



Appendix IR1-03-A

Updated Soil Screening Levels and References

Red Mountain Underground Gold Project
IDM Mining Ltd. Responses to
Canadian Environmental Assessment Information Request #1

Soil Screening Levels

Chemicals	USEPA RSLs	BC Background (Protocol 4)	CEQG Soil Quality for the Protection of Human Health (Residential/ Parkland)	BC CSR Schedules 4 Residential I/ Parkland	BC CSR Schedules 5 Residential I/ Parkland	BC CSR Schedules 10 Residential I/ Parkland	Screening value
Aluminum	15400	40000					15400
Antimony			20	20			20
Arsenic		15	12		40		12
Barium		400	6800		15000		500
Beryllium		2	75	4	150		75
Bismuth							
Boron	3200						3200
Cadmium		0.6	14		35		14
Chloride					1000		1000
Chromium		65	220		100		100
Cobalt		15	50	50			50
Copper		50	1100		15000		1100
Gallium							
Gold							
Iron	11000	30000					11000
Lead		15	140		400		140
Manganese						1800	1800
Mercury		0.15	6.6		15		6.6
Molybdenum		1	10	10			10
Nickel	50	50	200	100			100
Scandium							
Selenium		0.25	1				1
Silver		1	20	20			20
Sodium					1000		1000
Strontium		47000					47000
Sulfur							
Thallium			1				1
Thorium							
Tin		4	50			50	50
Titanium							
Tungsten	12.6						12.6
Uranium			23			16	16
Vanadium		100	130	200			130
Zinc		150	200		10000		200

Units = mg/kg

a - essential nutrients calcium, magnesium, phosphorus, potassium, and sodium are not considered to be COPCs

b - Aluminum is most abundant element in the earth's crust 8.23% average = 82,300 mg/kg (Wedepohl 1995)

c - Iron is 2nd most abundant element in the earth's crust 5.63% average = 56,300 mg/kg (Wedepohl, 1995)

d - Titanium is 9th most abundant element in the earth's crust 0.565% average = 5,650 mg/kg (Wedepohl 1995)

e - Average crustal abundance of Lanthanum = 30 mg/kg (Wedepohl 1995)

f - Average crustal abundance of Scandium = 16 mg/kg (Wedepohl 1995)

g - Average crustal abundance of Thorium = 6 mg/kg (Wedepohl 1995)

h - Average crustal abundance of Yttrium = 24 mg/kg (Wedepohl 1995)

j - Average crustal abundance of Gallium = 19 mg/kg (Wedepohl 1995); generally considered to have low toxicity (Jewett et al. 2012)

k - Gold generally considered to be non-toxic (Tang et al. 2007).

i - The RDA for sulphur ranges from 800 to 900 mg/day if we assume that 20% of the intake comes from incidental soil ingestion that means 160 to 180 mg of sulphur can be consumed per day via the incidental soil ingestions route. However, Health Canada reports that incidental soil ingestion rates range from 20 to 80 mg per day. At that rate 100% of soil consumption could be elemental sulphur and the recommended daily contribution from soil would not be met. Therefore, sulphur was not considered to be a COPC in soil.

m - Due to biomagnification potential cadmium and mercury and selenium were included as COPCs

Updated References

- BCMOE. 2017. Protocol for Contaminated Sites Establishing Background Concentrations in Soil. Version 9. Queens Printers. Victoria, British Columbia.
- BCMOE. 2017. BC Contaminated Sites Regulation. <https://www2.gov.bc.ca/gov/content/environment/air-land-water/site-remediation/guidance-resources>
- CCME. 2017. Environmental Quality Guidelines Summary Tables. <http://stts.ccme.ca/index.html>
- Jewett, S.A., Makowski, M.S., Andrews, B., Manfra, M.J., and Ivanisevic, A. 2012. Gallium nitride is biocompatible and non-toxic before and after functionalization with peptides. *Acta Biomaterialia* 8(2): 728-733.
- Tang D., Yuan R., and Chai Y. 2007. Biochemical and immunochemical characterization of the antigen–antibody reaction on a non-toxic biomimetic interface immobilized red blood cells of crucian carp and gold nanoparticles. *Biosensors and Bioelectronics* 22(6): 1116-1120.
- USEPA. 2017. Regional Screening Levels. <https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2017>
- Wedepohl, K.H. 1995. The composition of the continental crust. *Geochemica et Cosmochemica Acta* 46(4): 741-752.