Appendix D

Documentation for the Derivation of Leaching BCL

Table D-1. DRAFT Leaching Based Basic Comparison Levels (LBCLs)

Chemical	RBGC (mg/L_w)	K_d (L_w/kg_s)	θ_w (L_w/L_T)	ρ_b (kg_s/L_T)	θ_a (L_a/L_T)	K'_H (L_w/L_a)	DAF = 1	DAF = 20	MCL Notes	K_d Notes	K'_H Notes
Aluminum	0.05	1.5E+03	0.30	1.5	0.13	0.0E+00	7.5E+01	1.5E+03	a	Kd a	-
Boron	7.3	3.0E+00	0.30	1.5	0.13	0.0E+00	2.3E+01	4.7E+02	b	Kd a	-
Cobalt	0.730	4.5E+01	0.30	1.5	0.13	0.0E+00	3.3E+01	6.6E+02	b	Kd a	-
Copper	1.0	3.5E+01	0.30	1.5	0.13	0.0E+00	3.5E+01	7.0E+02	c	Kd a	-
Iron	0.3	2.5E+01	0.30	1.5	0.13	0.0E+00	7.6E+00	1.5E+02	c	Kd a	-
Magnesium	138	4.5E+00	0.30	1.5	0.13	0.0E+00	6.5E+02	1.3E+04	d	Kd a	-
Manganese	0.05	6.5E+01	0.30	1.5	0.13	0.0E+00	3.3E+00	6.5E+01	c	Kd a	-
Mercury	0.002	5.2E+01	0.30	1.5	0.13	4.7E-01	1.0E-01	2.1E+00	e	Kd b	KH a
Molybdenum	0.180	2.0E+01	0.30	1.5	0.13	0.0E+00	3.6E+00	7.3E+01	b	Kd a	-
Silver	0.10	8.3E+00	0.30	1.5	0.13	0.0E+00	8.5E-01	1.7E+01	MCL c	Kd b	-
Titanium	150	1.0E+03	0.30	1.5	0.13	0.0E+00	1.5E+05	3.0E+06	b	Kd a	-
Tungsten	0.274	1.5E+02	0.30	1.5	0.13	0.0E+00	4.1E+01	8.2E+02	b	Kd a	-
Uranium	0.03	4.5E+02	0.30	1.5	0.13	0.0E+00	1.4E+01	2.7E+02	e	Kd a	-

SYMBOLS

K_d (L_W/kg_S) = soil-water partition coefficient
θ_w (L_W/L_T) = moisture content (value from USEPA, 1996; page 36)
ρ_b (kg_S/L_T) = dry bulk density (default value from USEPA, 1996; page 36)
θ_a (L_A/L_T) = air-filled porosity (default value from USEPA, 1996; page 36)
K'_H (L_W/L_A) = dimensionless Henry's constant
DAF ($C_{leachate}$/MCL) = dilution-attenuation factor
LBCL = Leaching-based comparison level
RBCL = Risk-based groundwater concentrations

UNITS

mg = milligrams
L_W = liters of water
L_A = liters of air
L_T = liters of total bulk soil (soil air, soil water, and soil)

Notes

Hierarchy of values used for RBGCs as follows: 1) Primary Federal (USEPA) MCL, 2) Secondary USEPA MCL, 3) USEPA tap water PRG (USEPA, 2004), and 4) NDEP tap water basic comparison levels (NDEP, 2009 BCLs)
All MCLs from http://www.epa.gov/safewater/consumer/pdf/mcl.pdf and are primary MCLs unless otherwise noted
a - Minimum of range given for secondary MCL for aluminum (0.05 to 0.2 mg/L_W).
b - NDEP, 2009 tap water basic comparison level (BCL).
c - Secondary MCL.
d - Based on average age-weighted recommended daily allowances (RDA) for males and females 0 to 30 years and an intake rate of 2 L_W/day.
(National Institute of Health, 2005. Office of Dietary Supplements, Magnesium. December 5. update; http://ods.od.nih.gov/factsheets/magnesium.asp)
e - Primary MCL.

Kd a - Value from Figure 2.31 of Baes et al., 1984.
Kd b - Value from Table 46 of USEPA, 1996 (at default pH value of 6.8 [page 40 of USEPA, 1996])
KH a - Value is for elemental mercury as listed in USEPA PRG chemical-specific parameters table (http://www.epa.gov/region09/superfund/prg/pdf/params_sl_table_bwrun_12SEP2008.pdf)