than 10 results or a relative uncertainty higher than 6.25%.

For each determinand the following parameters are given: mean, standard deviation, coefficient of variation, number of results, median, MAD (Median of Absolute Deviation) and the uncertainty in the assigned value. The confidence limits (at 95 % probabilty) are calculated for these determinands.

The results of each determinand is expressed on a wet weight basis.

## Sample information

QUASIMEME reference materials cover a range of natural Biota species from contaminated waters from the North Sea and/or Mediterranean. The supplied wet test materials are homogenised and sterilised by autoclaving.

This Biota sample 354 of Mix of Turbot and Brill liver from North Sea is prepared for the QUASIMEME proficiency programs. The results on which the values in this report are based were taken from the periods given in the following table.

| Year.Round | Program | Sample Round Id |
|---|---|---|
| 2023.1 | BT2 | QOR154BT |
| 2021.1 | BT1 | QTM131BT |
| 2019.2 | BT2 | QOR140BT |
| 2018.2 | BT2 | QOR137BT |
| 2017.2 | BT10 | QPF007BT |
| 2017.2 | BT9 | QBC053BT |

# Consensus Values BT1

**Method: Metals - BT1**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits |
|---|---|---|---|---|---|---|---|---|---|
| Mercury | µg/kg | 139 | 16.8 | 12.1 | 29 | 140 | 11.7 | 3.9 | 132 - 145 |
| Copper | µg/kg | 3746 | 256.7 | 6.9 | 25 | 3720 | 159.0 | 64.2 | 3641 - 3852 |
| Cadmium | µg/kg | 31.9 | 3.18 | 10.0 | 24 | 31.7 | 1.95 | 0.81 | 30.6 - 33.3 |
| Lead | µg/kg | 61.5 | 8.97 | 14.6 | 22 | 63.8 | 5.83 | 2.39 | 57.6 - 65.5 |
| Cobalt | µg/kg | 90.3 | 6.13 | 6.8 | 11 | 89.3 | 2.60 | 2.31 | 86.2 - 94.4 |
| Iron | mg/kg | 64.3 | 4.09 | 6.4 | 15 | 64.3 | 3.10 | 1.32 | 62.0 - 66.5 |
| Manganese | µg/kg | 2548 | 241.0 | 9.5 | 16 | 2533 | 120.5 | 75.3 | 2420 - 2675 |
| Selenium | µg/kg | 1886 | 232.5 | 12.3 | 19 | 1850 | 135.0 | 66.7 | 1774 - 1998 |
| Arsenic | mg/kg | 11.6 | 1.09 | 9.4 | 25 | 11.7 | 0.70 | 0.27 | 11.1 - 12.0 |
| Chromium | µg/kg | 152 | 26.8 | 17.6 | 20 | 153 | 17.7 | 7.5 | 139 - 164 |
| Zinc | mg/kg | 24.7 | 2.36 | 9.6 | 23 | 24.8 | 1.70 | 0.61 | 23.7 - 25.7 |
| Silver | µg/kg | 67.3 | 5.76 | 8.6 | 13 | 67.4 | 2.96 | 2.00 | 63.8 - 70.7 |

**Method: Weight - BT1**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits |
|---|---|---|---|---|---|---|---|---|---|
| Dry-weight | % | 32.0 | 1.52 | 4.7 | 16 | 32.2 | 0.78 | 0.48 | 31.2 - 32.8 |

## Indicative Values BT1

**Method: Metals - BT1**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits |
|---|---|---|---|---|---|---|---|---|---|
| Aluminium | mg/kg | 8.53 | 4.017 | 47.1 | 8 | 8.65 | 3.048 | 1.775 | 5.26 - 11.8 |
| Nickel | µg/kg | 48.9 | 12.76 | 26.1 | 18 | 50.5 | 9.63 | 3.76 | 42.6 - 55.2 |
| Vanadium | µg/kg | 56.8 | 6.53 | 11.5 | 9 | 55.3 | 3.70 | 2.72 | 51.9 - 61.7 |
| Tin | µg/kg | - | - | - | 4 | 31.0 | 15.9 | - | - - - |
| Sodium | mg/kg | - | - | - | 4 | 1743 | 47.4 | - | - - - |
| Magnesium | mg/kg | - | - | - | 5 | 410 | 4.0 | - | - - - |
| Calcium | mg/kg | - | - | - | 4 | 1040 | 30.0 | - | - - - |
| Molybdene | µg/kg | - | - | - | 5 | 121 | 11.0 | - | - - - |

**Method: Lipids - BT1**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits |
|---|---|---|---|---|---|---|---|---|---|
| Total-Lipid | % | 11.6 | 0.88 | 7.6 | 7 | 11.5 | 0.50 | 0.42 | 10.9 - 12.4 |

## Indicative Values BT10

**Method: Perfluorinated alkyl substances - BT10**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| n-PFOS | µg/kg | 8.12 | 3.391 | 41.8 | 9 | 8.01 | 1.820 | 1.413 | 5.56 | - | 10.7 |
| PFOSA | µg/kg | - | - | - | 4 | 6.62 | 0.6 | - | - | - | - |

# Consensus Values BT2

**Method: Chlorinated organics - BT2**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits |
|---|---|---|---|---|---|---|---|---|---|
| pp'-DDE | µg/kg | 15.2 | 2.17 | 14.3 | 45 | 15.2 | 1.31 | 0.40 | 14.5 - 15.8 |
| pp'-DDD | µg/kg | 0.892 | 0.2208 | 24.8 | 37 | 0.912 | 0.1160 | 0.0454 | 0.818 - 0.965 |
| HCB | µg/kg | 1.76 | 0.306 | 17.4 | 48 | 1.75 | 0.215 | 0.055 | 1.67 - 1.85 |
| PCB28 | µg/kg | 0.597 | 0.1352 | 22.7 | 40 | 0.608 | 0.0820 | 0.0267 | 0.553 - 0.640 |
| PCB52 | µg/kg | 1.88 | 0.298 | 15.8 | 46 | 1.91 | 0.195 | 0.055 | 1.79 - 1.97 |
| PCB101 | µg/kg | 7.06 | 0.921 | 13.0 | 52 | 7.20 | 0.500 | 0.160 | 6.80 - 7.32 |
| PCB105 | µg/kg | 2.24 | 0.263 | 11.8 | 30 | 2.30 | 0.165 | 0.060 | 2.14 - 2.34 |
| PCB118 | µg/kg | 8.83 | 1.278 | 14.5 | 50 | 8.93 | 0.803 | 0.226 | 8.46 - 9.19 |
| PCB153 | µg/kg | 28.5 | 3.31 | 11.6 | 52 | 28.5 | 1.78 | 0.57 | 27.5 - 29.4 |
| PCB156 | µg/kg | 0.960 | 0.1397 | 14.6 | 29 | 0.964 | 0.0840 | 0.0324 | 0.907 - 1.01 |
| PCB180 | µg/kg | 4.73 | 0.869 | 18.4 | 54 | 4.73 | 0.563 | 0.148 | 4.50 - 4.97 |
| PCB138 | µg/kg | 16.5 | 2.51 | 15.2 | 46 | 16.8 | 1.62 | 0.46 | 15.8 - 17.3 |

**Method: Lipids - BT2**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits |
|---|---|---|---|---|---|---|---|---|---|
| Total-Lipid | % | 11.5 | 0.73 | 6.4 | 24 | 11.6 | 0.40 | 0.19 | 11.22 - 11.84 |
| Extractable-Lipid | % | 12.2 | 1.01 | 8.2 | 13 | 12.3 | 0.45 | 0.35 | 11.6 - 12.9 |

## Indicative Values BT2

**Method: Chlorinated organics - BT2**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits |
|---|---|---|---|---|---|---|---|---|---|
| Transnonachlor | µg/kg | 0.0422 | 0.0354 | 83.9 | 11 | 0.0650 | 0.0250 | 0.0133 | 0.0187 - 0.0657 |
| Dieldrin | µg/kg | 0.985 | 0.7620 | 77.4 | 11 | 1.269 | 0.4140 | 0.2872 | 0.479 - 1.49 |
| op'-DDT | µg/kg | - | - | - | 5 | 0.200 | 0.2 | - | - - - |
| HCBD | µg/kg | - | - | - | 4 | 0.547 | 0.4 | - | - - - |
| PCB138+PCB163 | µg/kg | 16.7 | 3.43 | 20.5 | 11 | 16.9 | 2.07 | 1.29 | 14.5 - 19.0 |
| PCB31 | µg/kg | 0.359 | 0.1208 | 33.6 | 20 | 0.375 | 0.0820 | 0.0338 | 0.303 - 0.416 |
| d-HCH | µg/kg | - | - | - | 4 | 0.200 | 0.2 | - | - - - |
| Heptachlor | (µg/kg) | - | - | - | 4 | 0.293 | 0.3 | - | - - - |
| Heptachlor-epoxide (sum) | (µg/kg) | - | - | - | 5 | 0.700 | 0.7 | - | - - - |
| cis-chlordane | (µg/kg) | 0.123 | 0.0396 | 32.1 | 9 | 0.111 | 0.0290 | 0.0165 | 0.0934 - 0.153 |
| trans-chlordane | (µg/kg) | - | - | - | 4 | 0.100 | 0.1 | - | - - - |
| PCB187 | (µg/kg) | - | - | - | 4 | 7.10 | 1.0 | - | - - - |
| PCB170 | (µg/kg) | - | - | - | 4 | 2.00 | 0.0 | - | - - - |

## Consensus Values BT9

**Method: Brominated Flame Retardants - BT9**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits |
|---|---|---|---|---|---|---|---|---|---|
| BDE28 | µg/kg | 0.0846 | 0.0144 | 17.1 | 12 | 0.0858 | 0.0105 | 0.0052 | 0.0755 - 0.0937 |
| BDE47 | µg/kg | 2.39 | 0.351 | 14.6 | 14 | 2.41 | 0.224 | 0.117 | 2.19 - 2.59 |
| BDE100 | µg/kg | 0.651 | 0.1181 | 18.1 | 14 | 0.637 | 0.0660 | 0.0395 | 0.583 - 0.719 |

## Indicative Values BT9

**Method: Brominated Flame Retardants - BT9**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits |
|---|---|---|---|---|---|---|---|---|---|
| BDE99 | µg/kg | 0.127 | 0.0225 | 17.8 | 12 | 0.132 | 0.0165 | 0.0081 | 0.112 - 0.141 |
| BDE153 | µg/kg | 0.0743 | 0.0251 | 33.8 | 11 | 0.0727 | 0.0128 | 0.0095 | 0.0577 - 0.0910 |
| BDE154 | µg/kg | 0.323 | 0.0883 | 27.3 | 12 | 0.325 | 0.0550 | 0.0319 | 0.268 - 0.379 |
| BDE66 | µg/kg | 0.0757 | 0.0329 | 43.5 | 6 | 0.0830 | 0.0170 | 0.0168 | 0.0428 - 0.109 |