

WAC 173-340-747 Deriving soil concentrations for ground water protection

SeaTac Third Runway Embankment Project

Equation 747-1 Based on the protection of ground water

| Hazardous Substance | Cs mg/kg | Cw ug/liter | UCF mg/ug | DF | Kd liter/kg | Ow mL water/ mL soil | Oa mL air/ mL soil | Hcc | Pb kg/liter |
|---------------------|-------------|----------------|--------------|----|----------------|----------------------------|--------------------------|------|----------------|
| Antimony (2) | 5.79 | 6.4 | 0.001 | 20 | 45 | 0.3 | 0.13 | 0 | 1.5 |
| Arsenic (1) | 2.92 | 5 | 0.001 | 20 | 29 | 0.3 | 0.13 | 0 | 1.5 |
| Beryllium (2) | 0.01 | 0.02 | 0.001 | 20 | 17 | 0.3 | 0.13 | 0 | 1.5 |
| Cadmium (1) | 0.69 | 5 | 0.001 | 20 | 6.7 | 0.3 | 0.13 | 0 | 1.5 |
| Chromium +3 (2) | 2000.40 | 100 | 0.001 | 20 | 1000 | 0.3 | 0.13 | 0 | 1.5 |
| Chromium +6 (1) | 18.43 | 48 | 0.001 | 20 | 19 | 0.3 | 0.13 | 0 | 1.5 |
| Copper (1) | 262.85 | 592 | 0.001 | 20 | 22 | 0.3 | 0.13 | 0 | 1.5 |
| Lead (1) | | | 0.001 | 20 | 10000 | 0.3 | 0.13 | 0 | 1.5 |
| Mercury (1) | 2.09 | 2 | 0.001 | 20 | 52 | 0.3 | 0.13 | 0.47 | 1.5 |
| Nickel (1) | 417.28 | 320 | 0.001 | 20 | 65 | 0.3 | 0.13 | 0 | 1.5 |
| Selenium (1) | 8.32 | 80 | 0.001 | 20 | 5 | 0.3 | 0.13 | 0 | 1.5 |
| Silver (2) | 21.12 | 80 | 0.001 | 20 | 13 | 0.3 | 0.13 | 0 | 1.5 |
| Thallium (2) | 2.28 | 1.6 | 0.001 | 20 | 71 | 0.3 | 0.13 | 0 | 1.5 |
| Zinc (1) | 5971.20 | 4800 | 0.001 | 20 | 62 | 0.3 | 0.13 | 0 | 1.5 |

Kd from: (1) MTCA Table 747-3; (2) Soil Screening Guidance: Technical Background Document, 9355.4-17A, May 1996, Table 46.

Equation 747-1 Based on the protection of surface water

| Hazardous Substance | Cs mg/kg | Cw ug/liter | UCF mg/ug | DF | Kd liter/kg | Ow mL water/ mL soil | Oa mL air/ mL soil | Hcc | Pb kg/liter |
|---------------------|-------------|----------------|--------------|----|----------------|----------------------------|--------------------------|-----|----------------|
|---------------------|-------------|----------------|--------------|----|----------------|----------------------------|--------------------------|-----|----------------|

| | | | | | | | | | |
|-----------------|---------|-------|-------|----|-------|-----|------|------|-----|
| Antimony (2) | 1446.40 | 1600 | 0.001 | 20 | 45 | 0.3 | 0.13 | 0 | 1.5 |
| Arsenic (1) | 110.96 | 190 | 0.001 | 20 | 29 | 0.3 | 0.13 | 0 | 1.5 |
| Beryllium (2) | 1.82 | 5.3 | 0.001 | 20 | 17 | 0.3 | 0.13 | 0 | 1.5 |
| Cadmium (1) | 0.09 | 0.62 | 0.001 | 20 | 6.7 | 0.3 | 0.13 | 0 | 1.5 |
| Chromium +3 (2) | 2018.40 | 100.9 | 0.001 | 20 | 1000 | 0.3 | 0.13 | 0 | 1.5 |
| Chromium +6 (1) | 3.84 | 10 | 0.001 | 20 | 19 | 0.3 | 0.13 | 0 | 1.5 |
| Copper (1) | 2.79 | 6.28 | 0.001 | 20 | 22 | 0.3 | 0.13 | 0 | 1.5 |
| Lead (1) | 234.00 | 1.17 | 0.001 | 20 | 10000 | 0.3 | 0.13 | 0 | 1.5 |
| Mercury (1) | 0.01 | 0.012 | 0.001 | 20 | 52 | 0.3 | 0.13 | 0.47 | 1.5 |
| Nickel (1) | 114.03 | 87.45 | 0.001 | 20 | 65 | 0.3 | 0.13 | 0 | 1.5 |
| Selenium (1) | 0.52 | 5 | 0.001 | 20 | 5 | 0.3 | 0.13 | 0 | 1.5 |
| Silver (2) | 0.28 | 1.05 | 0.001 | 20 | 13 | 0.3 | 0.13 | 0 | 1.5 |
| Thallium (2) | 56.96 | 40 | 0.001 | 20 | 71 | 0.3 | 0.13 | 0 | 1.5 |
| Zinc (1) | 72.26 | 58.09 | 0.001 | 20 | 62 | 0.3 | 0.13 | 0 | 1.5 |

Kd from: (1) MTCA Table 747-3; (2) Soil Screening Guidance: Technical Background Document, 9355.4-17A, May 1996, Table 46.
Surface water quality values derived from WQP spreadsheet using a hardness value of 50 mg/liter.

WAC 173-340-720(4)(b)(A) Standard Method B potable ground water cleanup levels - Noncarcinogens
Equation 720-1 (Ground water cleanup level for noncarcinogens)

| Hazardous Substance | GWCL ug/liter | RfD mg/kg/day | ABW kg | UCF ug/mg | HQ | AT years | DWIR liter/day | INH | DWF | ED years |
|---------------------|------------------|------------------|-----------|--------------|----|-------------|-------------------|-----|-----|-------------|
| Antimony (1) | 6.4 | 0.0004 | 16 | 1000 | 1 | 6 | 1 | 1 | 1 | 6 |
| Arsenic (1) | 4.8 | 0.0003 | 16 | 1000 | 1 | 6 | 1 | 1 | 1 | 6 |
| Beryllium (1) | 32 | 0.002 | 16 | 1000 | 1 | 6 | 1 | 1 | 1 | 6 |
| Cadmium (1) | 8 | 0.0005 | 16 | 1000 | 1 | 6 | 1 | 1 | 1 | 6 |
| Chromium +3 (1) | 24000 | 1.5 | 16 | 1000 | 1 | 6 | 1 | 1 | 1 | 6 |
| Chromium +6 (1) | 48 | 0.003 | 16 | 1000 | 1 | 6 | 1 | 1 | 1 | 6 |
| Copper (2) | 592 | 0.037 | 16 | 1000 | 1 | 6 | 1 | 1 | 1 | 6 |
| Lead | | | 16 | 1000 | 1 | 6 | 1 | 1 | 1 | 6 |
| Mercury (2) | 4.8 | 0.0003 | 16 | 1000 | 1 | 6 | 1 | 1 | 1 | 6 |
| Nickel (2) | 320 | 0.02 | 16 | 1000 | 1 | 6 | 1 | 1 | 1 | 6 |

| | | | | | | | | | | |
|--------------|------|--------|----|------|---|---|---|---|---|---|
| Selenium (1) | 80 | 0.005 | 16 | 1000 | 1 | 6 | 1 | 1 | 1 | 6 |
| Silver (1) | 80 | 0.005 | 16 | 1000 | 1 | 6 | 1 | 1 | 1 | 6 |
| Thallium (2) | 1.6 | 0.0001 | 16 | 1000 | 1 | 6 | 1 | 1 | 1 | 6 |
| Zinc (1) | 4800 | 0.3 | 16 | 1000 | 1 | 6 | 1 | 1 | 1 | 6 |

RfD from: (1) U.S.EPA IRIS Substance file; (2) MTCA Cleanup Levels and Risk Calculations (CLARC II) Update, February 1996

Equation 720-2 (Ground water cleanup level for carcinogens)

| Hazardous Substance | GWCL ug/liter | RISK | ABW kg | AT years | UCF ug/mg | CPF kg-day/mg | DWIR liters/day | ED years | INH | DWF |
|---------------------|------------------|----------|-----------|-------------|--------------|------------------|--------------------|-------------|-----|-----|
| Antimony | | | | | | | | | | |
| Arsenic | 0.06 | 0.000001 | 70 | 75 | 1000 | 1.5 | 2 | 30 | 1 | 1 |
| Beryllium | 0.02 | 0.000001 | 70 | 75 | 1000 | 4.3 | 2 | 30 | 1 | 1 |
| Cadmium | | | | | | | | | | |
| Chromium +3 | | | | | | | | | | |
| Chromium +6 | | | | | | | | | | |
| Copper | | | | | | | | | | |
| Lead | | | | | | | | | | |
| Mercury | | | | | | | | | | |
| Nickel | | | | | | | | | | |
| Selenium | | | | | | | | | | |
| Silver | | | | | | | | | | |
| Thallium | | | | | | | | | | |
| Zinc | | | | | | | | | | |

CPF from MTCA Cleanup Levels and Risk Calculations (CLARC II) Update, February 1996