# QUASIMEME

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

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# Certificate of Analysis

**Sediment**

**REFERENCE MATERIAL**

**Sediment sample 62**

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# Certificate of Analysis Sediment 62

## 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 dried sediment.

## Sample information

QUASIMEME reference materials cover a range of natural Marine sediment species from contaminated waters from the North Sea and/or Mediterranean. There is no spiking, mixing or other alterations of the samples. For sample preparation the sediment samples are dried at 40 oC and milled to pass a 0.5 mm sieve.

This Sediment sample 62 of Harbor sediment from Goole harbor 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 |
|---|---|---|
| 2021.2 | MS1 | QTM137MS |

# Consensus Values MS1

**Method: Real totals - MS1**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits |
|---|---|---|---|---|---|---|---|---|---|
| Aluminium-RT | % | 6.82 | 1.131 | 16.6 | 11 | 6.74 | 0.755 | 0.426 | 6.07 - 7.57 |
| Chromium-RT | mg/kg | 160 | 13.5 | 8.4 | 12 | 159 | 8.5 | 4.9 | 152 - 169 |
| Copper-RT | mg/kg | 83.4 | 6.61 | 7.9 | 12 | 82.2 | 4.64 | 2.38 | 79.2 - 87.5 |
| Iron-RT | % | 4.38 | 0.314 | 7.2 | 12 | 4.40 | 0.218 | 0.113 | 4.18 - 4.57 |
| Manganese-RT | mg/kg | 1190 | 183 | 15.4 | 11 | 1170 | 130 | 69 | 1064 - 1307 |
| Mercury-RT | µg/kg | 464 | 22.2 | 4.8 | 12 | 462 | 16.1 | 8.0 | 450 - 478 |
| Nickel-RT | mg/kg | 55.1 | 8.11 | 14.7 | 11 | 55.5 | 5.94 | 3.06 | 49.8 - 60.5 |
| Zinc-RT | mg/kg | 353 | 18.7 | 5.3 | 12 | 347 | 11.9 | 6.7 | 341 - 365 |

**Method: Acid extractable (So-called totals) - MS1**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic-AE | mg/kg | 26.8 | 3.41 | 12.7 | 17 | 26.9 | 2.42 | 1.03 | 25.1 - 28.6 |
| Cadmium-AE | µg/kg | 1220 | 85 | 6.9 | 16 | 1230 | 58 | 27 | 1177 - 1267 |
| Chromium-AE | mg/kg | 123 | 22.8 | 18.6 | 17 | 117 | 16.3 | 6.9 | 111 - 134 |
| Cobalt-AE | mg/kg | 17.4 | 2.29 | 13.2 | 10 | 17.7 | 1.71 | 0.90 | 15.8 - 19.0 |
| Copper-AE | mg/kg | 86.4 | 9.14 | 10.6 | 17 | 86.3 | 6.42 | 2.77 | 81.7 - 91.1 |
| Iron-AE | % | 4.22 | 0.228 | 5.4 | 14 | 4.22 | 0.160 | 0.076 | 4.09 - 4.35 |
| Lead-AE | mg/kg | 129 | 13.5 | 10.4 | 18 | 128 | 9.5 | 4.0 | 123 - 136 |
| Manganese-AE | mg/kg | 1200 | 71 | 5.9 | 15 | 1220 | 52 | 23 | 1165 - 1243 |
| Mercury-AE | µg/kg | 454 | 42.5 | 9.4 | 16 | 458 | 29.3 | 13.3 | 431 - 476 |
| Nickel-AE | mg/kg | 52.5 | 4.46 | 8.5 | 17 | 52.4 | 2.90 | 1.35 | 50.2 - 54.8 |
| Zinc-AE | mg/kg | 369 | 28.5 | 7.7 | 18 | 366 | 19.4 | 8.4 | 355 - 383 |

## Indicative Values MS1

**Method: Real totals - MS1**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits |
|---|---|---|---|---|---|---|---|---|---|
| Arsenic-RT | mg/kg | 27.9 | 3.09 | 11.1 | 9 | 28.3 | 2.20 | 1.29 | 25.6 - 30.3 |
| Barium-RT | mg/kg | 514 | 59.7 | 11.6 | 5 | 529 | 42.9 | 33.4 | 445 - 583 |
| Cadmium-RT | µg/kg | 1250 | 342 | 27.5 | 9 | 1270 | 246 | 143 | 988 - 1504 |
| Calcium-RT | g/kg | 41.1 | 2.41 | 5.9 | 4 | 42.0 | 1.82 | 1.51 | 37.8 - 44.5 |
| Cobalt-RT | mg/kg | 19.6 | 1.02 | 5.2 | 5 | 19.7 | 0.70 | 0.57 | 18.4 - 20.8 |
| Lead-RT | mg/kg | 119 | 28.3 | 23.7 | 11 | 120 | 19.9 | 10.7 | 100 - 138 |
| Lithium-RT | mg/kg | 74.1 | 5.52 | 7.5 | 8 | 74.9 | 3.70 | 2.44 | 69.6 - 78.6 |
| Magnesium-RT | mg/kg | 12900 | 880 | 6.8 | 4 | 12600 | 670 | 550 | 11730 - 14160 |
| Phosphorus-RT | mg/kg | 3130 | 631 | 20.2 | 4 | 3150 | 439 | 394 | 2250 - 4000 |
| Strontium-RT | mg/kg | 165 | 15.5 | 9.4 | 4 | 165 | 10.4 | 9.7 | 144 - 187 |
| Vanadium-RT | mg/kg | 116 | 6.1 | 5.3 | 9 | 115 | 4.4 | 2.6 | 111 - 121 |

**Method: Acid extractable (So-called totals) - MS1**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits |
|---|---|---|---|---|---|---|---|---|---|
| Aluminium-AE | % | 4.48 | 1.424 | 31.8 | 11 | 4.42 | 0.907 | 0.537 | 3.54 - 5.43 |
| Barium-AE | mg/kg | 374 | 45.1 | 12.1 | 7 | 378 | 28.1 | 21.3 | 333 - 414 |
| Lithium-AE | mg/kg | 65.1 | 4.94 | 7.6 | 9 | 64.5 | 3.50 | 2.06 | 61.4 - 68.8 |
| Magnesium-AE | mg/kg | 12600 | 650 | 5.1 | 6 | 12500 | 450 | 330 | 11970 - 13270 |
| Molybdenum-AE | mg/kg | 1.91 | 0.340 | 17.8 | 5 | 1.99 | 0.220 | 0.190 | 1.52 - 2.30 |
| Phosphorus-AE | mg/kg | 3460 | 318 | 9.2 | 7 | 3500 | 223 | 150 | 3176 - 3745 |
| Strontium-AE | mg/kg | 114 | 29.1 | 25.4 | 5 | 116 | 19.9 | 16.2 | 81.0 - 148 |
| Vanadium-AE | mg/kg | 73.4 | 22.88 | 31.2 | 11 | 72.5 | 15.49 | 8.62 | 58.3 - 88.6 |

**Method: Carbon - MS1**

| Element | Unit | Mean | Std.Dev. | CV % | N | Median | MAD | Uncertainty | 95 % confidence limits |
|---|---|---|---|---|---|---|---|---|---|
| Inorganic-Carbonate | % | 1.81 | 0.832 | 45.9 | 7 | 1.96 | 0.640 | 0.393 | 1.07 - 2.56 |
| TOC | % | 4.72 | 0.378 | 8.0 | 9 | 4.66 | 0.240 | 0.158 | 4.43 - 5.00 |