# APPENDIX 1

# TABLES ON OCCURRENCE (PCDDs)

## Table 1. Concentrations of PCDDs in air

| Reference | Origin; sample description (and no.) | | Coll. period | Samp. meth. / Anal. meth. | PCDD concentration (pg/m³) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Australia** | | | | | | | | | | | | |
| Taucher *et al.* (1992) | Sydney; ambient air | (8) | 10/90 | G/P/X<br>BSI | | | | No information | | | | 0.016–0.062 |
| **Austria** | | | | | | | | | | | | |
| Moche & Thanner (1996a) | Mostly urban | | 92/93 | G/P<br>BN | | | | No information | | | | |
| | Ambient, winter | (41) | | | | | | | | | | 0.050–0.222 |
| | Ambient, summer | (43) | | | | | | | | | | 0.022–0.041 |
| Moche & Thanner (1996b) | Graz; ambient air, winter | (20) | 93/94 | G/P<br>BN | | | | No information | | | | 0.07–0.42 |
| | Linz; ambient air, winter | (15) | 94/95 | | | | | | | | | < 0.01–0.180 |
| Christmann *et al.* (1989b) | Brixlegg; ~ 280 m from Cu reclamation plant | (1) | 2/88 | G/P<br>CSI | 0.1 | 0.4 | ND | ND | ND | 2.1 | 2.7 | 2.3[a] |
| | | (1) | 5/88 | | 0.07 | 0.4 | ND | 0.2 | ND | 1.2 | 2.1 | 1.9[a] |
| | | (1) | 6/88 | | 0.03 | 0.2 | 0.04 | 0.08 | 0.05 | 0.4 | 0.5 | 1.2[a] |
| | | (1) | 7/88 | | ND | 0.2 | ND | ND | ND | 0.5 | 1.0 | 1.5[a] |
| **Belgium** | | | | | | | | | | | | |
| Wevers *et al.* (1992) | Antwerp | | 91 | G/P<br>BSN | | | | | | | | |
| | Tunnel air | (1) | | | 0.017 | 0.0126 | 0.0025 | 0.0042 | 0.0030 | 0.0047 | 0.0022 | |
| | | (3) | | | | | | No information | | | | 0.080 (0.030–0.116) |
| | Ambient air | (4) | | | | | | No information | | | | 0.035 (0.021–0.055) |
| Wevers *et al.* (1993) | Near emission sources | (20) | 92 | G/P<br>BSN | | | | No information | | | | 0.165 (0.018–0.379) |

**Table 1 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Samp. meth. / Anal. meth. | PCDD concentration (pg/m$^3$) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Canada** | | | | | | | | | | | | |
| Reiner *et al.* (1995) | Close to cement kiln; ambient air | (6) | 6/89 | G/P B/ | | | | No information | | | | 0.015–0.035 |
| | Toronto Island; ambient air | (6) | 9/88–7/89 | CSO | | | | No information | | | | 0.063 |
| Steer *et al.* (1990a) | SW Ontario; burning tyre dump | | 2/90 | G/P CSO | | | | | | | | |
| | 1 km downwind | (5) | | | | | | I-TEQ (PCDD only), 0.01–0.34 | | | | 0.02–2.5 |
| | 3 km downwind | (4) | | | | | | I-TEQ (PCDD only), 0.014–0.039 | | | | 0.046–0.27 |
| **Germany** | | | | | | | | | | | | |
| Bruckmann & Hackhe (1987) | Hamburg; dump site | (1) | 2/85 | G/P/Si BSI | < 0.02 | < 0.03 | < 0.02 | < 0.02 | ND | ND | 0.27 | 0[a] |
| | Dump site, oil | (1) | 4/85 | | < 0.1 | – | – | – | – | 1.1 | 1.0 | 0.038[a] |
| | Residential, west of dump | (2) | 4/85 3/86 | | < 0.1–0.02 | 0.06 | 0.05 | 0.22 | 0.09 | 1.5 | 1.2–4.2 | 0.032–0.072[a] |
| | Residential, highway, dump, industrial | (5) | 85–87 | | < 0.02–0.11 | < 0.01–0.60 | 0.06–1.0 | 0.08–2.2 | 0.07–5.2 | 2.15–15.4 | 1.1–40 | 0.164–2.186[a] |
| | Close to copper industry | (2) | 1&2/87 | | < 0.01 | 0.04 | 0.03–0.04 | 0.06–0.12 | 0.06–0.09 | 2.15–3.69 | 0.65–0.7 | 0.093–0.206[a] |
| | Industry, highway | (2) | 1&10/86 | | 0.02–0.20 | 0.04–0.22 | 0.19–0.26 | 0.60–0.71 | < 0.17–0.36 | 4.8–5.3 | 7.4–9.4 | 0.525–0.612[a] |
| | Industry, 2 MWI | (2) | 85–86 | | < 0.01–0.085 | 0.1–0.052 | < 0.09–0.19 | < 0.09–0.90 | < 0.09–0.38 | 1.5–7.7 | 3.7–7.7 | 0.156–1.081[a] |
| | Highway tunnel | (2) | 1/86 | | < 0.01–0.06 | 0.28–0.31 | < 0.17–0.37 | 0.66–1.19 | < 0.17–0.44 | 3.4 | 6.3–6.4 | 0.457–0.569[a] |
| | Suburb, highway | (1) | 9/86 | | < 0.02 | < 0.04 | 0.06 | 0.09 | < 0.04 | 2.31 | 2.9 | 0.085[a] |
| | Suburb (North) | (1) | 8/86 | | < 0.02 | < 0.03 | < 0.03 | 0.07 | 0.06 | 1.23 | 1.0 | 0.032[a] |
| | Suburb (13 km SE) | (1) | 4/86 | | 0.02 | < 0.02 | < 0.08 | 0.23 | < 0.08 | 0.60 | 0.37 | 0.084[a] |
| | Forest (20 km N) | (1) | 4/86 | | < 0.02 | < 0.03 | < 0.03 | < 0.03 | < 0.03 | 0.28 | 0.37 | 0.001[a] |

**Table 1 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Samp. meth. / Anal. meth. | PCDD concentration (pg/m$^3$) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Kirschmer (1987) | Rhine-Ruhr; Mean of 11 sites/wide range of uses | (33) | 85–86 | G/P CSI | ND | 0.02 | 0.03 | 0.06 | 0.03 | 1.14 | 0.98 | |
| Christmann *et al.* (1989b) | Ambient air; Berlin-Dahlem | (10) | 1/87 | G/P CSI | ND | ND | ND | ND | ND | 6.6 | 8.5 | 0.1 (0.02–0.4)[a] |
| | Bad-Kreuzberg | (1) | 2/88 | | ND | ND | ND | ND | ND | 1.3 | 2.2 | 0.07[a] |
| | Gelsenkirchen | (5) | 87/88 | | ND | ND | ND | ND | ND | 3.2 | 8.5 | 0.1 (0.03–0.3)[a] |
| | Recklinghausen | (3) | 5–9/87 | | ND | ND–0.5 | ND | ND | ND | ND–1.7 | 6.1 | 0.2 (0.1–0.3)[a] |
| | Indoor air; PCP application | (1) | | | ND | ND | ND | 6.2 | ND | 63.3 | 103 | 2.6[a] |
| Päpke *et al.* (1989a) | Indoor air; PCP application (kindergartens) | (1) (15) | 86 | G/P BSI | ND | ND | 0.04 | 0.92 No information | 0.11 | 77.0 | 131.5 | 2.46[a] 0.696 (0.018–2.46)[a] |
| König *et al.* (1993) | Hessen; ambient air | | 90 | G/P BSI | | | | | | | | |
| | Rural | (21) | | | 0.002 | 0.009 | 0.013 | 0.026 | 0.024 | 0.267 | 3.18 | 0.048 |
| | Rural/industry | (21) | | | 0.004 | 0.020 | 0.025 | 0.052 | 0.044 | 0.629 | 6.44 | 0.087 |
| | Rural industry | (21) | | | 0.003 | 0.021 | 0.019 | 0.048 | 0.036 | 0.527 | 5.80 | 0.079 |
| | Industry | (21) | | | 0.005 | 0.029 | 0.034 | 0.071 | 0.061 | 0.570 | 8.77 | 0.146 |
| | Industry | (21) | | | 0.004 | 0.022 | 0.024 | 0.053 | 0.044 | 0.603 | 6.77 | 0.110 |
| | Traffic | (21) | | | 0.002 | 0.018 | 0.017 | 0.042 | 0.036 | 0.435 | 5.14 | 0.078 |

**Table 1 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Samp. meth. / Anal. meth. | PCDD concentration ($pg/m^3$) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Wallenhorst *et al.* (1995) | Baden-Württemberg; ambient air | | 92 | G/P BSI | | | | | | | | |
| | Rural | | | | | | | No information | | | | 0.021 (0.008–0.054) |
| | Rural with special exposure | | | | | | | No information | | | | 0.018 (0.005–0.049) |
| | Suburban | | | | | | | No information | | | | 0.056 (0.009–0.098) |
| | Urban | | | | | | | No information | | | | 0.083 (0.021–0.217) |
| | Multitype | | | | | | | No information | | | | 0.062 (0.014–0.130) |
| Hiester *et al.* (1995) | Ambient air; | | 93–94 | G/P CSI | | | | | | | | |
| | Essen, mostly residential | | | | | | | No information | | | | 0.076 |
| | Duisburg, industrial | | | | | | | No information | | | | 0.124 |
| | Dortmund, downtown | | | | | | | No information | | | | 0.120 |
| | Cologne, mostly residential | | | | | | | No information | | | | 0.040 |
| Hippelein *et al.* (1996) | Augsburg; ambient air (means) | | | G/X BSI | | | | | | | | |
| | March–April | (6) | 92 | | < 0.0035 | 0.0086 | < 0.013 | 0.021 | 0.021 | 0.270 | 0.720 | 0.040 |
| | April–May | (6) | 92 | | < 0.0017 | 0.0039 | < 0.0049 | < 0.0081 | < 0.0074 | 0.087 | 0.280 | 0.019 |
| | June–July | (6) | 92 | | < 0.0012 | 0.0024 | < 0.0043 | < 0.0058 | < 0.0046 | 0.089 | 0.320 | 0.014 |
| | July–September | (6) | 92 | | < 0.0014 | < 0.0022 | < 0.0061 | < 0.0078 | < 0.0062 | 0.120 | 0.430 | 0.015 |
| | Sept.–October | (6) | 92 | | < 0.0030 | < 0.0076 | < 0.015 | < 0.021 | 0.021 | 0.310 | 0.750 | 0.042 |
| | Oct.–November | (6) | 92 | | 0.0037 | 0.012 | < 0.019 | 0.030 | 0.030 | 0.510 | 1.300 | 0.060 |
| | Nov.–January | (6) | 92–93 | | 0.0069 | 0.027 | 0.034 | 0.063 | 0.063 | 0.830 | 2.000 | 0.120 |
| | Jan.–February | (6) | 93 | | < 0.0036 | 0.018 | 0.027 | 0.045 | 0.044 | 0.530 | 1.200 | 0.087 |
| | Mean of mean | (48) | 92–93 | | 0.0031 | 0.010 | 0.015 | 0.030 | 0.024 | 0.340 | 0.870 | 0.049 |

**Table 1 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Samp. meth. / Anal. meth. | PCDD concentration (pg/m$^3$) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Rabl *et al.* (1996) | Bavaria; ambient air | | | G/P<br>BSI | | | | | | | | |
| | 1.3 km E of MWI | (1) | 96 | | | | No information | | | | | 0.034 |
| | 2.0 km NE of MWI | (2) | 95–96 | | | | No information | | | | | 0.055–0.064 |
| | 3.3 km NNE of MWI | (2) | 95–96 | | | | No information | | | | | 0.034–0.062 |
| Päpke *et al.* (1994a) | Workplace air | | 93 | G/P/Ps | | | | | | | | |
| | Plant 1 | (4) | | BSI | | | No information | | | | | 0.70–3.79 |
| | Plant 2 | (3) | | | | | No information | | | | | 0.06–0.18 |
| | Plant 3 | (5) | | | | | No information | | | | | 0.06–0.60 |
| | Plant 1 | (3) | | G/P | | | No information | | | | | 0.15–1.90 |
| | Plant 2 | (5) | | BSI | | | No information | | | | | 0.08–0.15 |
| | Plant 3 | (5) | | | | | No information | | | | | 0.07–0.54 |
| Menzel *et al.* (1996) | Workplace air; | | 95 | G/P/Ps | | | | | | | | |
| | Welding, MWI1 boiler pipes | (1) | | N | | | Total 2,3,7,8-isomers, 541 | | | | | 56 |
| | Welding, MWI2 waste chute | (2) | | | | | Total 2,3,7,8-isomers, 204–1058 | | | | | 11–44 |
| | Milling, MWI1 boiler pipes | (1) | | | | | Total 2,3,7,8-isomers, 975 | | | | | 87 |
| | Fitting, MWI1 waste chute | (2) | | | | | Total 2,3,7,8-isomers, 20 038–21 678 | | | | | 1830–2430 |
| | Fitting, MWI2 waste chute | (2) | | | | | Total 2,3,7,8-isomers, 794–2680 | | | | | 30–140 |
| | Air burning, MWI2 waste chute | (2) | | | | | Total 2,3,7,8-isomers, 354–6911 | | | | | 20–80 |
| | Cutting/welding, wood chip dryer | (1) | | | | | Total 2,3,7,8-isomers, 61 | | | | | 2 |

**Table 1 (contd)**

| Reference | Origin; sample description (and no.) | Coll. period | Samp. meth. / Anal. meth. | PCDD concentration ($pg/m^3$) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Menzel *et al.* (1996) (contd) | Open-air burning, power plant demol. (2) | | | | | Total 2,3,7,8-isomers, 20–39 | | | | | 358–459 |
| | Open-air burning, metal reclamation 1 (2) | | | | | Total 2,3,7,8-isomers, 227–1266 | | | | | 98–858 |
| | Open-air burning, metal reclamation 2 (2) | | | | | Total 2,3,7,8-isomers, 95–300 | | | | | 348–1183 |
| **Japan** | | | | | | | | | | | |
| Sugita *et al.* (1993) | Urban area | 92 | G/P BSI | | | | | | | | |
| | Ambient air, mean summer (2) | | | 0.007 | 0.087 | 0.180 | 0.274 | 0.191 | 2.375 | 4.624 | 0.469–1.427[b] |
| | Ambient air, mean winter (2) | | | 0.040 | 0.193 | 0.376 | 0.683 | 0.555 | 4.213 | 10.358 | 0.294–2.990[b] |
| Kurokawa *et al.* (1994) | Site A | < 94 | G/P BSO | | | | | | | | |
| | Ambient air, particle phase | | | | | No information | | | | Summer | 0.025 |
| | | | | | | | | | | Winter | 0.291 |
| | Ambient air, vapour phase | | | | | No information | | | | Summer | 0.035 |
| | | | | | | | | | | Winter | 0.012 |
| | Site B | | | | | | | | | | |
| | Ambient air, particle phase | | | | | No information | | | | Summer | 0.184 |
| | | | | | | | | | | Winter | 0.310 |
| | Ambient air, vapour phase | | | | | No information | | | | Summer | 0.407 |
| | | | | | | | | | | Winter | 0.046 |
| | Site C | | | | | | | | | | |
| | Ambient air, particle phase | | | | | No information | | | | Summer | 0.273 |
| | | | | | | | | | | Winter | 0.614 |
| | Ambient air, vapour phase | | | | | No information | | | | Summer | 0.218 |
| | | | | | | | | | | Winter | 0.072 |

**Table 1 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Samp. meth. / Anal. meth. | PCDD concentration (pg/m$^3$) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Norway** | | | | | | | | | | | | |
| Oehme *et al.* (1991) | Tunnel air; Northbound | | 89 | G/P CSI | | | | | | | | |
| | Intlet, weekday | (1) | | | 0.02 | 0.021 | 0.028 | 0.049 | 0.041 | 0.29 | 1.5 | 0.097[c] |
| | Outlet, weekday | (1) | | | 0.04 | 0.20 | 0.084 | 0.34 | 0.29 | 1.7 | 1.6 | 0.98[c] |
| | Inlet, weekend | (1) | | | < 0.01 | 0.018 | 0.018 | 0.091 | 0.029 | 0.36 | 2.3 | 0.089[c] |
| | Outlet, weekend | (1) | | | 0.03 | 0.054 | 0.050 | 0.12 | 0.09 | 0.52 | 2.8 | 0.55[c] |
| | Southbound | | | | | | | | | | | |
| | Inlet, weekday | (1) | | | 0.01 | 0.042 | 0.013 | 0.066 | 0.037 | 0.32 | 1.9 | 0.131[c] |
| | Outlet, weekday | (1) | | | 0.02 | 0.015 | 0.022 | 0.092 | 0.028 | 0.38 | 2.2 | 0.230[c] |
| | Inlet, weekend | (1) | | | < 0.01 | 0.021 | 0.086 | 0.063 | 0.024 | 0.18 | 1.1 | 0.101[c] |
| | Outlet, weekend | (1) | | | 0.01 | 0.031 | – | 0.048 | 0.028 | 0.24 | 1.7 | 0.134[c] |
| | Central Oslo; ambient air | | | | | | | No information | | | | 0.040[c] |
| Schlabach *et al.* (1996) | Spitbergen, arctic; | (1) | 5/95 | G/P | 0.0002 | 0.0005 | 0.0009 | 0.0013 | 0.0002 | – | – | 0.0023 |
| | ambient air | (1) | 8/95 | BSI | 0.0001 | 0.0002 | 0.0001 | 0.0003 | 0.0002 | 0.0016 | 0.0044 | 0.0011 |
| **Poland** | | | | | | | | | | | | |
| Grochowalski *et al.* (1995) | Cracow centre; | | 3/95 | G/C | | | | | | | | |
| | market square | (1) | | CSI | 0.15 | 0.18 | 0.21 | 0.2 | 0.16 | 2.7 | 10.4 | 0.95 |
| | Mateczny crossroad | (1) | | | 1 | 1.15 | 2.15 | 3 | 1.05 | 55 | 280 | 11.95 |
| **Russian Federation** | | | | | | | | | | | | |
| Kruglov *et al.* (1996) | Oil fire; residential area | | 96 | BSO | | | | | | | | |
| | 100 m downwind | (1) | | | 0.56 | 0.85 | 0.32 | 1.84 | 0.52 | 7.77 | 62.45 | 1.72 |
| | 100 m upwind | (1) | | | 0.17 | 0.12 | 0.09 | 0.12 | 0.08 | 4.26 | 39.3 | 0.5 |

**Table 1 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Samp. meth. / Anal. meth. | PCDD concentration ($pg/m^3$) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Slovakia** | | | | | | | | | | | | |
| Holoubek *et al.* (1991) | Ambient air | | 90 | P | | | | | | | | |
| | Urban/industrial | | | N | | | | No information | | | | ND–6.3 |
| | Rural | | | | | | | No information | | | | 0.0002–4.9 |
| | Rural/industrial | | | | | | | No information | | | | 3.0–6.0 |
| | Suburban | | | | | | | No information | | | | 0.0035–2.9 |
| | Resid./industrial | | | | | | | No information | | | | 0.23–5.5 |
| | Urban/industrial | | | | | | | No information | | | | 2.0–3.0 |
| **Spain** | | | | | | | | | | | | |
| Abad *et al.* (1996) | Catalonia (ambient air); urban, traffic | (8) | 93–95 | G/P BSI | [a]0.026 | 0.031 | 0.029 | 0.064 | 0.076 | 0.385 | 1.110 | 0.28 (0.05–0.62) |
| | Rural, near MWI | (12) | | | 0.006 | 0.009 | 0.008 | 0.023 | 0.031 | 0.218 | 1.286 | 0.05 (0.01–0.5) |
| | Urban | (3) | | | 0.003 | 0.010 | 0.013 | 0.027 | 0.043 | 0.277 | 0.803 | 0.13 (0.11–0.15) |
| | Urban | (3) | | | 0.007 | 0.014 | 0.013 | 0.020 | 0.033 | 0.223 | 1.237 | 0.20 (0.07–0.43) |
| | MWI influence | (2) | | | 0.010 | 0.050 | 0.060 | 0.155 | 0.210 | 1.720 | 5.695 | 0.55 (0.15–0.95) |
| | Industrial, MWI influence, traffic | (3) | | | 0.007 | 0.020 | 0.040 | 0.103 | 0.150 | 0.867 | 2.313 | 0.28 (0.20–0.36) |
| | MWI | (2) | | | 0.005 | 0.010 | 0.010 | 0.015 | 0.020 | 0.135 | 0.770 | 0.08 (0.01–0.05) |
| | Heavy industry | (2) | | | 0.040 | 0.045 | 0.100 | 0.150 | 0.140 | 1.035 | 2.920 | 0.52 (0.16–0.88) |

**Table 1 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Samp. meth. / Anal. meth. | PCDD concentration (pg/m$^3$) TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Sweden** | | | | | | | | | | | | |
| Rappe *et al.* (1989a) | Rörvik; ambient air | | | G BSI | | | | | | | | |
| | Wind WSW | (1) | 9/85 | | < 0.001 | 0.003 | < 0.001 | < 0.001 | < 0.001 | 0.057[d] | 0.050 | |
| | | (1) | 1/86 | | < 0.001 | 0.005 | < 0.001 | 0.004 | 0.005 | 0.140[d] | 0.064 | |
| | Wind W, N & E | (1) | 1/86 | | 0.002 | 0.009 | 0.002 | 0.005 | 0.006 | 0.210[d] | 0.160 | |
| | Wind E & N | (1) | 1/86 | | 0.005 | 0.035 | 0.007 | 0.014 | 0.032 | 1.00[d] | 0.540 | |
| | Wind SE | (1) | 2/86 | | < 0.001 | 0.004 | < 0.001 | 0.002 | 0.004 | 0.110[d] | – | |
| | Wind NE | (1) | 2/86 | | < 0.001 | 0.007 | 0.003 | 0.005 | 0.006 | 0.270[d] | 0.160 | |
| | Göthenburg; ambient air | | | | | | | | | | | |
| | Wind W, N & E | (1) | 1/86 | | 0.003 | 0.017 | 0.003 | 0.011 | 0.006 | 0.380[d] | 0.290 | |
| | Wind E & N | (1) | 1/86 | | 0.009 | 0.066 | 0.019 | 0.046 | 0.092 | 2.900[d] | 1.900 | |
| | Wind SE | (1) | 2/86 | | < 0.001 | 0.006 | 0.002 | 0.004 | 0.007 | 0.230[d] | 1.040 | |
| Antonsson *et al.* (1989) | Workplace air (steelmills); close to furnace | | 88 | G/X BSI | | | | No information | | | | 0.80–6.4[c] |
| | Overhead crane | | | | | | | No information | | | | 1.8–14[c] |
| | Crane cabin | | | | | | | No information | | | | 2.8–5.6[c] |
| **United Kingdom** | | | | | | | | | | | | |
| Clayton *et al.* (1993) | Ambient air | | | N | | | | | | | | |
| | Cardiff | (42) | 1/91–9/92 | B | | | | Mean (range) total 2,3,7,8-isomers, 2.3 (ND–66) | | | | 0.100 (ND–0.86) |
| | Manchester | (43) | 3/91–9/92 | | | | | Mean (range) total 2,3,7,8-isomers, 2.1 (ND–46) | | | | 0.102 (0.001–1.81) |
| | London | (43) | 1/91–11/92 | | | | | Mean (range) total 2,3,7,8-isomers, 2.2 (ND–17) | | | | 0.06 (ND–0.65) |
| | Stevenage | (43) | 1/91–4/92 | | | | | Mean (range) total 2,3,7,8-isomers, 1.7 (ND–9) | | | | 0.039 (ND–0.80) |

**Table 1 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Samp. meth. / Anal. meth. | PCDD concentration ($pg/m^3$) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Dyke & Coleman (1995) | Ambient air | | 11/94 | GP CSI | | | | | | | | |
| | Before bonfire | (1) | | | | | | No information | | | | 0.12–0.15 |
| | During bonfire | (1) | | | | | | No information | | | | 0.62–0.65 |
| | After bonfire | (1) | | | | | | No information | | | | 0.14–0.17 |
| **United States** | | | | | | | | | | | | |
| Eitzer & Hites (1989) | Bloomington; ambient, municipal | (55) | 85–87 | G/P CSN | | | No further isomers reported | | | | 0.89 | |
| | Trout Lake; ambient, rural | (2) | | | | | No further isomers reported | | | | 0.16 | |
| Smith *et al.* (1989) | Niagara Falls; ambient air | | | G/P CSI | | | | | | | | |
| | Downwind from industry | (1) | 11/86 | | ND | ND | 0.05 | 0.06 | 0.11 | 0.55 | 1.59 | |
| | | (1) | 11/86 | | ND | 0.49 | 0.64 | 1.06 | ND | 5.43 | 8.88 | |
| | | (1) | 1/86 | | ND | ND | 0.04 | 0.05 | 0.07 | ND | 1.83 | |
| | Upwind from industry | (1) | 11/86 | | ND | ND | ND | ND | ND | 0.34 | 1.40 | |
| | | (1) | 1/87 | | ND | ND | ND | 0.03 | 0.03 | 0.37 | 1.36 | |
| | | (1) | 2/87 | | ND | ND | ND | ND | ND | 0.51 | 5.79 | |
| Edgerton *et al.* (1989) | Akron; 2 km from MWI | | 87 | G/P BSN | < 0.20 | < 0.27 | 0.035 | 0.052 | 0.050 | 0.52 | 1.00 | |
| | | | | | < 0.16 | < 0.11 | 0.055 | 0.053 | 0.026 | 0.53 | 1.20 | |
| | | | | | < 0.01 | < 0.03 | 0.032 | 0.053 | 0.017 | 0.57 | 1.20 | |
| | Columbus; 3/4 km from RDF | | | | < 0.82 | < 0.06 | < 0.028 | < 0.028 | < 0.028 | 0.26 | 0.51 | |
| | 1/4 km from SSI | | | | < 0.24 | < 0.05 | < 0.039 | 0.078 | 0.064 | 0.52 | 1.10 | |
| | Highway | | | | < 0.15 | < 0.08 | < 0.032 | < 0.032 | < 0.032 | 0.32 | 0.96 | |
| | Waldo; Background | | | | < 0.06 | < 0.03 | 0.031 | 0.025 | 0.025 | 0.24 | 0.50 | |

**Table 1 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Samp. meth. / Anal. meth. | PCDD concentration (pg/m$^3$) TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Hahn *et al.* (1989) | Workplace air; bottom ash conveyor | | 1/88 | G/P/X N | ND | ND | ND | ND | ND | 0.431 | 2.141 | |
| | Feed table floor | | | | ND | ND | ND | ND | 0.039 | 1.012 | 9.494 | |
| Tiernan *et al.* (1989) | Dayton, OH; ambient air, near MWI | | 88 | N | ND | 0.57 | 0.63 | 1.19 | 0.91 | 6.02 | 8.26 | |
| Kominsky & Kwoka (1989) | Boston | | 9/86 | G/Si CN | | | | | | | | |
| | Office building | (12) | | | < 0.3–< 1.4 | < 0.2–< 1.1 | | < 0.25–< 0.95 | | < 0.66–2.0 | 3.2–7.6 | |
| | Ambient air | (4) | | | < 0.4–< 0.6 | < 0.5–< 1.6 | | < 0.27–< 0.51 | | < 1.2–1.6 | 3.5–5.6 | |
| Harless *et al.* (1990) | Green Bay, WI; ambient air | (4) | 89 | G/P BSI | < 0.01–< 0.04 | < 0.02–< 0.08 | < 0.01–0.01 | 0.01–0.03 | < 0.01–0.02 | 0.1–0.2 | 0.3–0.4 | |
| Hunt & Maisel (1990) | Bridgeport, CT; ambient air | (29) | 87–88 | G/P BSI | 0.012 | 0.024 | 0.030 | 0.043 | 0.075 | 0.477 | 2.10 | |
| Maisel (1990) | Bridgeport MWI; ambient preoperational | (22) | 87–88 | G/P BSI | < 0.010 | 0.021 | 0.030 | 0.046 | 0.080 | 0.47 | | |
| Maisel & Hunt (1990) | Los Angeles, CA; ambient air | (1) | W/87 | G/P BSI | < 0.010 | < 0.039 | < 0.076 | < 0.083 | < 0.086 | 0.25 | 1.9 | |

**Table 1 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Samp. meth. / Anal. meth. | PCDD concentration ($pg/m^3$) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Hunt & Maisel (1992) | S. California; | | | G/P | | | | | | | | |
| | Session I | (6) | 12/87 | BSI | < 0.020 | < 0.136 | < 0.196 | < 0.410 | < 0.392 | 2.02 | 2.46 | |
| | Session II | (2) | 12/87 | | < 0.006 | < 0.014 | < 0.010 | < 0.008 | < 0.010 | 0.230 | 1.25 | |
| | Session III | (5) | 7/88 | | < 0.026 | < 0.060 | < 0.086 | < 0.082 | < 0.104 | < 1.796 | 3.18 | |
| | Session IV | (6) | 7/88 | | < 0.034 | < 0.056 | < 0.082 | < 0.076 | < 0.150 | < 3.52 | 5.26 | |
| | Session V | (7) | 9/88 | | < 0.024 | < 0.026 | < 0.032 | < 0.050 | < 0.028 | 0.377 | 1.13 | |
| | Session VI | (1) | 11/88 | | < 0.012 | < 0.022 | < 0.036 | < 0.054 | < 0.050 | 0.227 | 0.437 | |
| | Session VII | (6) | 3/89 | | < 0.024 | < 0.186 | < 0.026 | < 0.026 | < 0.030 | 0.248 | 2.05 | |
| | Mean, all sessions | (33) | | | < 0.024 | < 0.088 | < 0.076 | < 0.118 | < 0.128 | < 2.02 | < 5.60 | |
| Schecter & Charles (1991) | Binghamton; | | | N | | | | | | | | |
| | transformer incident | | 81–82 | | | | | No information | | | | 352[c] |
| | site | | 89–90 | | | | | No information | | | | 74[c] |
| | Upper floors | | 81–82 | | | | | No information | | | | 202[c] |
| | | | 89–90 | | | | | No information | | | | 2.9[c] |
| Lorber *et al.* (1996a) | Columbus, OH; | | | N | | | | | | | | |
| | running MWI | (6) | 3/94 | | | | | No information | | | | 0.067 |
| | | (6) | 4/94 | | | | | No information | | | | 0.118 |
| | Shut down MWI | (7) | 6/95 | | | | | No information | | | | 0.049 |
| | Columbus high; | | | | | | | | | | | |
| | running MWI | (2) | 94 | | | | | No information | | | | 0.26 |
| | Shut down MWI | (2) | 95 | | | | | No information | | | | 0.09 |
| | Columbus low; | | | | | | | | | | | |
| | running MWI | (2) | 94 | | | | | No information | | | | 0.03 |
| | Shut down MWI | NG | 95 | | | | | No information | | | | 0.02 |

**Table 1 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Samp. meth. / Anal. meth. | PCDD concentration (pg/m$^3$) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Riggs *et al.* (1996) | Edgemont, OH; 2.4 km N of MWI | (6) | 9/95 | G/P CSO | | | | No information | | | | 0.206 |
| | Kettering; 1.6 km N of MWI | (6) | | | | | | No information | | | | 0.057 |
| | Site 8; 0.5 km SW of MWI | (6) | | | | | | No information | | | | 0.045 |
| | Miami Villa; 1.4 km SW of MWI | (6) | | | | | | No information | | | | 0.016 |
| | Background; 15 km N of Dayton | (1) | | | | | | No information | | | | 0.006 |

Analytical methods: All analyses use high-resolution gas chromatography; B, high-resolution mass spectrometry; C, low-resolution mass spectrometry; I, isomer-specific; O, others; N, no information; S, sophisticated clean-up; R, reduced clean-up; W, WHO-accepted laboratory
Sampling methods: G, glass fibre filter; P, polyurethane foam; X, XAD; C, carbon; Si, silica; Ps, personal sampling
ND, not detected; HWI, hospital waste incinerator; MWI, municipal waste incinerator; SSI, sewage sludge incinerator; RDF, refuse-derived fuel incinerator; W, winter
Data presented are means. Figures in parentheses are ranges. Levels of congeners not detected at known detection limits (for examples, 0.02 pg/m$^3$) are presented as < 0.02
[a] German TEQ
[b] Including PCBs contribution
[c] Nordic TEQ
[d] Contains non-toxic isomers
[e] Eadon-TEQ

## Table 2. Concentrations of PCDDs in water

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (pg/L; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Canada** | | | | | | | | | | | | |
| Jobb *et al.* (1990) | Ontario; Amherstburg; drinking water, raw | 5 | 85–86 | AB/CS | – | – | – | – | – | – | 20–115 | |
| | Cayuga; drinking water, raw | 1 | 87 | | – | – | – | – | – | – | 42 | |
| | Lambton Area; drinking water, raw | 2 | 86 | | – | – | – | – | – | – | 13–38 | |
| | Mitchell's Bay; drinking water, raw | 4 | 85–86 | | – | – | – | – | – | – | 24–140 | |
| | South Peel Area; drinking water, raw | 1 | 83 | | – | – | – | – | – | – | 30 | |
| | St. Catharines; drinking water, raw | 3 | 83–86 | | – | – | – | – | – | – | 39–90 | |
| | Stoney Point; drinking water, raw | 4 | 85–86 | | – | – | – | – | – | – | 24–120 | |
| | Wallaceburg; drinking water, raw | 2 | 85–86 | | – | – | – | – | – | – | 12–175 | |
| | Wallaceburg; drinking water, treated | 1 | 86 | | – | – | – | – | – | – | 19 | |

## Table 2 (contd)

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (pg/L; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Canada (contd)** | | | | | | | | | | | | |
| Jobb *et al.* (1990) (contd) | Walpole Island; drinking water, treated | 2 | 86 | AB/CS | – | – | – | – | – | – | 28–41 | |
| | Walpole Island; drinking water, raw | 2 | 86 | | – | – | – | – | – | – | 9–35 | |
| | Welland river; drinking water, raw | 1 | 86 | | – | – | – | – | – | – | 25 | |
| | Windsor; drinking water, raw | 8 | 85–86 | | – | – | – | – | – | – | 22–63 | |
| | Windsor; drinking water, treated | 1 | 86 | | – | – | – | – | – | – | 46 | |
| **Germany** | | | | | | | | | | | | |
| Götz *et al.*(1994) | River Elbe; | | | ABSIW | | | | | | | | |
| | Bunthaus d and PB | | 8/90 | | 0.220 | 0.409 | 0.732 | 1.120 | 1.936 | 15.065 | 64.6 | 3.15 |
| | Blankenese d and PB | | 8/90 | | 0.090 | 0.107 | 0.322 | 0.351 | 0.814 | 3.209 | 12.8 | 1.21 |
| **Japan** | | | | | | | | | | | | |
| Hashimoto *et al.* (1995a) | Matsuyama | | 8/90 | ACIS | | | | | | | | |
| | Coastal seawater, d | 1a | | | ND | ND | ND | ND | ND | ND | ND | |
| | Coastal seawater, PB | 1b | | | ND | ND | ND | ND | ND | 0.068 | 2.5 | |

**Table 2 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (pg/L; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Japan (contd)** | | | | | | | | | | | | |
| Hashimoto *et al.* (1995a) (contd) | Misaki | | 8/90 | ACIS | | | | | | | | |
| | Coastal seawater, d | 1a | | | ND | ND | ND | ND | ND | ND | 0.10 | |
| | Coastal seawater, PB | 1b | | | ND | ND | ND | ND | ND | ND | 1.1 | |
| Matsumara *et al.* (1994) | Coastal seawater | 1 | NG | ABIS | 0.020 | 0.014 | 0.040 | 0.070 | 0.088 | 0.250 | 0.340 | |
| Miyata *et al.* (1992, 93) | Nagahama | | 10–11/91 | ABIS | | | | | | | | |
| | Wellwater, S | 1a | | | ND | ND | ND | ND | ND | ND | 0.19 | |
| | Wellwater, PB | 1b | | | ND | ND | ND | ND | ND | 0.62 | 11.73 | |
| | Home tap water, S | 1a | | | ND | ND | ND | ND | ND | ND | 0.29 | |
| | Home tap water, PB | 1b | | | ND | ND | ND | ND | ND | ND | 0.24 | |
| | Hirakata | | 10–11/91 | | | | | | | | | |
| | Home tap water, S | 2a | | | ND | ND | ND | ND | ND | ND | 0.72–0.88 | |
| | Home tap water, PB | 2b | | | ND | ND | ND | ND | ND | ND | 0.51–0.79 | |
| | Osaka | | 10–11/91 | | | | | | | | | |
| | Home tap water, S | 2a | | | ND | ND | ND | ND | ND | 0.09–0.14 | 0.85–1.33 | |
| | Home tap water, PB | 2b | | | ND | ND | ND | ND | ND | ND | 0.58–0.86 | |
| **Russian Federation** | | | | | | | | | | | | |
| Fedorov (1993) | Ufa, north; drinking water | | 4/92 | N | 27.5 | | | | | | | |
| | Ufa, south; drinking water | | 4/92 | | 48.8 | | | | | | | |

**Table 2 (contd)**

| Reference | Origin; sample description (and no.) | Coll. period | Anal. meth. | PCDD concentration (pg/L; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Russian Federation (contd)** | | | | | | | | | | | |
| Fedorov (1993) (contd) | Ufa, Iziak; drinking water | 4/92 | | 167.0 | | | | | | | |
| | Ufa; Dem; drinking water | 4/92 | N | 83.5 | | | | | | | |
| | Chapaevsk; Artesian drinking water | 6–9/92 | | 20.3 | 31.3 | | 18.0 | 16.7 | 235 | 55.7 | |
| | Ufa, Chapaevsk; river water | 3–6/90 | | | | | | | 25 000 | 760 000 | |
| Khamitov & Maystrenko (1995) | Ufa; drinking water | 90 | N | No isomer-specific information | | | | | | | 0.5–1.0 |
| | Belaja river; river water | 90 | | No isomer-specific information | | | | | | | 2.3–5.7 |
| | Belaja river/Ufa; river water | 90 | | No isomer-specific information | | | | | | | 1.7–6.0 |
| | Ufa river/w.i.; river water | 90 | | No isomer-specific information | | | | | | | 0.6–1.0 |
| | Inzer river; river water | 90 | | No isomer-specific information | | | | | | | 1.8 |
| | Zilim river; river water | 90 | | No isomer-specific information | | | | | | | 0.2 |
| **Sweden** | | | | | | | | | | | |
| Rappe *et al.* (1989b) | Bälinge, Uppsala; | | ABIS | | | | | | | | |
| | MWTP, in | 1 87 | | < 1.2 | < 3.6 | < 7 | < 5 | < 5 | 62 | 730 | |
| | MWTP, out | 1 87 | | < 0.26 | < 0.77 | < 2 | < 1.5 | < 1.5 | 2.8 | 14 | |
| | Henriksdal, Stockholm; | | | | | | | | | | |
| | MWTP, in | 1 87 | | < 1.6 | < 4.8 | < 9 | < 14 | < 20 | 70 | 620 | |
| | MWTP, out | 1 87 | | < 0.28 | < 0.70 | < 2 | < 3 | < 4 | < 6.1 | 39 | |

**Table 2 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (pg/L; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Sweden (contd)** | | | | | | | | | | | | |
| Rappe *et al.* (1989b) (contd) | Järnsjön; Eman river | 1 | 87 | ABIS | < 0.024 | < 0.039 | 0.054 | 0.120 | 0.075 | 0.300 | 2.000 | |
| | Fliseryd; Eman river | 1 | 87 | | < 0.020 | < 0.025 | < 0.014 | < 0.013 | < 0.015 | 0.150 | 0.790 | |
| | Filtered water; Eman river | 1 | 87 | | < 0.023 | < 0.019 | < 0.027 | < 0.024 | < 0.029 | 0.057 | 0.170 | |
| | Blank; Laboratory | 1 | 87 | | < 0.039 | < 0.034 | < 0.045 | < 0.040 | < 0.049 | < 0.083 | 0.180 | |
| Rappe *et al.* (1990a) | Ringhals, in; sea cooling water | 1 | 89 | ABIS | < 0.005 | < 0.003 | 0.011 | 0.0047 | 0.0054 | 0.110 | 0.620 | 0.0083 |
| | Ringhals, out; sea cooling water | 1 | 89 | | < 0.005 | < 0.003 | < 0.006 | 0.0067 | < 0.005 | 0.070 | 0.240 | 0.0075 |
| | Ringhals, in; sea cooling water | 1 | 89 | | 0.0019 | 0.0009 | 0.0011 | 0.0015 | < 0.002 | 0.030 | 0.185 | 0.0057 |
| | Ringhals, out; sea cooling water | 1 | 89 | | 0.0026 | 0.0004 | < 0.002 | 0.0023 | 0.0012 | 0.031 | 0.154 | 0.0063 |
| | River Ljusnan | 3 | 89 | | 0.001–0.0021 | 0.0037–0.0048 | 0.0018–0.0022 | 0.018–0.021 | 0.0093–0.017 | 0.059–0.110 | 0.140–0.170 | 0.013–0.017 |
| | River Ljungan | 1 | 89 | | 0.0031 | < 0.0004 | < 0.0006 | 0.0046 | 0.0027 | 0.036 | 0.140 | 0.014 |
| | Drinking water | 1 | 89 | | 0.0005 | < 0.0005 | < 0.0008 | 0.001 | < 0.0009 | 0.0044 | 0.017 | 0.0029 |
| **United States** | | | | | | | | | | | | |
| Meyer *et al.* (1989) | Lockport; Finished water, S | 1 | 8/86 | AC/BOS | < 1.0 | < 1.8 | | < 0.9 | | < 0.9 | 5.0 | |
| | Finished water, PB | 1 | | | < 0.7 | < 1.6 | | < 0.6 | | < 0.5 | 3.6 | |

**Table 2 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (pg/L; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **United States (contd)** | | | | | | | | | | | | |
| Meyer *et al.* (1989) (contd) | Blank; Distilled water, soluble | 1 | 9/86 | | < 1.1 | < 3.9 | | < 1.2 | | < 1.4 | 6.5 | |
| | Distilled water; PB | 1 | | | < 1.0 | < 3.9 | | < 0.9 | | < 0.8 | 2.3 | |
| | Lockport; Finished water, S | 1 | 2/88 | | < 3.8 | < 4.9 | | < 6.3 | | < 12 | < 23 | |
| | Finished water, PB | 1 | | | < 4.0 | < 4.8 | | < 6.0 | | < 9.4 | < 19 | |
| | Lockport; Finished water, S | 1 | 8/88 | | < 3.4 | < 3.9 | | < 4.7 | | < 6.8 | 31 | |
| | Finished water, PB | 1 | | | < 2.6 | < 3.8 | | < 4.4 | | < 5.4 | 15 | |
| | 19 other locations; Finished water, S | 19 | 86–87 | | ND (0.4–2.6) | ND (1.2–7.4) | | ND (0.4–3.6) | | ND (0.4–6.1) | ND (0.9–15) | |
| | Finished water, PB | 19 | | | ND (0.3–2.0) | ND (1.0–8.9) | | ND (0.5–4.1) | | ND (0.4–15.4) | ND (0.9–69) | |

Analytical methods: A, high-resolution gas chromatography; B, high-resolution mass spectrometry; C, low-resolution mass spectrometry; I, isomer-specific; O, others; N, no information; S, sophisticated clean-up; R, reduced clean-up; W, WHO-accepted laboratory
ND, not detected; w.i., water intake; NG, not given
Data presented are means. Figures in parentheses are ranges. Levels of congeners not detected at known detection limits (for examples, 0.02 pg/m$^3$) are presented as < 0.02
S, soluble; PB, particle bound; d, water dissolved; MWTP, municipal water treatment plant

**Table 3. Concentrations of PCDDs in soil**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (ng/kg; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Australia** | | | | | | | | | | | | |
| Sund *et al.* (1993) | Melbourne; | | | ABSN | | | | | | | | |
| | Park; urban area | 1 | 90 | | ND | | No further isomer-specific information | | | | 1200 | 2.1 |
| | Near Tullamarine tip; industrial area | 1 | 90 | | ND | | No further isomer-specific information | | | | 1200 | 2.1 |
| | Near Maid-road; industrial area | 1 | 90 | | ND | | No further isomer-specific information | | | | 190 | 0.47 |
| | Near incinerator; industrial area | 1 | 90 | | ND | | No further isomer-specific information | | | | 230 | 0.09 |
| | Park; urban area | 1 | 90 | | ND | | No further isomer-specific information | | | | 2900 | 1.8 |
| | Gardens; urban area | 1 | 90 | | ND | | No further isomer-specific information | | | | 11 000 | 8.2 |
| | Near incinerator; industrial area | 1 | 90 | | ND | | No further isomer-specific information | | | | 1 000 | 1.0 |
| | Werribee farm; land filtration paddock | 1 | 90 | | 34 | | No isomer-specific information | | | | 75 000 | 520 |
| Buckland *et al.* (1994) | 300 m fr. road; burnt area | 1 | 94 | ABSI | | | No isomer-specific information | | | | | 2.2 |
| | 100 m fr. road; unburnt area | 1 | 94 | | | | No isomer-specific information | | | | | 3.1 |
| | 300 m fr. road; burnt area | 1 | 94 | | | | No isomer-specific information | | | | | 35.1/38.5 |
| | 5 m fr. road; unburnt area | 1 | 94 | | | | No isomer-specific information | | | | | 8.7 |
| | 1 km fr. highway; burnt area | 1 | 94 | | | | No isomer-specific information | | | | | 3.0 |
| | 5 m fr. highway; unburnt area | 1 | 94 | | | | No isomer-specific information | | | | | 10.0 |
| | High traffic; unburnt area, Sydney | 1 | 94 | | | | No isomer-specific information | | | | | 42.6 |
| **Austria** | | | | | | | | | | | | |
| Weiss *et al.* (1993, 1994) | Linz area; grassland; depth, 0–5 cm | 13 | < 93 | ABSI | | | No further isomer-specific information | | | | | [1.6–14.4] |

**Table 3 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (ng/kg; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Austria (contd)** | | | | | | | | | | | | |
| Riss *et al.* (1990) | Brixlegg (Tyrol) | | | | | | | | | | | |
| | 200m downwind | NG | 87 | | | | | | | | | 420[a] |
| | 400 m downwind | NG | 87 | | | | | No isomer-specific information | | | | |
| | 700 m downwind | NG | 87 | | | | | No isomer-specific information | | | | 170[a] |
| | | | | | | | | No isomer-specific information | | | | 46[a] |
| Boos *et al.* (1992) | Salzburg; | | | ACSI | | | | | | | | |
| | Meadow; urban emission | 1 | 90/91 | | ND | ND | ND | ND | ND | 7.3 | 19.4 | 2.3 |
| | Park; urban emission | 1 | 90/91 | | ND | ND | ND | ND | ND | 10.5 | 65.0 | 1.8 |
| | Traffic island; heavy traffic | 1 | 90/91 | | ND | 4.6 | 3.2 | 5.6 | 1.6 | 64.3 | 305 | 8.3 |
| | Meadow; urban emission | 1 | 90/91 | | ND | ND | 1.5 | 3.3 | 3.0 | 57.7 | 892 | 5.2 |
| | | 1 | 90/91 | | ND | ND | ND | 1.1 | ND | 45.5 | 328 | 1.8 |
| | | 1 | 90/91 | | ND | 1.1 | ND | 2.4 | ND | 38.9 | 270 | 3.9 |
| | | 1 | 90/91 | | ND | ND | 2.0 | 3.9 | 4.6 | 121.8 | 1022 | 4.5 |
| | Park; urban emission | 1 | 90/91 | | ND | ND | ND | ND | ND | 10.6 | 40.8 | 2.2 |
| | Meadow; cable proc. plant | 1 | 90/91 | | ND | ND | ND | ND | ND | 17.2 | 48.5 | 4.0 |
| | | 1 | 90/91 | | ND | ND | 0.8 | 1.8 | 1.6 | 13.8 | 29.4 | 6.9 |
| | | 1 | 90/91 | | ND | ND | ND | 1.8 | 1.6 | 16.2 | 57.2 | 3.5 |
| | Meadow; diffuse emission | 1 | 90/91 | | ND | ND | 1.1 | 1.1 | ND | 10.8 | 19.2 | 3.0 |
| | | 1 | 90/91 | | ND | ND | ND | ND | ND | 3.7 | 10.1 | 0.8 |
| | Diffuse emission, highway 100m | 1 | 90/91 | | ND | ND | ND | ND | ND | 3.9 | 13.2 | 0.6 |
| | Diffuse emission, highway 200m | 1 | 90/91 | | ND | ND | ND | ND | ND | 3.5 | 7.5 | 0.9 |
| | Steel foundry | 1 | 90/91 | | ND | ND | ND | ND | ND | 6.3 | 17.9 | 1.0 |
| | Steel foundry | 1 | 90/91 | | ND | ND | 0.4 | 0.9 | 1.1 | 5.9 | 17.7 | 1.8 |
| | Industry | 1 | 90/91 | | ND | 1.9 | ND | 2.3 | 2.5 | 13.6 | 28.7 | 3.7 |

**Table 3 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (ng/kg; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Austria (contd)** | | | | | | | | | | | | |
| Boos *et al.* (1992) (contd) | Meadow; Alpine background | 1 | 90/91 | | ND | ND | ND | ND | ND | 1.8 | 3.6 | 0.1 |
| | Urban outsk.; 2ndary Al Smelter | 1 | 90/91 | | ND | ND | 1.1 | 1.2 | 1.6 | 6.6 | 24.2 | 2.8 |
| | 2ndary Al Smelter | 1 | 90/91 | | ND | ND | 2.0 | 2.3 | 1.5 | 7.0 | 23.5 | 5.3 |
| | Diffuse emission | 1 | 90/91 | | ND | ND | 0.6 | 1.5 | 1.2 | 11.4 | 26.0 | 3.6 |
| | Meadow; highway 0.5 m | 1 | 90/91 | | ND | ND | 0.7 | 1.9 | 2.1 | 24.6 | 89.1 | 3.1 |
| | Industrial area; metal smelter | 1 | 90/91 | | ND | ND | ND | ND | ND | 92.0 | 241 | 11.5 |
| **Belgium** | | | | | | | | | | | | |
| Van Cleuven-bergen *et al.* (1993) | Mol; rural | | 92 | ABSI | | | | No isomer-specific information | | | | 2.14 |
| | Moerkerke; rural | | 92 | | | | | No isomer-specific information | | | | 2.27 |
| | Berendrecht; harbour Antwerp | | 92 | | | | | No isomer-specific information | | | | 3.81 |
| | Zelzate; industry, highway | | 92 | | | | | No isomer-specific information | | | | 8.94 |
| | Ham; industry, highway | | 92 | | | | | No isomer-specific information | | | | 2.72 |
| | Vilvoorde; industry, power plant | | 92 | | | | | No isomer-specific information | | | | 5.76 |
| **Brazil** | | | | | | | | | | | | |
| Krauss *et al.* (1995) | Amazone basin; rural | | < 95 | ABSI | | | | No isomer-specific information | | | | 0.02–0.4 |
| | Rio de Janeiro; industrial region | | < 95 | | | | | No isomer-specific information | | | | 3–654 |
| | Rio de Janeiro; recreation areas | | < 95 | | | | | No isomer-specific information | | | | 0.03–1.8 |
| | Cubatao; heavy industry | | < 95 | | | | | No isomer-specific information | | | | 11–341 |

**Table 3 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (ng/kg; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Canada** | | | | | | | | | | | | |
| McLaughlin *et al.* (1989) | Hamilton, Ontario; vicinity incinerator | 14 | 7/83 | ACSO | | | No further isomer-specific information | | | | 50–3 500 | |
| Pearson *et al.* (1990) | Hamilton; vicinity incinerator | 11 | 83 | | | | No further isomer-specific information | | | | 663 [ND–3 500] | |
| | Scarborough; vicinity incinerator | 12 | 87 | | | | No further isomer-specific information | | | | 570 [ND–1 500] | |
| | Ontario; rural soils | 1 | 83 | | | | No further isomer-specific information | | | | 810 | |
| | Rural soils | 26 | 87 | | | | No further isomer-specific information | | | | 30 [ND–100] | |
| | Rural soils | 15 | 88 | | | | No further isomer-specific information | | | | 3 [ND–45] | |
| | Rural soils | 1 | 88 | | | | No further isomer-specific information | | | | ND | |
| | Urban soils | 2 | 83 | | | | No further isomer-specific information | | | | 2 070 [940–3 200] | |
| | Urban soils | 11 | 87 | | | | No further isomer-specific information | | | | 1 461 [ND–11 000] | |
| | Urban soils | 15 | 88 | | | | No further isomer-specific information | | | | 3 402 [ND–1 600] | |
| | Urban soils | 1 | 88 | | | | No further isomer-specific information | | | | 220 | |
| **China** | | | | | | | | | | | | |
| Wu *et al.* (1995) | Ya-Er lake area; 1 | 1 | 91–94 | ACSI | ND | ND | ND | ND | ND | 0.49 | 14.6 | 0.11 |
| | Ya-Er lake area; 2 | 1 | 91–94 | ACSI | ND | ND | ND | ND | ND | 6.78 | 24.4 | 0.15 |
| **Czech Republic** | | | | | | | | | | | | |
| Zemek & Kocan (1991) | TCP prod. plant[b]; | | | ACSI | | | | | | | | |
| | East | 5 | 86 | | 10–400 | | No further isomer-specific information | | | | | |
| | North, intern.[b] | 10 | 86 | | 20–10 800 | | No further isomer-specific information | | | | | |
| | North, extern.[b] | 13 | 86 | | 20–2 200 | | No further isomer-specific information | | | | | |
| | West[b] | 18 | 86 | | ND–11 800 | | No further isomer-specific information | | | | | |
| | South[b] | 14 | 86 | | ND–1 300 | | No further isomer-specific information | | | | | |
| | Drum dump[b] | 33 | 86 | | ND–29 800 | | No further isomer-specific information | | | | | |
| **Finland** | | | | | | | | | | | | |
| Sandell & Tuominen (1993) | 0–20 cm; Sawmill soil | 14 | NG | ABSI | | | No isomer-specific information | | | | | 1 700–85 000[c] |
| | 20–50 cm; Sawmill soil | 14 | NG | | | | No isomer-specific information | | | | | 100–9 800[c] |

**Table 3 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (ng/kg; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Finland (contd)** | | | | | | | | | | | | |
| Assmuth & Vartiainen (1995) | Sawmill soil; depth 0–50 cm | 10 | NG | ABSI | 84–240 | ND | ND | 130–8 700 | ND–290 | 110–20 000 | 370–21 000 | |
| **Germany** | | | | | | | | | | | | |
| Rotard *et al.* (1987) | Soil waste; oil contamination | | NG | N | ND | – | ND | ND | ND | 300–1 200 | ND | |
| Schlesing (1989) | Herbicide plant; | | | ANSI | | | | | | | | |
| | Typical | | | | | | | | | | | |
| | Depth, 1 m | 1 | < 89 | | 6300 | | PnCDD-HpCDD, only totals reported | | | | 2 129 000 | |
| | Depth, 2 m | 1 | < 89 | | 5300 | | PnCDD-HpCDD, only totals reported | | | | 36 800 | |
| | Depth, 3 m | 1 | < 89 | | 12 700 | | PnCDD-HpCDD, only totals reported | | | | 29 000 | |
| | Depth, 4 m | 1 | < 89 | | 400 | | PnCDD-HpCDD, only totals reported | | | | 10 300 | |
| | Contaminated | | | | | | | | | | | |
| | Depth, 1 m | 1 | < 89 | | 166 000 | | PnCDD-HpCDD, only totals reported | | | | 349 000 | |
| | Depth, 2 m | 1 | < 89 | | 698 000 | | PnCDD-HpCDD, only totals reported | | | | 202 000 | |
| | Depth, 3 m | 1 | < 89 | | 54 900 | | PnCDD-HpCDD, only totals reported | | | | 164 000 | |
| | Depth, 4 m | 1 | < 89 | | 200 | | PnCDD-HpCDD, only totals reported | | | | 700 | |
| | Depth, 5 m | 1 | < 89 | | 400 | | PnCDD-HpCDD, only totals reported | | | | 2 500 | |
| | Depth, 6 m | 1 | < 89 | | 500 | | PnCDD-HpCDD, only totals reported | | | | 3 900 | |
| | Depth, 7 m | 1 | < 89 | | 98 200 | | PnCDD-HpCDD, only totals reported | | | | 931 000 | |
| | Depth, 8 m | 1 | < 89 | | 300 | | PnCDD-HpCDD, only totals reported | | | | 1 500 | |
| | Depth, 9 m | 1 | < 89 | | 400 | | PnCDD-HpCDD, only totals reported | | | | 300 | |
| Hagenmaier *et al.* (1992) | Rastatt; Cu smelter | | | ABSI | | | | | | | | |
| | Site 1 | 1 | 87 | | 2 | 4 | 3 | 8 | 8 | 62 | 400 | 30 |
| | | 1 | 89 | | 1 | 2 | 5 | 9 | 5 | 49 | 280 | 26 |
| | Site 2 | 1 | 87 | | 90 | 470 | 590 | 1 040 | 580 | 6 760 | 8 000 | 5 900 |
| | | 1 | 89 | | 90 | 540 | 550 | 950 | 540 | 6 770 | 6 600 | 5 110 |
| | Site 3 | 1 | 87 | | 10 | 60 | 60 | 100 | 60 | 760 | 1 600 | 600 |
| | | 1 | 89 | | 10 | 60 | 50 | 100 | 80 | 700 | 1 000 | 600 |
| | Site 4 | 1 | 87 | | 10 | 40 | 40 | 80 | 120 | 650 | 1 300 | 400 |
| | | 1 | 89 | | 10 | 50 | 70 | 110 | 70 | 820 | 1 100 | 510 |
| She & Hagenmaier (1996) | Rastatt; all samples[d] | 77 | 87 | ABSI | 7 [1–130] | 27 [2–1970] | 35 [1–2080] | 61 [4–3 680] | 48 [4–3 430] | 420 [31–22 400] | 800 [40–20 800] | 300 [12–14 500] |

**Table 3 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (ng/kg; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Germany (contd)** | | | | | | | | | | | | |
| Deister & Pommer (1991) | Schwabach | | | N | | | | | | | | |
| | 750 m from MSWI | 5 | < 91 | | | | | No isomer-specific information | | | | 0.2–4.3[a] |
| | 750 m from MSWI | 2 | < 91 | | | | | No isomer-specific information | | | | 3.7–14.5[a] |
| | 550 m from MSWI | 5 | < 91 | | | | | No isomer-specific information | | | | 0.2–4.1[a] |
| | 350 m from MSWI | 5 | < 91 | | | | | No isomer-specific information | | | | 0.6–4.4[a] |
| | 350 m from MSWI | 1 | < 91 | | | | | No isomer-specific information | | | | 20.7[a] |
| Unger & Prinz (1991) | B5 road, 43 000′; 0.1 m from road | | < 91 | NNSN | | | | No isomer-specific information | | | | 23.0 |
| | B3 road, 15 000′; 1.0 m from road | | < 91 | | | | | No isomer-specific information | | | | 2.6 |
| | B5 road, 43 000′; 1.0 m from road | | < 91 | | | | | No isomer-specific information | | | | 9.7 |
| | B31 road, 50 000′, 1.0 m from road | | < 91 | | | | | No isomer-specific information | | | | 44.8 |
| | B5 road, 43 000′; 2.5 m from road | | < 91 | | | | | No isomer-specific information | | | | 20.0 |
| | B5 road, 43 000′; 5.0 m from road | | < 91 | | | | | No isomer-specific information | | | | 2.6 |
| | B3 road, 15 000′, 10 m from road | | < 91 | | | | | No isomer-specific information | | | | 0.6 |
| | B5 road, 43 000′; 10 m from road | | < 91 | | | | | No isomer-specific information | | | | 1.0 |
| | B31 road, 50 000T′, 10 m from road | | < 91 | | | | | No isomer-specific information | | | | 2.5 |
| | B5 road, 43 000′; 25 m from road | | < 91 | | | | | No isomer-specific information | | | | 0.4 |
| | B5 road, 43 000′; 50 m from road | | < 91 | | | | | No isomer-specific information | | | | 0.4 |
| Theisen *et al.* (1993) | Kieselrot, Cu slag | | 92 | ABSI | 1800 | 8000 | 3800 | 4200 | 3900 | 78 300 | 530 000 | 64 500 |
| | Near Kieselrot, sports ground; garden soil | | 92 | | 4 | 26 | 8 | 14 | 11 | 439 | 3 450 | 154 |
| | Corresponding standard soil | | 92 | | < 0.5 | 1.4 | 0.7 | 2 | 2 | 26.8 | 170 | 3.8 |

**Table 3 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (ng/kg; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Germany (contd)** | | | | | | | | | | | | |
| McLachlan & | Bavaria; | | | ACSI | | | | | | | | |
| | Field 1; no sludge[f] | 1 | 89 | | 0.04 | 0.14 | 0.12 | 0.28 | 0.21 | 3.3 | 9.4 | 0.84[a] |
| Reissinger (1990) | Field 2; sludge for 10 y[f] | 1 | 89 | | 0.05 | 0.47 | 0.76 | 5.0 | 2.7 | 44 | 100 | 3.7[a] |
| | Field 3; sludge for 30 y[f] | 1 | 89 | | 0.16 | 1.1 | 2.1 | 17.0 | 8.2 | 130 | 250 | 9.4[a] |
| | Meadow; Sludge for 30 y[b] | 1 | 89 | | 0.24 | 1.9 | 3.9 | 25 | 13 | 200 | 360 | 15[a] |
| | Sewage sludge | 1 | 89 | | 1.1 | 4.9 | 4.9 | 31 | 20 | 910 | 4 400 | 42[a] |
| Rotard *et al.* (1994) | Ploughland | 14 | < 94 | ACSI | ND | ND | 1.2 [0.8–1.4] | 1.5 [1.1–1.8] | 2.0 [1.6–2.4] | 9.1 [4.1–21.9] | 32 [7.4–88] | 1.7 [0.3–3.7] |
| | Grassland | 7 | < 94 | | ND | 0.4 [0.4–0.4] | ND [ND] | 1.9 [1.4–2.9] | 1.7 [1.7–1.7] | 14.6 [7.1–35] | 44 [26–87] | 2.3 [0.4–4.8] |
| | Deciduous forest | 9 | < 94 | | 1.4 [0.5–3.0] | 8.3 [1.1–29] | 6.5 [1.5–20.9] | 12.4 [3.1–49] | 19.1 [3.6–82] | 121 [23–399] | 283 [60–759] | 38 [5.9–102] |
| | Coniferous forest | 11 | < 94 | | 1.3 [ND–4.0] | 5.1 [ND–8.9] | 5.8 [2.1–14] | 11.1 [3.7–29] | 16.2 [5.3–54] | 109 [36–272] | 320 [100–692] | 37 [11.1–112] |
| Kujawa *et al.* (1995) | Brandenburg; Rural | 49 | < 94 | ACSN | No isomer-specific information | | | | | | | 1–54 |
| **Italy** | | | | | | | | | | | | |
| di Domenico *et al.* (1993b) | Sea level | 10 | 91 | ACSI | 0.025+ | 0.045 | 0.068 | 0.11 | 0.23 | 2.2 | 15 | |
| | Alt. 800–1300 m | 11 | 91 | | 0.036+ | 0.084 | 0.074 | 0.18 | 0.32 | 3.6 | 29 | |
| | Caves | 6 | 91 | | 0.025+ | 0.030+ | 0.038+ | 0.038+ | 0.038+ | 0.11 | 2.5 | |
| **Japan** | | | | | | | | | | | | |
| Nakamura *et al.* (1994) | Agricultural field | 1 | NG | ABSI | No isomer-specific information | | | | | | | 271 |
| | Agricultural field | 1 | NG | | No isomer-specific information | | | | | | | 49.6 |
| | Urban field | 1 | NG | | No isomer-specific information | | | | | | | 42.4 |

**Table 3 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (ng/kg; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Jordan** | | | | | | | | | | | | |
| Alawi *et al.* (1996a) | Landfill,Amman | | | ACSI | | | | | | | | |
| | Sample 1 | 1 | 95 | | < 10 | 343 | 536 | 733 | 567 | 3 960 | 3250 | 1 470[a] |
| | Sample 2 | 1 | 95 | | < 10 | 87 | 85 | 132 | 98 | 1390 | 3 510 | 323[a] |
| | Sample 3 | 1 | 95 | | < 10 | 37 | 48 | 86 | 56 | 453 | 474 | 122[a] |
| | Sample 4 | 1 | 95 | | < 10 | 36 | 31 | 50 | 34 | 210 | 202 | 192[a] |
| | Sample 5 | 1 | 95 | | < 10 | 30 | 16 | 35 | 22 | 428 | 544 | 111[a] |
| | Sample 6 | 1 | 95 | | < 10 | < 10 | < 10 | < 10 | < 10 | 66 | 154 | 8.2[a] |
| **The Netherlands** | | | | | | | | | | | | |
| van Wijnen *et al.* (1992) | Scrap car dealer | 4 | 6/88 | ACSI | ND | ND–110 | ND–12 | 30–80 | 24–88 | 290–820 | 790–3 600 | 60–160 |
| | Cable burning | 3 | 6/88 | | ND–1100 | 67–2 000 | 0–2 100 | 91–6 800 | 130–3 400 | 550–25000 | 860–17 000 | 380–16 000 |
| | Scrap metal dealer, cable burning | 1 | 6/88 | | 170 | 590 | 72 | 460 | 280 | 21000 | 89 000 | 1600 |
| | | 2 | 6/88 | | ND | ND | ND | ND | ND | 950–14 000 | 4 600–5 000 | 230–800 |
| | Scrap car and open air cable burning | 4 | 6/88 | | 130–840 | 350–2 200 | ND–1 200 | 360–3400 | 320–2 800 | 900–14 000 | 1 100–10 000 | 1 200–9 900 |
| | | 3 | 6/88 | | 2100–3400 | 6 800–8 800 | 8 100–14 000 | 30 000–33 000 | 20 000–28 000 | 150 000–200 000 | 140 000–370 000 | 72 000–98 000 |
| | | 3 | 6/88 | | 190–240 | 100–930 | 610–1 900 | 1 900–4 800 | 1 300–3 400 | 13 000–37 000 | 8 500–730 000 | 4 100–12 000 |
| **Russian Federation** | | | | | | | | | | | | |
| Pervunina *et al.* (1992) | Bashkiriya; Chlorophenol, 2,4-D production site | 3 | NG | ACSI | 900–40 000 | | | No further isomer-specific information | | | | |
| | Moscow region; TCP production site | 2 | NG | | 1 000–4 800 | | | No further isomer-specific information | | | | |
| | Samara region; PCP production site | 1 | NG | | 18 700 | | | No further isomer-specific information | | | | |
| Fedorov (1993) | Chapaevsk | | | N | | | | | | | | |
| | Soil, near sect. 23 | 1 | 10/90 | | 18 700 | | | Only total reported | | | – | |
| | Street dust | 1 | 6/91 | | 0.2 | | | Only total reported | | 660 | 2 000 | |
| | Farming area | 1 | 6/91 | | – | | | Only total reported | | 34 | 120 | |
| | Farming area | 1 | 7/92 | | – | | | Only total reported | | | 9 600 | |
| | Potato field | 1 | 7/92 | | 68 | | | Only total reported | | | 13 300 | |

**Table 3 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (ng/kg; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Russian Federation (contd)** | | | | | | | | | | | | |
| Fedorov (1993) (contd) | Chapaevsk; rest zone Incinerator Ufa | 1 | 7/92 | | 56 | | Only total reported | | | 76 | 256 | |
| | Near sect. N 15 | | 10/90 | | 8 000 | 1 230 | | | 1 900 | 56 000 | 18 100 | |
| | Near sect. N 11 | | 10/90 | | 40 000 | 9 000 | | | 4 300 | 10 200 | 29 000 | |
| Fedorov *et al.* (1993) | Chapaevsk; CFP on site | 3 | 92–93 | ACNN | 20–3 000 | | | Only total reported | | | 30 000–134 000 | 100–46 200 |
| | 1.5 km from CFP | 2 | 92–93 | | < 1–7.5 | | | Only total reported | | | 3 900–64 000 | 50–298 |
| | 2 km from CFP | 1 | 92–93 | | 1.5 | | | Only total reported | | | 13 000 | 40 |
| | 3 km from CFP | 1 | 92–93 | | < 1 | | | Only total reported | | | 4 800 | 30 |
| | 6 km from CFP | 1 | 92–93 | | < 1 | | | Only total reported | | | 4 310 | 14 |
| | 7 km from CFP | 1 | 92–93 | | < 1 | | | Only total reported | | | 960 | 10 |
| | 8 km from CFP | 1 | 92–93 | | < 1 | | | Only total reported | | | 200 | 4 |
| | 12 km from CFP | 1 | 92–93 | | < 1 | | | Only total reported | | | < 5 | < 4 |
| **Spain** | | | | | | | | | | | | |
| Jiménez *et al.* (1996a) | Madrid; | | | ABSO | | | | | | | | |
| | SW, 400 m fr. CWI | 1 | 93 | | 0.98 | 0.23 | – | 0.23 | – | 1.60 | 6.52 | 2.28 |
| | SE, 1200 m fr. CWI | 1 | 93 | | 1.51 | 0.53 | 0.42 | 1.18 | 1.53 | 26.24 | 136.7 | 4.11 |
| | NE, 600 m fr. CWI | 1 | 93 | | ND | 0.31 | 0.15 | 0.36 | ND | 4.28 | 20.4 | 1.85 |
| | NW, 1200 m fr. CWI | 1 | 93 | | – | 0.36 | – | – | – | 1.73 | 6.84 | 1.36 |
| | W, 2000 m fr. CWI | 1 | 93 | | 0.89 | ND | ND | ND | ND | 2.07 | 8.76 | 1.99 |
| | SW, 2000 m fr. CWI | 1 | 93 | | 2.62 | 1.04 | 1.27 | 2.92 | 4.05 | 34.6 | 171.3 | 11.4 |
| | N, 2000 m fr. CWI | 1 | 93 | | ND | 0.14 | 0.13 | 0.21 | 0.29 | 1.75 | 9.42 | 0.69 |
| | S, 1200 m fr. CWI | 1 | 93 | | – | – | 0.15 | 0.30 | 0.61 | 1.74 | 7.43 | 2.03 |
| | NE, 2600 m fr. CWI | 1 | 93 | | 0.13 | 0.24 | 0.21 | 0.32 | 0.39 | 2.93 | 15.7 | 1.23 |
| | NE, 2600 m fr. CWI | 1 | 93 | | 1.03 | 0.37 | 0.27 | 0.43 | 0.57 | 3.64 | 24.9 | 2.59 |
| | NE, 2600 m fr. CWI | 1 | 93 | | 0.10 | 0.30 | 0.18 | 0.40 | 0.52 | 3.66 | 21.9 | 1.83 |
| | NE, 3000 m fr. CWI | 1 | 93 | | ND | 0.26 | 0.15 | 0.32 | 0.46 | 3.75 | 17.5 | 1.52 |
| | NE, 3000 m fr. CWI | 1 | 93 | | 0.13 | 0.20 | 0.08 | 0.20 | 0.25 | 2.54 | 23.01 | 0.82 |
| | NE, 3000 m fr. CWI | 1 | 93 | | ND | 0.16 | 0.10 | 0.21 | 0.25 | 1.58 | 7.01 | 0.82 |
| | Control; NW, 4500 m fr. CWI | 1 | 93 | | ND | ND | 0.13 | 0.32 | 0.48 | 1.36 | 5.93 | 0.71 |

**Table 3 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (ng/kg; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Spain (contd)** | | | | | | | | | | | | |
| Jiménez *et al.* (1996a) (contd) | Madrid, control; NE, 4500 m fr. CWI | 1 | 93 | ABSO | 0.07 | 0.16 | 0.06 | 0.16 | 0.32 | 1.52 | 8.85 | 0.69 |
| Schuhmacher *et al.* (1996) | Tarragona; | | | ABSO | | | | | | | | |
| | 250 m fr. MSWI | 6 | < 96 | | ND | 0.10 | 0.05 | 0.09 | 0.17 | 2.12 | 234.1 | 0.48 |
| | 500 m fr. MSWI | 6 | < 96 | | 0.03 | 0.06 | 0.12 | 0.22 | 0.15 | 3.39 | 23.1 | 0.36 |
| | 750 m fr. MSWI | 6 | < 96 | | 0.01 | 0.11 | 0.18 | 0.26 | 0.35 | 6.67 | 54.8 | 0.84 |
| | 1000 m fr. MSWI | 6 | < 96 | | 0.02 | 0.09 | 0.08 | 0.14 | 0.21 | 1.72 | 7.62 | 0.53 |
| | NE fr. MSWI | 8 | < 96 | | 0.03 | 0.06 | 0.07 | 0.08 | 0.11 | 0.69 | 2.27 | 0.23 |
| | SE fr. MSWI | 8 | < 96 | | 0.04 | 0.08 | 0.23 | 0.45 | 0.23 | 8.11 | 60.0 | 0.63 |
| | SE fr. MSWI | 8 | < 96 | | – | 0.05 | 0.07 | 0.13 | 0.12 | 1.37 | 7.06 | 0.23 |
| **Sweden** | | | | | | | | | | | | |
| Rappe *et al.* (1991b) | Plant B; soil I | 1 | 90 | ABSI | < 10 | < 11 | < 2.8 | < 13 | < 2.4 | 33 | 160 | 11 000[b] |
| | Plant B; soil II | 1 | 90 | | < 7 | < 11 | < 3.3 | < 6.9 | < 2.2 | 69 | 400 | 870[b] |
| | Outside plant B Grassfield; soil III | 1 | 90 | | < 0.1 | < 0.1 | 0.2 | 0.3 | 0.3 | 4.1 | 25 | 5.3[b] |
| | Plant B; soil IV | 1 | 90 | | < 0.1 | < 0.1 | < 0.2 | 3.6 | 2 | 81 | 820 | 440[b] |
| | Plant B; soil V | 1 | 90 | | < 0.4 | < 0.4 | < 0.8 | < 0.7 | < 0.8 | 1.5 | 30 | 96[b] |
| | Plant B; $Cl_2$ prod.; soil VI | 1 | 90 | | < 0.5 | < 0.5 | < 1.2 | 21 | 9.9 | 6.8 | 49 | 1 400[b] |
| **Taiwan** | | | | | | | | | | | | |
| Huang *et al.* (1992) | Electric wire | 1 | 89 | ABSI | 17 | 64 | 25 | 81 | 20 | 607 | 37 | |
| | incinerator site | 1 | 89 | | 2 | 249 | 242 | 289 | 242 | 2162 | 5 | |
| | Mainly magnetic card | 1 | 89 | | ND | ND | 1 | – | – | 8 | 1 | |
| | incinerator site | 1 | 89 | | ND | ND | ND | ND | ND | ND | ND | |
| | | 1 | 89 | | 8 | 4 | – | 2 | 2 | 9 | – | |
| | | 1 | 89 | | ND | ND | ND | ND | ND | 1 | – | |
| Soong & Ling (1996) | PCP production plant | 1 | < 96 | ACSO | 19 | 69 | 192 | 794 | 375 | 39530 | 433 900 | 2 150 |
| | site | 1 | < 96 | | 2646 | 28850 | 50 770 | 1 337 000 | 130 600 | 23 670 000 | 206 900 000 | 1 357 000 |

**Table 3 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (ng/kg; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **United Kingdom** | | | | | | | | | | | | |
| Kjeller *et al.* (1991) | Rothamsted (semi-rural); | 1 | 1846 | ABSI | 0.048 | 0.13 | 0.18 | 0.31 | 0.28 | 2.8 | 13 | |
| | Archived samples | 1 | 1856 | | 0.033 | 0.09 | 0.13 | 0.12 | 0.14 | 1.2 | 7.8 | |
| | (0–23 cm depth) | 1 | 1893 | | 0.029 | 0.09 | 0.12 | 0.1 | 0.13 | 1.5 | 11 | |
| | | 1 | 1914 | | 0.040 | 0.11 | 0.16 | 0.23 | 0.18 | 2.0 | 11 | |
| | | 1 | 1944 | | 0.043 | 0.18 | 0.21 | 0.20 | 0.17 | 1.8 | 12 | |
| | | 1 | 1956 | | 0.049 | 0.18 | 0.26 | 0.46 | 0.34 | 3.5 | 13 | |
| | | 1 | 1966 | | 0.060 | 0.22 | 0.29 | 0.52 | 0.51 | 5.3 | 32 | |
| | | 1 | 1980 | | 0.079 | 0.20 | 0.30 | 0.67 | 0.41 | 4.6 | 20 | |
| | | 1 | 1986 | | 0.058 | 0.27 | 0.31 | 0.57 | 0.48 | 6.3 | 25 | |
| Creaser *et al.* (1989) | 50 km grid UK; All samples | 77 | < 89 | ABSI | < 0.5 [< 0.5–6.4] | < 0.5 [< 0.5–7.8] | | Only totals reported | | | 277 [29–1365] | |
| | Reduced data-set | 65 | < 89 | | < 0.5 [0.5–2.1] | < 0.5 [0.5–2.4] | | Only totals reported | | | 191 [29–832] | |
| Creaser *et al.* (1990) | Urban soils (5 cities) | 19 | < 90 | ABSI | 0.7 [< 0.5–4.2] | 2.4 [< 0.5–11] | | Only totals reported | | | 9980 [176–99 000] | |
| Stenhouse & Badsha (1990) | Different semi-urban sites | 12 | 90 | ABSO | 3 [1–7] | < 1 [< 1–1] | | 4 [2–8] | | 33 [10–61] | 58 [20–150] | 8 [3–20] |
| Foxall & Lovett (1994) | South Wales; close to incinerator plant | 42 | 91/93 | N | | | | | | | | 66 [2.5–1745] |
| **United States** | | | | | | | | | | | | |
| Kimbrough *et al.* (1977) | E. Missouri; | | | N | | | | | | | | |
| | Horse arena A | | 8/71 | | $31.8–33 \times 10^6$ | | | No further isomer-specific information | | | | |
| | Arena A (excavated) | | 8/74 | | None | | | No further isomer-specific information | | | | |
| | Arena C | | 8/74 | | 0.22–0.85 $\times 10^6$ | | | No further isomer-specific information | | | | |
| | Farmroad soil | | 9/74 | | $0.61 \times 10^6$ | | | No further isomer-specific information | | | | |

**Table 3 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (ng/kg; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **United States (contd)** | | | | | | | | | | | | |
| Viswanathan *et al.* (1985) | E. Missouri; Denney's farm | 27 | NG | ACSO | $46 \times 10^6$–$9.6 \times 10^9$ | | | | No further isomer-specific information | | | |
| | Other sites | 22 | NG | | 2 200–1 500 000 | | | | No further isomer-specific information | | | |
| Nestrick *et al.* (1986) | Dow, Midland; | | | ACSI | | | | | | | | |
| | Chlorophenol prod. area, top soil | | 83 | | 41–5 200 | | | | No further isomer-specific information | | | |
| | Waste incinerator area, top soil | 10 | 83 | | 18–4 300 | | | | No further isomer-specific information | | | |
| | Background, top soil | 11 | 83 | | 6.5–590 | | | | No further isomer-specific information | | | |
| | Various; Industrial areas of US cities, top soil | 20 | 83 | | < 0.2–9.4 | | | | No further isomer-specific information | | | |
| Reed *et al.* (1990) | Elk River, MI | | | ABSI | | | | | | | | |
| | Site 1 untilled[g] | 1 | 9/88 | | ND | ND | ND | 14 | 9.9 | 300 | 2300 | |
| | Site 1 tilled[g] | 1 | 9/88 | | ND | ND | ND | ND | ND | 37 | 340 | |
| | Site 2 untilled[g] | 1 | 9/88 | | ND | ND | ND | ND | ND | 78 | 680 | |
| | Site 2 tilled[g] | 1 | 9/88 | | ND | ND | ND | ND | 8.7 | 360 | 3 300 | |
| Rappe *et al.* (1995) | S. Mississippi; rural | 36 | 94 | ABSI | | | No further isomer-specific information | | | | Range: 11–15 000 | 3.14 [0.08–22.6] |
| Lorber *et al.* (1996b) | Columbus, OH; MSWI, on site | 4 | 95 | ABSI | 29 | 180 | 143 | 138 | 202 | 765 | 1495 | |
| | MSWI, downwind off site | 4 | 95 | | 4 | 18 | 16 | 26 | 28 | 459 | 3893 | |
| | City of Columbus; urban | 14 | 95 | | 2 | 3 | 3 | 6 | 6 | 112 | 892 | |
| | Ohio; Rural | 3 | 95 | | 0.4 | 0.1 | 0.4 | 0.8 | 1.2 | 18 | 161 | |

**Table 3 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | Anal. meth. | PCDD concentration (ng/kg; ppt) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Viet Nam** | | | | | | | | | | | | |
| Matsuda *et al.* (1994) | Hanoi; background | 5 | 89–91 | ACSI | ND | | No further isomer-specific information | | | | 66.3–578 | |
| | Hue, Phu Loc; sprayed area | 6 | 89–91 | | 4.37–16.8 | | No further isomer-specific information | | | | 72.8–1 318 | |
| | Ho Chi Minh; sprayed area | 9 | 89–91 | | 2.98–59.2 | | No further isomer-specific information | | | | 317–1 865 | |
| | Tay Ninh; sprayed area | 54 | 89–91 | | 1.2–38.5 | | No further isomer-specific information | | | | 17–16 000 | |
| | Song Be; sprayed area | 11 | 89–91 | | 6.0 | | No further isomer-specific information | | | | 11–880 | |
| | Tam Nong; sprayed area | 4 | 89–91 | | – | | No further isomer-specific information | | | | 69 | |
| | Dog Bin Kieu; sprayed area | 6 | 89–91 | | – | | No further isomer-specific information | | | | 180–380 | |
| | Ca Mau; sprayed area | 16 | 89–91 | | – | | No further isomer-specific information | | | | 210–900 | |

Analytical methods: A, high-resolution gas chromatography; B, high-resolution mass spectrometry; C, low-resolution mass spectrometry; I, isomer-specific; O, others; N, no information; S, sophisticated clean-up; R, reduced clean-up; W, WHO-accepted laboratory

ND, not detected, detection limit in parentheses; [ ], range; +, contains 50% of detection limit

Data presented are means. Figures in parentheses are ranges. Levels of congeners not detected at known detection limits (for examples, 0.02 pg/m$^3$) are presented as < 0.02

S, soluble; PB, particle bound; MWTP, municipal water treatment plant; CFP, chemical fertilizer plant; CWI, clinical waste incinerator; MSWI, municipal solid-waste incinerator; NG, not given

[a] German TEQ

[b] Sample depth, 0–20 cm

[c] Nordic TEQ

[d] Median values

[e] Cars per day

[f] Sample depth: 0–30 cm

[g] Sample depth, 0–2.5 cm

**Table 4. PCDD/PCDFF content in various materials from different areas of Brazil**

| Area | Material | ng I-TEQ/kg |
|---|---|---|
| Amazon basin | | |
| Eucalipto (eucalyptus trees) | Leaves ($n = 5$) | 0.19 |
| | < 2 mm ($n = 3$)[a] | 0.04 |
| | Soil ($n = 2$) | 0.4 |
| Capoeira (wood cut) | Leaves ($n = 5$) | 0.07 |
| | < 2 mm ($n = 3$) | 0.08 |
| | Soil ($n = 3$) | 0.05 |
| Mata natural 1 (natural forest) | Leaves ($n = 5$) | 0.03 |
| | < 2 mm ($n = 3$) | 0.1 |
| | Soil ($n = 2$) | 0.05 |
| Mata natural 2 (natural forest) | Leaves ($n = 5$) | 0.02 |
| | < 2 mm ($n = 3$) | 0.02 |
| | Soil ($n = 2$) | 0.03 |
| Mata degradada (new-grown forest) | Leaves ($n = 5$) | 0.03 |
| | < 2 mm ($n = 3$) | 0.05 |
| | Soil ($n = 2$) | 0.1 |
| Rio de Janeiro – industrial regions | | |
| Niterói, hospital waste incineration | Soil (from plant) | 23 |
| | Soil (street nearby) | 73 |
| | Soil (reference) | 3 |
| São Gonçalo, metal industry | Soil (nearby) | 35 |
| | Soil (outer wall) | 15 |
| Santa Cruz, iron industry | Sludge | 21 |
| | Soil | 27 |
| | Leaves | 77 |
| | Soil beyond leaves | 654 |
| Rio de Janeiro – recreation areas | | |
| Itaipuaçu | Leaves | 2.6 |
| | 1. Soil layer | 0.6 |
| | 2. Soil layer | 1.8 |
| Serra de Mauá | Leaves | 0.6 |
| | Soil | 0.4 |
| Saquarema | Leaves | 0.4 |
| | Soil (sand) | 0.03 |
| Cubatão, São Paulo – industrial region | | |
| Ultrafertil (fertilizer production) | Leaves | 10 |
| | Soil | 11 |
| Eletropaulo (chlorochemistry plant) | Leaves | 12 |
| | Soil | 54 |
| Carbocloro (chlorochemistry plant) | Leaves | 49 |
| | Soil | 341 |

From Krauss *et al.* (1995)

[a] Fraction < 2 mm (detritus plus soil particles)

**Table 5. Concentrations of PCDDs/PCDFs in soil samples from former East and West Germany (ng I-TEQ/kg)**

| Soil type | East | West |
|---|---|---|
| For defined emitters — traffic, incinerators, landfills | 2–14 | 1–160 |
| Diffuse sources — green land, parks, playgrounds | 1–9 | 0.8–1594 |
| Background — forest soils, forest litter, green land | 1–54 | 0.01–140 |

From Kujawa *et al.* (1995)

**Table 6. 2,3,7,8-TCDD soil levels (in ng/kg) in the City of Midland, MI**

| | Range |
|---|---|
| Chlorophenol production site | |
| Locally elevated level area 1 | 52–52 000 |
| Locally elevated level area 2 | 1000–34 000 |
| Other sites | 41–1 100 |
| Chemical plant | |
| Waste incinerator site | 18–4 300 |
| Background area | ND–590 |
| City of Midland | |
| Close to chemical plant | 22–450 |
| Further from chemical plant | 0.6–9.2 |

From Nestrick *et al.* (1986)
ND, not detected

**Table 7. 2,3,7,8-TCDD soil levels in industrialized areas of US cities (ng/kg)**

| | | | |
|---|---|---|---|
| Lansing, MI ($n = 2$) | ND (0.8)–3 | Pittsburgh, PA | 2.6 |
| Gaylord, MI | ND (0.2) | Marcus Hook, PA | 0.4 |
| Detroit, MI ($n = 2$) | 2.1–3.6 | Philadelphia, PA | 0.9 |
| Chicago, IL ($n = 2$) | 4.2–9.4 | Clifton Heights, PA | ND (0.4) |
| Middletown, OH ($n = 2$) | ND (0.3) | Brooklyn, NY | 2.6 |
| Barberton, OH | 5.6 | South Charleston, WV | ND (0.4) |
| Akron, OH | 6.3 | Arlington, VA | ND (0.4) |
| Nashville, TN | 0.8 | Newport News, VA | 0.4 |

From Nestrick *et al.* (1986)
ND, not detected; detection limits in parentheses

**Table 8. PCDD/PCDF concentrations in Mississippi (USA) soil samples (ng/kg dry matter)**

| County | OCDD | I-TEQ | County | OCDD | I-TEQ | County | OCDD | I-TEQ |
|---|---|---|---|---|---|---|---|---|
| George | 36 | 0.16 | Jones | 4 000 | 20.30 | Perry | 140 | 0.52 |
| Jackson | 98 | 0.42 | Jones | 590 | 1.31 | Perry | 18 | 0.17 |
| Jackson | 67 | 0.38 | Jones | 13 000 | 14.30 | Wayne | 39 | 0.17 |
| Jackson | 34 | 0.31 | Jones | 1 200 | 2.81 | Wayne | 210 | 7.15 |
| Jackson | 29 | 0.37 | Lamar | 110 | 0.64 | Wayne | 2 400 | 3.41 |
| Jackson | 20 | 0.27 | Lamar | 174 | 0.55 | Wayne | 11 | 0.08 |
| Forrest | 4 300 | 10.90 | Lamar | 500 | 1.42 | Wayne | 880 | 1.66 |
| Forrest | 260 | 1.12 | Lamar | 140 | 0.36 | Greene | 51 | 0.20 |
| Forrest | 200 | 1.05 | Lamar | 37 | 0.15 | Greene | 410 | 1.03 |
| Forrest | 450 | 0.93 | Perry | 7 100 | 8.09 | Greene | 3 500 | 5.26 |
| Forrest | 110 | 0.25 | Perry | 1 200 | 2.75 | Greene | 36 | 0.18 |
| Jones | 260 | 0.90 | Perry | 15 000 | 22.60 | Greene | 75 | 0.37 |

I-TEQ: Mean 3.14 Min 0.08
Median 0.77 Max 22.60

From Fiedler *et al.* (1995); Rappe *et al.* (1995)

## Table 9. Concentrations of PCDDs in background cow's milk

| Reference | Origin; sample description (and no.) | | Coll. period | PCDD concentration (ng/kg fat) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Canada** | | | | | | | | | | | |
| Ryan *et al.* (1990) | 6 cities (2% fat) | 6 | 1985–88 | 1.9 | NR | NR | NR | NR | NR | NR | 10.0 |
| **France** | | | | | | | | | | | |
| Fraisse *et al.* (1996) | | 57 | 1994 | NR | NR | NR | NR | NR | NR | NR | 1.74 |
| **Germany** | | | | | | | | | | | |
| Beck *et al.* (1987) | Berlin | 8 | 1987~ | 0.2 | 0.7 | 0.3 | 1.1 | 0.4 | < 2 | < 10 | 1.79 |
| Fürst *et al.* (1990) | NR West. | 10 | 1989~ | 0.4 | 1.2 | 0.8 | 4.0 | 0.8 | 6.2 | 11 | 3.83 |
| Fürst *et al.* (1992a) | NR West. | 120 | 1990 | NR | NR | NR | NR | NR | NR | NR | 1.38 |
| **Netherlands** | | | | | | | | | | | |
| Liem *et al.* (1991b) | | NR | 1991 | 0.25 | 0.52 | 0.25 | 0.73 | 0.28 | 1.39 | 3.64 | 1.50 |
| **Russian Federation** | | | | | | | | | | | |
| Khamitov *et al.* (1996) | Bashkortostan | 15 | 1995 | 0.16 | NR | NR | NR | NR | NR | NR | 0.26 |
| **Spain** | | | | | | | | | | | |
| Ramos *et al.* (1996) | Asturias | 15 | 1995 | ND | 0.36 | 0.24 | 8.93 | 15.8[a] | 7.21 | 136 | 3.94 |
| **Sweden** | | | | | | | | | | | |
| Rappe *et al.* (1990b) | Malmö | 1 | 1989 | < 0.4 | 0.49 | 0.3 | 1.5 | < 0.3 | 3.1 | 3.5 | 1.77 |
| | Stockholm | 1 | 1989 | < 0.1 | < 0.2 | < 0.2 | 0.3 | < 0.2 | 1.0 | 2 | 0.48 |
| | Umeå | 1 | 1989 | < 0.1 | 0.2 | < 0.2 | 0.3 | < 0.2 | 1.0 | 1.4 | 0.47 |
| | Vaxjo | 1 | 1989 | < 0.3 | < 0.2 | < 0.2 | 1.0 | < 0.2 | 3.0 | 4.9 | 1.08 |
| | Gothenburg | 1 | 1989 | < 0.2 | < 0.2 | < 0.2 | 1.0 | 0.2 | 1.8 | 1.6 | 0.82 |

**Table 9 (contd)**

| Reference | Origin; sample description (and no.) | | Coll. period | PCDD concentration (ng/kg fat) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| **Switzerland** | | | | | | | | | | | |
| Rappe *et al.* (1987b) | Bern (retail) | 1 | 1986 | < 0.3 | < 1.0 | < 1.7 | < 1.7 | < 1.7 | < 1.6 | < 4.0 | 2.68 |
| | Bowil (pool) | 1 | 1986 | < 0.3 | < 1.4 | < 1.4 | < 1.4 | < 1.4 | < 1.5 | < 2.8 | 2.48 |
| | Bowil | 1 | 1986 | < 0.3 | < 1.83 | < 2.29 | < 2.29 | < 2.29 | < 1.51 | < 5.95 | 2.96 |
| Schmid & Schlatter (1992) | Retail | 9 | 1990–91 | 0.2 | 0.46 | 0.21 | 0.49 | 0.27 | 0.98 | 2.5 | 1.31 |
| **United Kingdom** | | | | | | | | | | | |
| Harrison *et al.* (1996) | Derbyshire (4% fat assumed) | 47 | 1991–93 | 1.25 | 2.25 | 5 | | 1.75 | 3.25 | 11.75 | 3.64 |
| Startin *et al.* (1990) | Rural farms (4% fat assumed) | 7 | 1989 | 0.225 | 0.4 | 0.8 | | 0.25 | 1.15 | 5.75 | 1.11 |
| Wright & Startin (1995) | TDS | pool | 1982 | 0.84 | 1.4 | 2.2 | 4.4 | 1.2 | 12 | 32 | 4.53 |
| Wright & Startin (1995) | TDS | pool | 1992 | < 0.40 | 0.80 | 0.50 | 0.95 | 0.56 | 6.6 | 51 | 2.02 |
| **USA** | | | | | | | | | | | |
| Eitzer (1995) | Connecticut (4% fat assumed) | 17 | 1991 | 0.425 | 0.16 | 0.775 | 0.8 | 0.375 | 2.35 | 19.25 | 0.99 |

NR, not reported; ND, not detected and detection limit not reported; TDS, total diet study; NR West., North Rhine Westphalia

[a] [Dubious concentration]

TEQ concentrations recalculated where possible assuming congeners that were not detected were present at the full value of the detection limit

**Table 10. Summary of concentrations (ng/kg fat) of PCDDs in background cow's milk, reported in Table A1.10**

| | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
|---|---|---|---|---|---|---|---|---|
| | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Number of positives | 10 | 13 | 10 | 16 | 11 | 15 | 15 | 23 |
| Mean | 0.58 | 0.72 | 0.57 | 2.0 | 0.58 | 3.4 | 19 | 2.3 |
| Minimum | 0.16 | 0.16 | 0.13 | 0.30 | 0.20 | 0.20 | 1.4 | 0.26 |
| 5th %tile | 0.18 | 0.18 | 0.17 | 0.30 | 0.23 | 0.68 | 1.5 | 0.47 |
| 25th %tile | 0.74 | 0.80 | 0.71 | 2.1 | 0.68 | 4.7 | 16 | 2.8 |
| Median | 0.33 | 0.49 | 0.30 | 0.97 | 0.38 | 2.4 | 4.9 | 1.7 |
| 75th %tile | 0.21 | 0.40 | 0.24 | 0.71 | 0.28 | 1.1 | 2.9 | 1.1 |
| 95th %tile | 1.6 | 1.7 | 1.6 | 6.0 | 1.5 | 8.6 | 76 | 4.5 |
| Maximum | 1.9 | 2.3 | 2.2 | 8.9 | 1.8 | 12 | 140 | 10.0 |

## Table 11. Concentrations of PCDDs in milk products

| Sample description | Origin | Reference | Coll. period | No. | PCDD concentration (ng/kg fat) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Butter | Egypt | Malisch & Saad (1996) | 1994–96 | 33 | 1.06 | 2.1 | 0.53 | 0.8 | 0.31 | 1.14 | 8.36 | 7.68 |
| Butter | Germany, NR West. | Fürst *et al.* (1992a) | 1990 | 22 | NR | NR | NR | NR | NR | NR | NR | 1.11 |
| Butter | Germany, Berlin, retail | Beck *et al.* (1989a) | 1987~ | 1 | 0.08 | 0.41 | 0.15 | 0.95 | 0.26 | 0.34 | 3.4 | 0.79 |
| Butter | Germany, NR West. | Fürst *et al.* (1990) | 1989~ | 5 | < 0.5 | < 0.5 | < 0.5 | 0.7 | < 0.5 | 1.7 | 11.6 | 1.76 |
| Butter | Netherlands | Liem *et al.* (1991b) | 1990–91 | | 0.24 | 0.67 | 0.36 | 0.83 | 0.31 | 0.91 | 0.98 | 1.78 |
| Butter | Norway | Biseth *et al.* (1990) | 1989~ | 3 | < 0.5 | 0.35 | 0.26 | 1.0 | 0.41 | 1.0 | 4.6 | 1.38 |
| Butter | Russian Federation, Baikalsk | Schecter *et al.* (1990a) | 1988–89 | 1 | < 1.0 | < 0.49 | < 0.49 | 0.6 | < 0.49 | 1.0 | 17 | 3.37 |
| Cheese | Germany | Fürst *et al.* (1992b) | 1990 | 4 | NR | NR | NR | NR | NR | NR | NR | 1.83 |
| Cheese | Germany, NR West. | Fürst *et al.* (1990) | 1989~ | 10 | 0.5 | 0.6 | 0.3 | 0.8 | 0.5 | 2.3 | 10.5 | 2.17 |
| Cheese | Netherlands | Liem *et al.* (1991b) | 1990–91 | | 0.22 | 0.5 | 0.24 | 0.72 | 0.22 | 1.16 | 3.77 | 1.41 |
| Cheese | Russian Federation, Moscow | Schecter *et al.* (1990a) | 1988-89 | 1 | < 1.0 | < 0.67 | 0.4 | 1.6 | 0.4 | 8.0 | 22 | 2.13 |
| Cheese/butter | Russian Federation, Novosibirsk | Schecter *et al.* (1990a) | 1988–89 | 1 | < 1.0 | < 0.5 | < 0.5 | 0.8 | < 0.5 | 2.0 | 15 | 1.78 |
| Cream | Germany | Fürst *et al.* (1992a) | 1990 | 22 | NR | NR | NR | NR | NR | NR | NR | 1.37 |
| Cream | Russian Federation, Irkutsk | Schecter *et al.* (1990a) | 1988–89 | 1 | < 1.0 | < 0.47 | < 0.47 | 0.9 | < 0.47 | 3.0 | 21 | 6.26 |
| Mixed (TDS) | Spain, Basque | Startin (1996) | 1994 | 8 | 0.51 | 0.5 | 0.59 | 0.94 | 0.55 | 3.14 | 14 | 2.30 |
| Mixed (TDS) | United Kingdom | Wright & Startin (1995); MAFF (1995) | 1982 | pool | 0.56 | 1.4 | 2.2 | 4.9 | 1.4 | 13 | 25 | 3.42 |
| Mixed (TDS) | United Kingdom | Wright & Startin (1995); MAFF (1995) | 1992 | pool | 0.17 | 0.28 | 0.22 | 0.34 | 0.29 | 0.95 | 3.6 | 0.75 |

NR, not reported; NR West., North Rhine Westphalia; MAFF, Ministry of Agriculture, Fisheries and Food
I-TEQ concentrations recalculated where possible assuming congeners that were not detected were present at the full value of the detection limit

**Table 12. Concentrations of PCDDs in meat and meat products**

| Sample description | Origin | Reference | Coll. period | No. | PCDD concentration (ng/kg fat) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Mixed (TDS) | Spain, Basque region | Startin (1996) | 1994 | 8 | < 0.5 | 0.33 | < 0.5 | 0.85 | 0.5 | 8.7 | 50 | 1.64 |
| Mixed (TDS) | United Kingdom | Wright & Startin (1995) | 1982 | pool | < 0.44 | 0.88 | 1.5 | 2.3 | 0.8 | 13 | 51 | 2.81 |
| Mixed (TDS) | United Kingdom | Wright & Startin (1995) | 1992 | pool | < 0.12 | 0.44 | 0.30 | 0.70 | < 0.15 | 2.0 | 6.6 | 0.95 |
| Beef | Germany, Berlin, retail | Beck *et al.* (1989a) | 1987~ | 1 | 0.6 | 0.8 | 0.6 | 1.9 | 0.6 | 18 | 25 | 2.59 |
| Beef | Germany, NR West. | Fürst *et al.* (1990) | 1989~ | 3 | < 0.5 | 1.7 | 1.9 | 3.2 | 2.0 | 3.9 | 5.4 | 3.73 |
| Beef | Russian Fed., Bashkortostan | Khamitov *et al.* (1996) | 1995 | 8 | 0.12 | NR | NR | NR | NR | NR | NR | 0.20 |
| Beef | Russian Fed., Irkutsk | Schecter *et al.* (1990a) | 1988–89 | 1 | < 1.0 | < 0.67 | < 0.67 | 0.6 | < 0.67 | 5.2 | 21 | 5.84 |
| Beef fat | Russian Fed., Novosibirsk | Schecter *et al.* (1990a) | 1988–89 | 1 | < 1.0 | < 0.5 | < 0.5 | 1.0 | < 0.5 | 3 | 10.0 | 2.05 |
| Beef | USA | Ferrario *et al.* (1996) | 1993 | 63 | 0.05 | 0.35 | 0.46 | 1.4 | 0.53 | 4.50 | 4.80 | 0.89 |
| Beef (hamburger) | Canada | Ryan *et al.* (1990) | 1985–88 | 6 | 0 | 0 | 0 | 6.3 | 0 | 21.3 | 35.6 | 1.29 |
| Beef fat | Netherlands | Liem *et al.* (1991b) | 1990–91 | pool | 0.21 | 0.57 | 0.3 | 1.32 | 0.31 | 1.95 | 2.86 | 1.77 |
| Beef fat | Viet Nam, Hanoi | Schecter *et al.* (1989a) | 1985–87 | 1 | 1.6 | 1.3 | 2.1 | 4.1 | 2.1 | 0 | 0 | 3.61 |
| Canned (unspecified) | Germany, NR West. | Fürst *et al.* (1990) | 1989~ | 2 | < 0.5 | < 0.5 | 1.0 | 3.2 | 1.2 | 13.2 | 53 | 2.10 |
| Liver (cow) | Netherlands | Liem *et al.* (1991b) | 1990–91 | pool | 0.16 | 1.1 | 2.82 | 3.56 | 1.59 | 39.2 | 144 | 5.72 |
| Goat | Netherlands | Liem *et al.* (1991b) | 1990–91 | pool | 0.8 | 1.98 | 1.27 | 6.4 | 0.64 | 12.8 | 26.8 | 4.20 |

**Table 12 (contd)**

| Sample description | Origin | Reference | Coll. period | No. | PCDD concentration (ng/kg fat) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Horse fat | Netherlands | Liem *et al.* (1991b) | 1990–91 | pool | 1.98 | 5.16 | 7.36 | 20.75 | 2.7 | 92.2 | 171 | 13.8 |
| Horse liver | Netherlands | Liem *et al.* (1991b) | 1990–91 | pool | 2.03 | 15.9 | 24.2 | 39.3 | 12 | 941 | 1751 | 61.2 |
| Liver (pooled) | Netherlands | Liem *et al.* (1991b) | 1990–91 | pool | 1.25 | 5.39 | 6.49 | 14.8 | 4.0 | 227 | 1017 | 30.7 |
| Mutton fat | Netherlands | Liem *et al.* (1991b) | 1990–91 | pool | 0.32 | 0.86 | 0.44 | 1.41 | 0.28 | 2.44 | 4.73 | 1.81 |
| Offal (TDS) | UK | Wright & Startin (1995); MAFF (1995) | 1982 | pool | 0.32 | 1.3 | 4.9 | 7.4 | 1.9 | 360 | 4400 | 19.0 |
| Offal (TDS) | UK | Wright & Startin (1995); MAFF (1995) | 1992 | pool | 0.81 | 1.7 | 2.9 | 2.6 | 1.3 | 30 | 200 | 9.86 |
| Liver (pig) | Netherlands | Liem *et al.* (1991b) | 1990–91 | pool | 0.24 | 0.73 | 3.41 | 4.4 | 1.29 | 120 | 3431 | 15.3 |
| Pork | Germany, Berlin, retail | Beck *et al.* (1989a) | 1987~ | 1 | 0.03 | 0.12 | 0.21 | 0.29 | 0.06 | 2.1 | 19 | 0.28 |
| Pork | Germany, NR West. | Fürst *et al.* (1990) | 1989~ | 3 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 0.7 | 8.2 | 1.20 |
| Pork | Netherlands | Liem *et al.* (1991b) | 1990–91 | pool | 0.07 | 0.07 | 0.18 | 0.54 | 0.1 | 3.82 | 44.8 | 0.42 |
| Pork | Russian Fed., Baikalsk | Schecter *et al.* (1990a) | 1988–89 | 1 | < 1 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 2.0 | 16 | 1.97 |
| Pork | Russian Fed., Bashkortostan | Khamitov *et al.* (1996) | 1995 | 6 | 0.14 | NR | NR | NR | NR | NR | NR | 0.34 |
| Pork fat | Viet Nam, Ho Chi Minh City | Schecter *et al.* (1990a) | 1988–89 | 1 | < 1.0 | 0.5 | 0.6 | 1.7 | 0.4 | 7.5 | 30 | 2.34 |
| Pork sticks | Viet Nam, Ho Chi Minh City | Schecter *et al.* (1990a) | 1988–89 | 1 | < 1 | 0.5 | 0.7 | 1.4 | 0.3 | 8.4 | 28 | 2.31 |

**Table 12 (contd)**

| Sample description | Origin | Reference | Coll. period | No. | PCDD concentration (ng/kg fat) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Pork fat | Viet Nam, Song Be | Schecter *et al.* (1989a) | 1986 | 1 | 0.6 | 0.9 | 0.4 | 1.2 | 0.8 | 13.2 | 64 | 2.65 |
| Products | Netherlands | Liem *et al.* (1991b) | 1990–91 | pool | 0.09 | 0.13 | 0.19 | 0.41 | 0.06 | 2.93 | 32.9 | 0.67 |
| Products (TDS) | UK | Wright & Startin (1995); MAFF (1995) | 1982 | pool | 0.15 | 0.34 | 1.5 | 2.1 | 0.33 | 19 | 111 | 1.44 |
| Products (TDS) | UK | Wright & Startin (1995); MAFF (1995) | 1992 | pool | < 0.04 | 0.11 | 0.23 | 0.34 | 0.13 | 2.9 | 18 | 0.40 |
| Sausage | Moscow | Schecter *et al.* (1990a) | 1988–89 | 1 | < 1 | < 0.51 | < 0.51 | < 0.51 | < 0.51 | 1.0 | 10 | 1.73 |
| Sheep | Germany, Berlin, retail | Beck *et al.* (1989a) | 1987 ~ | 1 | 0.01 | 0.5 | 0.3 | 1.5 | 0.4 | 15 | 68 | 1.65 |
| Sheep | Germany, NR West. | Fürst *et al.* (1990) | 1989~ | 2 | < 0.5 | < 0.5 | 0.8 | 3.0 | 0.7 | 11.4 | 19.3 | 2.43 |
| Veal | Germany, NR West. | Fürst *et al.* (1990) | 1989~ | 4 | < 0.5 | 3.1 | 1.9 | 5.3 | 1.8 | 14.4 | 22.3 | 7.68 |

NR, not reported; NR West., North Rhine Westphalia; TDS, total diet survey; MAFF, Ministry of Agriculture, Fisheries and Food

I-TEQ, concentrations recalculated where possible assuming congeners that were not detected were present at the full value of the detection limit

**Table 13. Summary of concentrations (ng/kg fat) of PCDDs for meat and meat products reported in Table 12**

| | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
|---|---|---|---|---|---|---|---|---|
| | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Number of positives | 24 | 29 | 31 | 34 | 30 | 36 | 36 | 39 |
| Mean | 0.54 | 1.9 | 2.4 | 5.0 | 1.6 | 62 | 350 | 6.5 |
| Minimum | 0.01 | 0.07 | 0.18 | 0.29 | 0.06 | 0.70 | 2.9 | 0.20 |
| 5th %tile | 0.03 | 0.11 | 0.20 | 0.39 | 0.08 | 1.7 | 4.8 | 0.33 |
| 25th %tile | 0.14 | 0.44 | 0.42 | 1.3 | 0.35 | 3.0 | 18 | 1.4 |
| Median | 0.30 | 0.86 | 1.0 | 2.5 | 0.75 | 12 | 29 | 2.3 |
| 75th %tile | 0.70 | 1.7 | 2.5 | 5.8 | 1.9 | 22 | 79 | 5.8 |
| 95th %tile | 1.9 | 5.4 | 6.9 | 17 | 4.2 | 260 | 2 200 | 22 |
| Maximum | 2.0 | 16 | 24 | 39 | 12 | 941 | 4 400 | 61 |

**Table 14. Concentrations of PCDDs in poultry**

| Sample description | Origin | Reference | Sample year | No. | Concentration ng/kg fat | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Chicken fat, PCP contamination | Canada | Ryan *et al.* (1985a) | 1980 | 26 | ND | ND | [a] | 27 | ND | 52 | 90 | 3.31 |
| Chicken | Germany, Berlin, retail | Beck *et al.* (1989a) | | 1 | 0.3 | 0.7 | 0.5 | 2.8 | 0.6 | 6 | 52 | 2.25 |
| Chicken | Germany, North Rhine Westphalia, | Fürst *et al.* (1990) | 1989~ | 2 | < 0.5 | 1 | 0.6 | 1.8 | 0.6 | 4.5 | 16.5 | 2.53 |
| Chicken fat | Netherlands | Liem *et al.* (1991b) | 1990–91 | | 0.29 | 0.53 | 0.4 | 1.84 | 0.64 | 6.73 | 25.6 | 1.62 |
| Chicken | Russian Federation, Bashkortostan | Khamitov *et al.* (1996) | 1995 | 10 | 1.02 | NR | NR | NR | NR | NR | NR | 4.54 |
| Chicken (TDS) | United Kingdom | Wright & Startin (1995) | 1982 | pool | 0.76 | 1.3 | 5.1 | 12 | 1.5 | 65 | 150 | 5.41 |
| Chicken (TDS) | United Kingdom | Wright & Startin (1995) | 1992 | pool | < 0.51 | 0.36 | 0.37 | 0.79 | 0.61 | 3.8 | 10 | 1.68 |
| Chicken fat | Viet Nam, Hanoi | Schecter *et al.* (1989a) | 1986 | 1 | 1.0 | 0.6 | [a] | 1.0 | 1.2 | < 4.5 | < 15 | 2.94 |
| Chicken liver | Viet Nam, Ho Chi Minh City | Schecter *et al.* (1990a) | 1988–89 | 1 | < 1.0 | 2.4 | 2.6 | 9.7 | 3.7 | 34 | 42 | 10.2 |
| Chicken | Vietnam, Ho Chi Minh City | Schecter *et al.* (1990a) | 1988–89 | 1 | < 1.0 | 1.0 | 0.5 | 4.0 | 0.7 | 14 | 24 | 2.80 |
| Chicken fat | Vietnam, Song Be | Schecter *et al.* (1989a) | 1986 | 1 | 4.1 | 10 | 6.9 | 27 | 5.4 | 71 | 75 | 21.8 |

NR, not reported; ND, not detected and detection limit not reported; TDS, total diet surveyI-TEQ concentrations recalculated where possible assuming congeners that were not detected were present at the full value of the detection limit

[a] Included with 1,2,3,6,7,8-HxCDD

## Table 15. Concentrations of PCDDs in poultry eggs

| Sample description | Origin | Reference | Coll. period | No. | PCDD concentration (ng/kg fat) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Chicken | Germany, Berlin, retail | Beck *et al.* (1989a) | 1987– | 1 | 0.2 | 0.4 | 1.3 | 1.4 | 0.5 | 0.4 | 12 | 1.52 |
| Chicken | Netherlands | Liem *et al.* (1991b) | 1990–91 | | 0.27 | 0.76 | 0.44 | 1.49 | 0.68 | 7.1 | 70.9 | 2.02 |
| Chicken | Spain, Basque region, TDS | Startin (1996) | 1994 | 8 | 0.23 | 0.28 | 0.29 | 2.0 | 0.51 | 14 | 64 | 1.26 |
| Chicken (TDS) | UK | Wright & Startin (1995) | 1982 | pool | 0.65 | 2.7 | 8.6 | 18 | 6.3 | 120 | 720 | 8.26 |
| Chicken (TDS) | UK | Wright & Startin (1995) | 1992 | pool | 0.43 | 0.51 | 0.54 | 0.96 | 0.65 | 6.2 | 38 | 1.80 |
| Duck | UK, rural | Lovett *et al.* (1996) | 1993–94 | 7 | | | | | | | | 0.7 |

TDS, total diet survey

**Table 16. Concentrations of PCDDs in fish**

| Species | Origin | Reference | Coll. period | No. | Concentration ng/kg fat | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Barbel (river) | Germany | Frommberger (1991) | 1988 | 1 | 5.1 | 8.3 | 1.0 | 4.7 | 1.1 | 4.1 | 9.0 | 39.2 |
| Brown trout (river) | Germany | Frommberger (1991) | 1988 | 1 | 1.4 | 1.3 | < 1.3 | 0.6 | < 0.2 | 0.7 | < 5 | 10.6 |
| Catfish (farmed) | USA | Cooper *et al.* (1996) | 1995 | 1 | 2.2 | 3.6 | 1.9 | 4.2 | 2.3 | 11 | 48 | 5.0 |
| Catfish (farmed) | USA | Cooper *et al.* (1996) | 1995 | 1 | 32 | 16 | 1.4 | 5.7 | 14 | 8.8 | 49 | 42.9 |
| Cod | Norway | Biseth *et al.* (1990) | 1989~ | 2 | < 29.4 | < 17.6 | < 14.7 | < 14.7 | < 29.4 | < 29.4 | 353 | 59.6 |
| Cod (retail) | Germany, Berlin | Beck *et al.* (1989a) | | 1 | 23 | 1.3 | 0.01 | 17 | 5.2 | 10 | 83 | 42.7 |
| Eel | Germany | Frommberger (1991) | 1988 | 1 | 3.1 | 3.5 | 2.4 | 14 | 2.6 | 15 | 60 | 15.2 |
| Eel | Germany | Frommberger (1991) | 1988 | 1 | 3.3 | 3.4 | < 2.0 | 10 | 2.3 | 19 | 52 | 16.2 |
| Herring | Norway | Biseth *et al.* (1990) | 1989~ | 6 | < 3.60 | < 1.08 | < 0.72 | < 0.72 | < 2.16 | < 2.16 | 17.3 | 17.6 |
| Herring, retail | Germany, Berlin | Beck *et al.* (1989a) | | 1 | 4.7 | 12 | 1.2 | 5.8 | 1.0 | 3.6 | 19 | 33.7 |
| Lean sea fish | Netherlands | Liem *et al.* (1991b) | 1990–91 | | 16.3 | 6.61 | 2.38 | 7.11 | 4.10 | 22.9 | 213 | 48.6 |
| Mackerel | Norway | Biseth *et al.* (1990) | 1989~ | 3 | < 1.57 | < 0.47 | < 0.31 | < 0.31 | < 0.94 | < 0.94 | 16.6 | 3.49 |
| Mixed | Russian Federation, Bashkortostan | Khamitov *et al.* (1996) | 1995 | 13 | 0.11 | NA | NA | NA | NA | NA | NA | 0.18 |
| Mixed (TDS) | Spain, Basque Region | Startin (1996) | 1994 | 8 | 2.2 | 2.0 | 1.5 | 2.9 | 1.6 | 23 | 98 | 7.24 |
| Mixed (TDS) | UK | Wright & Startin (1995); MAFF (1995) | 1982 | pool | 0.79 | 1.2 | 0.61 | 3.6 | 1.5 | 14 | 57 | 5.29 |
| Mixed (TDS) | UK | Wright & Startin (1995); MAFF (1995) | 1992 | pool | < 0.25 | 0.90 | 0.59 | 1.0 | 0.74 | 2.7 | 16 | 2.72 |

**Table 16 (contd)**

| Species | Origin | Reference | Coll. period | No. | Concentration ng/kg fat | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Mixed, freshwater | Germany, North Rhine Westphalia | Fürst (1990) | 1989~ | 18 | NA | 9.7 | 2.4 | 14.9 | 1.8 | 9.9 | 19.3 | 30.5 |
| Mixed, salt-water | Germany, North Rhine Westphalia | Fürst (1990) | 1989~ | 15 | 6.5 (n = 6) | 7.5 | 1.0 | 7.3 | 2.8 | 8.8 | 10.5 | 35.3 |
| Redfish, retail | Germany, Berlin | Beck *et al.* (1989a) | 1987~ | 1 | 2.8 | 6.5 | 0.5 | 8.4 | 1.3 | 3 | 11 | 30.6 |
| Salmon (farmed) | Norway | Biseth *et al.* (1990) | 1989~ | 4 | < 19.0 | < 4.76 | < 3.81 | < 3.81 | < 9.52 | 16.7 | 129 | 53.0 |

NA, not analyzed; TDS, total diet survey; MAFF, Ministry of Agriculture, Fisheries and Food

**Table 17. Summary of concentrations (ng/kg fat) of PCDDs in fish reported in Table 16**

| | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
|---|---|---|---|---|---|---|---|---|
| | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Number of positives | 14 | 15 | 13 | 15 | 14 | 16 | 18 | 19 |
| Mean | 7.4 | 5.6 | 1.3 | 7.1 | 3.0 | 11 | 70 | 25 |
| Minimum | 0.11 | 0.90 | 0.01 | 0.60 | 0.74 | 0.70 | 9.0 | 0.2 |
| 5th %tile | 0.55 | 1.1 | 0.30 | 0.88 | 0.91 | 2.2 | 10 | 3.4 |
| 25th %tile | 2.2 | 1.6 | 0.61 | 3.9 | 1.4 | 4.0 | 17 | 9.1 |
| Median | 3.2 | 3.6 | 1.2 | 5.8 | 2.0 | 9.9 | 49 | 31 |
| 75th %tile | 6.2 | 7.9 | 1.9 | 9.2 | 2.8 | 15 | 77 | 41 |
| 95th %tile | 26 | 13 | 2.4 | 16 | 8.3 | 23 | 230 | 54 |
| Maximum | 32 | 16 | 2.4 | 17 | 14 | 23 | 350 | 60 |

## Table 18. Concentrations of PCDDs in miscellaneous foods

| Sample description | Origin | Reference | Coll. period | No. | PCDD concentration (ng/kg fat) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Bread (Mixed, TDS) | United Kingdom | Wright & Startin (1995) | 1982 | pool | < 0.23 | < 0.31 | < 0.26 | 0.87 | 0.70 | 9.9 | 55 | 1.27 |
| Bread (Mixed, TDS) | United Kingdom | Wright & Startin (1995) | 1992 | pool | < 0.49 | < 0.14 | < 0.22 | < 0.22 | < 0.22 | 15 | 94 | 1.34 |
| Cereal products (Mixed, TDS) | United Kingdom | Wright & Startin (1995) | 1982 | pool | < 0.14 | < 0.16 | 0.55 | 4.45 | 2.7 | 10 | 50 | 1.76 |
| Cereal products (Mixed, TDS) | United Kingdom | Wright & Startin (1995) | 1992 | pool | < 0.41 | < 0.56 | < 0.80 | < 0.66 | < 0.93 | 16 | 870 | 2.66 |
| Cheesecake | United States, Mississippi | Fiedler *et al.* (1996) | 1995 | 1 | 0.08 | 0.44 | 0.45 | 2.2 | 0.42 | 5 | 4 | 0.95 |
| Cod liver oil | Germany, NRW | Fürst *et al.* (1990) | 1989~ | 4 | 1.7 | 1.9 | 0.4 | 4.1 | 0.9 | 1.4 | 9.6 | 16.4 |
| Fish oil | Germany, NRW | Fürst *et al.* (1990) | 1989~ | 4 | < 1.0 | 1.0 | 0.4 | 1.5 | 1.0 | 1.8 | 4.8 | 4.39 |
| Fish oils | Netherlands | Liem *et al.* (1991b) | 1990–91 | 5 | 0.53 | 1.17 | 0.65 | 1.2 | 1.46 | 6.19 | 14.9 | 2.24 |
| Fish oil (dietary supplement) | Spain | Jiménez *et al.* (1996b) | 1994 | 7 | 0.50 | 0.44 | 0.11 | 0.58 | 0.40 | 2.1 | 6.4 | 2.15 |
| Hamburger | United States, Mississippi | Fiedler *et al.* (1996) | 1995 | 1 | < 0.05 | 0.22 | 0.18 | 0.97 | 0.25 | 3 | 3.9 | 0.47 |
| Infant formula | Germany, NRW | Fürst *et al.* (1990) | 1989~ | 10 | < 0.5 | 0.4 | 0.3 | 0.3 | 0.3 | 2.2 | 25.8 | 1.11 |
| Lard | Germany, NRW | Fürst *et al.* (1990) | 1989~ | 4 | < 0.5 | < 0.5 | < 0.5 | 0.3 | < 0.5 | 2.8 | 16.0 | 1.23 |
| Margarine | Germany, NRW | Fürst *et al.* (1990) | 1989~ | 6 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | < 0.5 | 0.9 | 11.0 | 1.2 |

**Table 18 (contd)**

| Sample description | Origin | Reference | Coll. period | No. | PCDD concentration (ng/kg fat) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | TCDD | PeCDD | HxCDD | | | HpCDD | OCDD | I-TEQ PCDD/PCDF |
| | | | | | 2378 | 12378 | 123478 | 123678 | 123789 | 1234678 | | |
| Margarine | Norway | Biseth *et al.* (1990) | 1989~ | 4 | < 0.9 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | 1.3 | 18 | 1.53 |
| Mexican dish | United States, Mississippi | Fiedler *et al.* (1996) | 1995 | 1 | 0.04 | 0.09 | 0.09 | 0.12 | 0.12 | 0.88 | 9.1 | 0.22 |
| Mexican dish | United States, Mississippi | Fiedler *et al.* (1996) | 1995 | 1 | 0.06 | 0.06 | < 0.08 | < 0.07 | < 0.08 | 0.37 | 2.8 | 0.19 |
| Mexican dish | United States, Mississippi | Fiedler *et al.* (1996) | 1995 | 1 | < 0.05 | 0.17 | 0.15 | 0.74 | 0.16 | 2.1 | 2.5 | 0.40 |
| Nuts | Netherlands | Liem *et al.* (1991b) | 1990–91 | pool | 0.17 | ND | ND | ND | ND | 0.88 | 7.25 | 0.20 |
| Oils and fats (Mixed, TDS) | Spain, Basque region | Startin (1996) | 1994 | 8 | < 0.22 | < 0.18 | < 0.25 | < 0.25 | < 0.25 | 1.48 | 17.7 | 0.24 |
| Oils and fats (Mixed, TDS) | United Kingdom | Wright & Startin (1995) | 1982 | pool | 0.15 | 0.17 | 0.57 | 1.3 | 1.5 | 11 | 50 | 1.26 |
| Oils and fats (Mixed, TDS) | United Kingdom | Wright & Startin (1995) | 1992 | pool | < 0.02 | 0.09 | 0.07 | 0.14 | 0.18 | 1.5 | 10 | 0.26 |
| Vegetable oils | Netherlands | Liem *et al.* (1991b) | 1990–91 | | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 | 0.5 | 8.3 | 0.03 |

ND, not detected and detection limit not reported; TDS, total diet survey; NRW, North Rhine Westphalia