

Attachment 3
TABLE 1A
Input Parameters for Soil-Water Partition Equation ¹

Parameter	Description	Units	Site-Specific Value	Default Value	Parameter sources and uses
d	Mixing zone thickness	ft	-- ²	--	Chemical-specific (NDEP, 2010); used to calculate DAF in Equation 4 of leaching guidance. ²
d _a	Aquifer thickness (ft)	ft	13.5	--	Average saturated alluvial thickness; used to calculate DAF in Equation 4 of leaching guidance. ³
DAF	Dilution attenuation factor	unitless	-- ⁴	--	Chemical- and source-specific calculation; see Attachment 2, Tables 4A and 4B.
I	Infiltration rate	ft/yr	0.14 ⁵	0.0067	See Attachment 2 for Site-specific estimate of infiltration rate for industrial land use; used to calculate DAF in Equations 3 and 4 of leaching guidance; default value applies only to undeveloped land. ⁵
i	Hydraulic gradient	unitless	0.02	--	Average horizontal gradient in the shallow water-bearing zone; used to calculate DAF in Equations 3 and 4 of leaching guidance. ⁶
K	Hydraulic conductivity	ft/yr	47,500	--	Average horizontal hydraulic conductivity in the saturated alluvium; used to calculate DAF in Equations 3 and 4 of leaching guidance. ⁷
K _d	Distribution coefficient	L/kg	-- ⁸	--	Chemical-specific; used to calculate LBCLs and LSSLs in Equations 1 and 2 of leaching guidance. ⁸
K _{oc}	Soil organic carbon-water partition coefficient	L/kg	-- ⁸	--	Chemical-specific; used to calculate LBCLs and LSSLs in Equation 2 of leaching guidance. ⁸
L	Source length	ft	-- ⁹	--	Chemical-specific; used to calculate DAF in Equations 3 and 4 of leaching guidance. ⁹
f _{oc}	Fraction organic carbon	unitless	0.001	0.002	Site-specific; used to calculate LSSL for organic chemicals in Equation 2 of leaching guidance. ⁸
θ	soil porosity [1-(ρ _b /ρ _s)]	unitless	0.40	0.43	Site-specific value calculated from dry bulk density and particle density; used to calculate LSSLs; default value used to calculate LBCLs.
θ _w	Water filled soil porosity	unitless	0.22	0.3	Site-specific mean of geotechnical samples per ASTM D 2216 used to calculate LSSLs; default value used to calculate LBCLs.
θ _a	Air filled soil porosity	unitless	0.18	0.13	Site-specific value calculated from total porosity - water filled porosity; used to calculate LSSLs; default value used to calculate LBCLs.
H'	Henry's Law constant	unitless	-- ⁸	--	Chemical specific; used to calculate LBCLs and LSSLs.
ρ _b	Dry bulk density	kg/L	1.61	1.5	Site-specific mean of geotechnical samples per ASTM D 2937; used to calculate LSSLs; default value used to calculate LBCLs.
ρ _s	Soil particle density	kg/L	2.67	--	Site-specific mean of geotechnical samples per ASTM D 854; used to calculate total soil porosity.
RBGC	Risk-based groundwater concentration	mg/L	-- ¹⁰	--	Chemical-specific; used to calculate LBCLs and LSSLs. ¹⁰

Notes:

- 1 - Leaching-based site-specific levels (LSSLs) are calculated using Equations 1 and 2 of the leaching guidance (NDEP, 2010); see Attachment 3, Tables 5A and 5B .
- 2 - Aquifer mixing zone depth $d = (0.0112L^2)^{0.5} + da[1 - \exp(-LI/Kida)]$; see Equation 4 from leaching guidance and Attachment 3, Tables 4A and 4B for chemical and source-specific values. If $d > d_a$, aquifer thickness was used instead of mixing zone thickness, per NDEP guidance (NDEP, 2010).
- 3 - Refer to Attachment 3, Table 1B for the calculation of aquifer thickness for the saturated alluvium at northern Site boundary wells, based on the measured

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groundwater elevations for the shallow water-bearing zone from the Annual Remedial Performance Report for Chromium and Perchlorate (Northgate, 2009).

4 - See Attachment 3, Tables 4A and 4B for calculation of DAFs.

5 - See Attachment 3 for a discussion of the methods used to estimate the infiltration rate.

6 - Average on-Site hydraulic gradient from Annual Remedial Performance Report for Chromium and Perchlorate (Northgate, 2009).

7 - Hydraulic conductivity = average from well M-27 slug test (1,496 gpd/ft²=73,050 ft/yr) + average of six other M-series Qal slug tests (449 gpd/ft²=21,900 ft/yr) (Northgate, 2010).

8 - See Attachment 3, Tables 3A and 3B for references for chemical-specific parameters.

9 - See Attachment 3 for a discussion of the methodology for determining chemical-specific source lengths.

10 - Hierarchy of values used for RBGCs as follows: 1) Primary Federal (USEPA) MCL, 2) NDEP tap water basic comparison levels (NDEP, 2009 BCLs), and 3) Secondary USEPA MCLs (NDEP, 2009). All MCLs from <http://www.epa.gov/safewater/consumer/pdf/mcl.pdf>.