



Dioxine/Furane (PCDD/F) und polychlorierte Biphenyle (PCB) in Wildaalen aus nordrhein-westfälischen Gewässern

|  | Wert         | Einheit | Wert         | Einheit | Wert        | Einheit | Wert         | Einheit | Wert         | Einheit | Wert         | Einheit | Wert         | Einheit | Wert         | Einheit | Wert         | Einheit |              |             |             |
|--|--------------|---------|--------------|---------|-------------|---------|--------------|---------|--------------|---------|--------------|---------|--------------|---------|--------------|---------|--------------|---------|--------------|-------------|-------------|
| <b>Gewässer:Sieg Eitorf bis Bülgenuel</b>                      |              |         |              |         |             |         |              |         |              |         |              |         |              |         |              |         |              |         |              |             |             |
| Probennummer   | 1            |         | 2            |         | 3           |         | 4            |         | 5            |         | 6            |         | 7            |         | 8            |         | 9            |         | 10           |             |             |
| WHO(2005)-PCDD/F TEQ inkl. BG                                  | 0,365 pg/g   |         | 0,314 pg/g   |         | 0,925 pg/g  |         | 0,676 pg/g   |         | 0,785 pg/g   |         | 0,551 pg/g   |         | 0,357 pg/g   |         | 0,201 pg/g   |         | 0,24 pg/g    |         | 0,148 pg/g   |             |             |
| Summe 6 DIN-PCB inkl. BG                                       | 135000 pg/g  |         | 164000 pg/g  |         | 313000 pg/g |         | 203000 pg/g  |         | 177000 pg/g  |         | 167000 pg/g  |         | 137000 pg/g  |         | 108000 pg/g  |         | 143000 pg/g  |         | 105000 pg/g  |             |             |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG                              | 5,305 pg/g   |         | 5,874 pg/g   |         | 10,925 pg/g |         | 9,686 pg/g   |         | 8,105 pg/g   |         | 7,521 pg/g   |         | 4,817 pg/g   |         | 3,211 pg/g   |         | 4,91 pg/g    |         | 2,168 pg/g   |             |             |
| <b>Gewässer:Ertf, Erprather Mühle bis Mündung Rhein</b>        |              |         |              |         |             |         |              |         |              |         |              |         |              |         |              |         |              |         |              |             |             |
| Probennummer   | 1            |         | 2            |         | 3           |         | 4            |         | 5            |         | 6            |         | 7            |         | 8            |         | 9            |         | 10           | 11          |             |
| WHO(2005)-PCDD/F TEQ inkl. BG                                  | 1,46 pg/g    |         | 2,63 pg/g    |         | 2,38 pg/g   |         | 1,9 pg/g     |         | 2 pg/g       |         | 1,18 pg/g    |         | 1,8 pg/g     |         | 0,951 pg/g   |         | 0,823 pg/g   |         | 0,11 pg/g    | 1,27 pg/g   |             |
| Summe 6 DIN-PCB inkl. BG                                       | 232000 pg/g  |         | 306000 pg/g  |         | 324000 pg/g |         | 363000 pg/g  |         | 263000 pg/g  |         | 336000 pg/g  |         | 446000 pg/g  |         | 142000 pg/g  |         | 260000 pg/g  |         | 262000 pg/g  | 441000 pg/g |             |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG                              | 9,82 pg/g    |         | 21,03 pg/g   |         | 20,18 pg/g  |         | 18,6 pg/g    |         | 18,9 pg/g    |         | 15,98 pg/g   |         | 21,3 pg/g    |         | 9,721 pg/g   |         | 9,513 pg/g   |         | 3,2 pg/g     | 15,17 pg/g  |             |
| <b>Gewässer:Wupper Reuschenberger Mühle bis Rhein</b>          |              |         |              |         |             |         |              |         |              |         |              |         |              |         |              |         |              |         |              |             |             |
| Probennummer   | 1            |         | 2            |         | 3           |         | 4            |         | 5            |         | 6            |         | 7            |         | 8            |         | 9            |         | 10           |             |             |
| WHO(2005)-PCDD/F TEQ inkl. BG                                  | 1,29 pg/g    |         | 0,999 pg/g   |         | 0,637 pg/g  |         | 0,604 pg/g   |         | 0,919 pg/g   |         | 0,931 pg/g   |         | 0,62 pg/g    |         | 0,854 pg/g   |         | 0,773 pg/g   |         | 0,392 pg/g   |             |             |
| Summe 6 DIN-PCB inkl. BG                                       | 382000 pg/g  |         | 324000 pg/g  |         | 280000 pg/g |         | 262000 pg/g  |         | 475000 pg/g  |         | 429000 pg/g  |         | 417000 pg/g  |         | 452000 pg/g  |         | 229000 pg/g  |         | 436000 pg/g  |             |             |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG                              | 18,69 pg/g   |         | 16,899 pg/g  |         | 14,037 pg/g |         | 10,704 pg/g  |         | 17,919 pg/g  |         | 15,331 pg/g  |         | 13,52 pg/g   |         | 16,754 pg/g  |         | 9,593 pg/g   |         | 13,292 pg/g  |             |             |
| <b>Gewässer:Eifel Rur unterhalb Wehr Kariken bis Grenze NL</b> |              |         |              |         |             |         |              |         |              |         |              |         |              |         |              |         |              |         |              |             |             |
| Probennummer   | 1            |         | 2            |         | 3           |         | 4            |         | 5            |         | 6            |         | 7            |         | 8            |         | 9            |         | 10           |             |             |
| WHO(2005)-PCDD/F TEQ inkl. BG                                  | 1,73 pg/g    |         | 1,13 pg/g    |         | 0,6 pg/g    |         | 2,01 pg/g    |         | 1,87 pg/g    |         | 2,32 pg/g    |         | 2,73 pg/g    |         | 1,73 pg/g    |         | 4,91 pg/g    |         | 1,58 pg/g    |             |             |
| Summe 6 DIN-PCB inkl. BG                                       | 1400000 pg/g |         | 1120000 pg/g |         | 857000 pg/g |         | 1540000 pg/g |         | 1760000 pg/g |         | 1720000 pg/g |         | 1900000 pg/g |         | 1230000 pg/g |         | 3590000 pg/g |         | 1180000 pg/g |             |             |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG                              | 29,03 pg/g   |         | 24,13 pg/g   |         | 10,9 pg/g   |         | 37,51 pg/g   |         | 37,47 pg/g   |         | 47,72 pg/g   |         | 50,13 pg/g   |         | 27,83 pg/g   |         | 106,91 pg/g  |         | 24,08 pg/g   |             |             |
| <b>Gewässer:Niers oberhalb Goch</b>                            |              |         |              |         |             |         |              |         |              |         |              |         |              |         |              |         |              |         |              |             |             |
| Probennummer   | 1            |         | 2            |         | 3           |         | 4            |         | 5            |         | 6            |         | 7            |         | 8            |         | 9            |         | 10           |             |             |
| WHO(2005)-PCDD/F TEQ inkl. BG                                  | 2,81 pg/g    |         | 1,7 pg/g     |         | 2,32 pg/g   |         | 1,89 pg/g    |         | 2,49 pg/g    |         | 2,49 pg/g    |         | 1,89 pg/g    |         | 2,49 pg/g    |         | 2,49 pg/g    |         | 2,49 pg/g    |             |             |
| Summe 6 DIN-PCB inkl. BG                                       | 808000 pg/g  |         | 382000 pg/g  |         | 814000 pg/g |         | 723000 pg/g  |         | 487000 pg/g  |         | 487000 pg/g  |         | 487000 pg/g  |         | 487000 pg/g  |         | 487000 pg/g  |         | 487000 pg/g  |             |             |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG                              | 36,41 pg/g   |         | 19,9 pg/g    |         | 30,72 pg/g  |         | 27,39 pg/g   |         | 28,59 pg/g   |         | 28,59 pg/g   |         | 28,59 pg/g   |         | 28,59 pg/g   |         | 28,59 pg/g   |         | 28,59 pg/g   |             |             |
| <b>Gewässer:Lippe km 4.8 bis Mündung Rhein</b>                 |              |         |              |         |             |         |              |         |              |         |              |         |              |         |              |         |              |         |              |             |             |
| Probennummer   | 1            |         | 2            |         | 3           |         | 4            |         | 5            |         | 6            |         | 7            |         | 8            |         | 9            |         | 10           |             |             |
| WHO(2005)-PCDD/F TEQ inkl. BG                                  | 1,6 pg/g     |         | 0,674 pg/g   |         | 1,2 pg/g    |         | 0,688 pg/g   |         | 0,357 pg/g   |         | 1,46 pg/g    |         | 1,78 pg/g    |         | 1,06 pg/g    |         | 1,57 pg/g    |         | 1,57 pg/g    |             |             |
| Summe 6 DIN-PCB inkl. BG                                       | 1950000 pg/g |         | 227000 pg/g  |         | 301000 pg/g |         | 286000 pg/g  |         | 375000 pg/g  |         | 344000 pg/g  |         | 411000 pg/g  |         | 346000 pg/g  |         | 326000 pg/g  |         | 326000 pg/g  |             |             |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG                              | 83,4 pg/g    |         | 13,574 pg/g  |         | 16,7 pg/g   |         | 14,188 pg/g  |         | 11,657 pg/g  |         | 21,86 pg/g   |         | 26,88 pg/g   |         | 15,96 pg/g   |         | 22,67 pg/g   |         | 22,67 pg/g   |             |             |
| <b>Gewässer:Rhein, Bonn bis Siegmündung</b>                    |              |         |              |         |             |         |              |         |              |         |              |         |              |         |              |         |              |         |              |             |             |
| Probennummer   | 1            |         | 2            |         | 3           |         | 4            |         | 5            |         | 6            |         | 7            |         | 8            |         | 9            |         | 10           |             |             |
| WHO(2005)-PCDD/F TEQ inkl. BG                                  | 2,21 pg/g    |         | 2,66 pg/g    |         | 2,09 pg/g   |         | 1,95 pg/g    |         | 1,09 pg/g    |         | 1,3 pg/g     |         | 1,29 pg/g    |         | 0,683 pg/g   |         | 2,47 pg/g    |         | 2,58 pg/g    |             |             |
| Summe 6 DIN-PCB inkl. BG                                       | 232000 pg/g  |         | 311000 pg/g  |         | 315000 pg/g |         | 231000 pg/g  |         | 142000 pg/g  |         | 151000 pg/g  |         | 225000 pg/g  |         | 273000 pg/g  |         | 398000 pg/g  |         | 88800 pg/g   |             |             |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG                              | 17,91 pg/g   |         | 25,96 pg/g   |         | 20,39 pg/g  |         | 17,55 pg/g   |         | 10,17 pg/g   |         | 12 pg/g      |         | 12,39 pg/g   |         | 11,783 pg/g  |         | 24,97 pg/g   |         | 7,31 pg/g    |             |             |
| <b>Gewässer:Ruhr Essen Kettwig</b>                             |              |         |              |         |             |         |              |         |              |         |              |         |              |         |              |         |              |         |              |             |             |
| Probennummer   | 1            |         | 2            |         | 3           |         | 4            |         | 5            |         | 6            |         | 7            |         | 8            |         | 9            |         | 10           |             |             |
| WHO(2005)-PCDD/F TEQ inkl. BG                                  | 2,13 pg/g    |         | 3,34 pg/g    |         | 0,936 pg/g  |         | 0,289 pg/g   |         | 3,29 pg/g    |         | 2,06 pg/g    |         | 2,61 pg/g    |         | 3,55 pg/g    |         | 0,363 pg/g   |         | 2,46 pg/g    |             |             |
| Summe 6 DIN-PCB inkl. BG                                       | 537000 pg/g  |         | 1050000 pg/g |         | 189000 pg/g |         | 697000 pg/g  |         | 1080000 pg/g |         | 600000 pg/g  |         | 684000 pg/g  |         | 1250000 pg/g |         | 273000 pg/g  |         | 1030000 pg/g |             |             |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG                              | 23,13 pg/g   |         | 47,84 pg/g   |         | 11,336 pg/g |         | 9,559 pg/g   |         | 42,59 pg/g   |         | 27,86 pg/g   |         | 35,91 pg/g   |         | 53,85 pg/g   |         | 6,643 pg/g   |         | 42,06 pg/g   |             |             |
| <b>Gewässer:Berkel, Vreden bis Ellewick</b>                    |              |         |              |         |             |         |              |         |              |         |              |         |              |         |              |         |              |         |              |             |             |
| Probennummer   | 1            |         | 2            |         | 3           |         | 4            |         | 5            |         | 6            |         | 7            |         | 8            |         | 9            |         | 10           |             |             |
| WHO(2005)-PCDD/F TEQ inkl. BG                                  | 0,648 pg/g   |         | 0,877 pg/g   |         | 0,636 pg/g  |         | 0,641 pg/g   |         | 0,412 pg/g   |         | 1,73 pg/g    |         | 4,22 pg/g    |         | 0,265 pg/g   |         | 0,265 pg/g   |         | 0,265 pg/g   |             |             |
| Summe 6 DIN-PCB inkl. BG                                       | 161000 pg/g  |         | 152000 pg/g  |         | 333000 pg/g |         | 141000 pg/g  |         | 114000 pg/g  |         | 287000 pg/g  |         | 1250000 pg/g |         | 420000 pg/g  |         | 420000 pg/g  |         | 420000 pg/g  |             |             |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG                              | 13,448 pg/g  |         | 12,677 pg/g  |         | 14,436 pg/g |         | 7,741 pg/g   |         | 8,502 pg/g   |         | 26,23 pg/g   |         | 36,02 pg/g   |         | 7,065 pg/g   |         | 7,065 pg/g   |         | 7,065 pg/g   |             |             |
| <b>Gewässer:Rhein Düsseldorf bis Meerbusch</b>                 |              |         |              |         |             |         |              |         |              |         |              |         |              |         |              |         |              |         |              |             |             |
| Probennummer   | 1            |         | 2            |         | 3           |         | 4            |         | 5            |         | 6            |         | 7            |         | 8            |         | 9            |         | 10           | 11          | 12          |
| WHO(2005)-PCDD/F TEQ inkl. BG                                  | 1,98 pg/g    |         | 0,904 pg/g   |         | 2 pg/g      |         | 0,941 pg/g   |         | 2,59 pg/g    |         | 0,809 pg/g   |         | 0,368 pg/g   |         | 0,6 pg/g     |         | 1,1 pg/g     |         | 1,51 pg/g    | 1,24 pg/g   | 0,528 pg/g  |
| Summe 6 DIN-PCB inkl. BG                                       | 384000 pg/g  |         | 223000 pg/g  |         | 590000 pg/g |         | 394000 pg/g  |         | 647000 pg/g  |         | 251000 pg/g  |         | 340000 pg/g  |         | 205000 pg/g  |         | 545000 pg/g  |         | 412000 pg/g  | 277000 pg/g | 325000 pg/g |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG                              | 19,78 pg/g   |         | 13,204 pg/g  |         | 28,9 pg/g   |         | 20,641 pg/g  |         | 34,99 pg/g   |         | 14,509 pg/g  |         | 11,968 pg/g  |         | 10,47 pg/g   |         | 23,6 pg/g    |         | 25,81 pg/g   | 15,24 pg/g  | 15,028 pg/g |
| <b>Gewässer:Rhein Rees bis Grietherort</b>                     |              |         |              |         |             |         |              |         |              |         |              |         |              |         |              |         |              |         |              |             |             |
| Probennummer   | 1            |         | 2            |         | 3           |         | 4            |         | 5            |         | 6            |         | 7            |         | 8            |         | 9            |         | 10           |             |             |
| WHO(2005)-PCDD/F TEQ inkl. BG                                  | 3,56 pg/g    |         | 6,06 pg/g    |         | 3,66 pg/g   |         | 2,8 pg/g     |         | 2,48 pg/g    |         | 3,57 pg/g    |         | 4,89 pg/g    |         | 4,53 pg/g    |         | 8,7 pg/g     |         | 4,84 pg/g    |             |             |
| Summe 6 DIN-PCB inkl. BG                                       | 849000 pg/g  |         | 1240000 pg/g |         | 599000 pg/g |         | 698000 pg/g  |         | 363000 pg/g  |         | 404000 pg/g  |         | 655000 pg/g  |         | 705000 pg/g  |         | 895000 pg/g  |         | 576000 pg/g  |             |             |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG                              | 28,56 pg/g   |         | 46,26 pg/g   |         | 32,86 pg/g  |         | 45,9 pg/g    |         | 24,58 pg/g   |         | 32,07 pg/g   |         | 44,59 pg/g   |         | 36,73 pg/g   |         | 67,9 pg/g    |         | 40,84 pg/g   |             |             |
| <b>Gewässer:Schwalm Brüggen bis Grenze NL</b>                  |              |         |              |         |             |         |              |         |              |         |              |         |              |         |              |         |              |         |              |             |             |
| Probennummer   | 1            |         | 2            |         | 3           |         | 4            |         | 5            |         | 6            |         | 7            |         | 8            |         | 9            |         | 10           |             |             |
| WHO(2005)-PCDD/F TEQ inkl. BG                                  | 1,31 pg/g    |         | 1,18 pg/g    |         | 0,712 pg/g  |         | 0,801 pg/g   |         | 1,46 pg/g    |         | 1,2 pg/g     |         | 0,776 pg/g   |         | 0,296 pg/g   |         | 0,296 pg/g   |         | 0,296 pg/g   |             |             |
| Summe 6 DIN-PCB inkl. BG                                       | 266000 pg/g  |         | 267000 pg/g  |         | 319000 pg/g |         | 225000 pg/g  |         | 251000 pg/g  |         | 110000 pg/g  |         | 174000 pg/g  |         | 119000 pg/g  |         | 119000 pg/g  |         | 119000 pg/g  |             |             |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG                              | 16,11 pg/g   |         | 12,78 pg/g   |         | 10,662 pg/g |         | 12,301 pg/g  |         | 18,56 pg/g   |         | 11,19 pg/g   |         | 12,076 pg/g  |         | 4,956 pg/g   |         | 4,956 pg/g   |         | 4,956 pg/g   |             |             |
| <b>Gewässer:Rhein bei Emmerich</b>                             |              |         |              |         |             |         |              |         |              |         |              |         |              |         |              |         |              |         |              |             |             |
| Probennummer   | 1            |         | 2            |         | 3           |         | 4            |         | 5            |         | 6            |         | 7            |         | 8            |         | 9            |         | 10           | 11          |             |
| WHO(2005)-PCDD/F TEQ inkl. BG                                  | 6,44 pg/g    |         | 6,94 pg/g    |         | 6,01 pg/g   |         | 5,22 pg/g    |         | 5,71 pg/g    |         | 9,3 pg/g     |         | 4,07 pg/g    |         | 2,26 pg/g    |         | 6,19 pg/g    |         | 6 pg/g       | 0,89 pg/g   |             |
| Summe 6 DIN-PCB inkl. BG                                       | 850000 pg/g  |         | 1530000 pg/g |         | 970000 pg/g |         | 942000 pg/g  |         | 1090000 pg/g |         | 1240000 pg/g |         | 982000 pg/g  |         | 662000 pg/g  |         | 1200000 pg/g |         | 964000 pg/g  | 377000 pg/g |             |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG                              | 45,84 pg/g   |         | 80,54 pg/g   |         | 46,91 pg/g  |         | 36,42 pg/g   |         | 40,01 pg/g   |         | 61,2 pg/g    |         | 36,97 pg/g   |         | 25,66 pg/g   |         | 51,59 pg/g   |         | 52,9 pg/g    | 13,69 pg/g  |             |
| <b>Gewässer:Urt-Talsperre</b>                                  |              |         |              |         |             |         |              |         |              |         |              |         |              |         |              |         |              |         |              |             |             |
| Probennummer   | 1            |         | 2            |         | 3           |         | 4            |         | 5            |         | 6            |         | 7            |         | 8            |         | 9            |         | 10           |             |             |
| WHO(2005)-PCDD/F TEQ inkl. BG                                  | 0,86 pg/g    |         | 1,03 pg/g    |         | 0,474 pg/g  |         | 1,060 pg/g   |         | 1,060 pg/g   |         | 1,060 pg/g   |         | 1,060 pg/g   |         | 1,060 pg/g   |         | 1,060 pg/g   |         | 1,060 pg/g   |             |             |
| Summe 6 DIN-PCB inkl. BG                                       | 378000 pg/g  |         | 986000 pg/g  |         | 106000 pg/g |         | 106000 pg/g  |         | 106000 pg/g  |         | 106000 pg/g  |         | 106000 pg/g  |         | 106000 pg/g  |         | 106000 pg/g  |         | 106000 pg/g  |             |             |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG                              | 22,36 pg/g   |         | 41,33 pg/g   |         | 1,914 pg/g  |         | 1,914 pg/g   |         | 1,914 pg/g   |         | 1,914 pg/g   |         | 1,914 pg/g   |         | 1,914 pg/g   |         | 1,914 pg/g   |         | 1,914 pg/g   |             |             |

Legende:

|                                   |  | Grenzwerte für in Verkehr gebrachte Aale in pg/g Frischgewicht |
|-----------------------------------|--|--|
| WHO(2005)-PCDD/F TEQ inkl. BG     | Toxizitätsäquivalente der Dioxine/Furane berechnet nach dem Verfahren WHO(2005) unter Berücksichtigung der Bestimmungsgrenze   | 3,5  |
| Summe 6 DIN-PCB inkl. BG          | Summe der sechs PCB-Indikatorokongenerne 28, 52, 101, 138, 153 und 180 unter Berücksichtigung der Bestimmungsgrenze  | 300000   |
| WHO(2005)-PCDD/F+PCB TEQ inkl. BG | Summe der Toxizitätsäquivalente der Dioxine/Furane und der Toxizitätsäquivalente der dioxinähnlichen PCB nach dem Verfahren WHO(2005) unter Berücksichtigung der Bestimmungsgrenze | 10   |