



Appendix F - Part 4

Human health risk assessment



APPENDIX J

Estimated metal intakes, hazard quotient and hazard index calculations for metals other than Pb

As S1

[illegible]

As S2

Parameter	Abbreviation	Unit	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40		
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	C _s	µg metal/g soil	0.00005	0.00008	0.00007	0.00004	0.00003	0.00002	0.00001	0.00003	0.00003	0.00003	0.00004	0.00004	0.00004	0.00003	0.00002	0.00009	0.00002	0.00006	0.00002	0.00004	0.00003	0.00002	0.00004	0.00001	0.00013	0.00007	0.00007	0.00006	0.00004	0.00018	0.00003	0.00005	0.00001	0.00002	0.00003	0.00005	0.00003	0.00002	0.00003	0.00002	
Bioaccessibility of metal in soil (Asoc; Section 1.2.3)	BAC	unitless	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	
Dusting (i.e. "background") soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 2.5)	C _{dust(background)}	µg metal/g soil	0.72	0.11	0.11	0.39	0.07	0.19	0.06	0.04	0.06	0.06	0.07	0.12	0.04	0.32	0.04	0.04	0.08	0.07	0.07	0.07	0.04	0.05	0.07	0.03	0.06	0.06	0.11	0.11	0.05	0.06	0.08	0.32	0.12	0.05	0.07	0.11	0.04	0.08	0.08		
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{ingest}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time	365	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day	IR _{soil,ys}	g/day	0.5-3 yrs 0.1-0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05			
Annual metal deposition from PM _{2.5-20.25}	M _{dep,an}	g/m²/year	0.000006	0.000006	0.000006	0.000003	0.000003	0.000002	0.000002	0.000002	0.000002	0.000002	0.000003	0.000003	0.000003	0.000003	0.000002	0.000007	0.000002	0.000005	0.000002	0.000003	0.000002	0.000002	0.000003	0.000001	0.000006	0.000006	0.000005	0.000005	0.000005	0.000015	0.000002	0.000002	0.000004	0.000002	0.000002	0.000004	0.000003	0.000002	0.000002	0.000002	0.000002
Soil conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3-4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	
Annual rainfall in Cedar Rapids (Section 3-4.3.8)	Rainfall	L/m²/year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Loss of rainfall associated with absorption and wetting of rainwater (Section 3-4.3.8)	loss	L/m²/year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MConc _{rain}	µg/L	0.0013	0.0021	0.0019	0.0011	0.0009	0.0006	0.0008	0.0007	0.0007	0.0007	0.0011	0.0010	0.0011	0.0009	0.0003	0.0024	0.0007	0.0017	0.0005	0.0010	0.0008	0.0005	0.0010	0.0008	0.0037	0.0018	0.0019	0.0017	0.0010	0.0050	0.0007	0.0014	0.0009	0.0006	0.0008	0.0014	0.0008	0.0006	0.0006		
Age-specific tap water consumption rate per day (Section 4.4.1)	IR _{water,ys}	L/day	0.5-3 yrs 0.1-0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05	0.1 0.1 0.05 0.05				
Fraction of total water intake that stems from rainwater tanks (Section 3-4.3.8)	F	unitless	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Age interval exposure duration (Section 4.4.1)	ED _{ys}	years	0.5-3 yrs 1-18 yrs 18-82 yrs	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	
Age interval body weight (Section 4.4.1)	BW _{ys}	kg	0.5-3 yrs 1-18 yrs 18-82 yrs	15 35 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	25 55 78	
Averaging time (Section 4.4.1.1)	AT _{ys}	yr	0.5-3 yrs 1-18 yrs 18-82 yrs	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	2.5 10 64	
Life stage intake of metal from soil/dust via ingestion (Calculated from Equation 1 in Table 3-3)	IR _{soil,ys} (20-5)	µg/kg/d	0.00000001	0.00000002	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000002	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000002	0.00000002	0.00000002	0.00000002	0.00000002	0.00000001	0.00000002	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	
Life stage intake of metal from rainwater (Calculated from Equation 2 in Table 3-3)	IR _{rain,ys} (20-5)	µg/kg/d	0.00000008	0.00000001	0.00000001	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	
Life stage intake of metal from rainwater (Calculated from Equation 2 in Table 3-3)	IR _{rain,ys} (20-5)	µg/kg/d	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	
Life stage intake of metal from rainwater (Calculated from Equation 3 in Table 4-3)	IR _{rain,ys} (20-5)	µg/kg/d	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.00000017	0.000000				

As S3

[illegible]

Cd S1

Parameter	Abbreviation	Unit	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	C _s	µg metal/g soil	0.00010	0.00013	0.00016	0.00008	0.00007	0.00003	0.00005	0.00005	0.00003	0.00003	0.00008	0.00007	0.00009	0.00006	0.00003	0.00025	0.00005	0.00010	0.00003	0.00007	0.00006	0.00005	0.00005	0.00010	0.00035	0.00017	0.00016	0.00014	0.00007	0.00020	0.00005	0.00008	0.00007	0.00002	0.00005	0.00012	0.00006	0.00005	0.00004
Bioaccessibility of metal in soil/dust (Section 2.5.2)	B _{AC}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Existing (i.e. "background") soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)	C _{s, existing(EMM)}	µg metal/g soil	0.04	0.04	0.14	0.15	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.14	0.14	0.04	0.04	0.04	0.04	0.04	0.04	0.08	0.04	0.04	0.04		
Exposure frequency	EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	B _{A_{ing}}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time	365	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day	IR _{soil, as}	g/day	0.5-3 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
			3-13 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
			13-18 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
			18-82 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Annual metal deposition (from EMM 2020c)	M _{air, dep}	g/m ² /year	0.0000004	0.0000005	0.0000006	0.0000003	0.0000003	0.0000001	0.0000002	0.0000002	0.0000001	0.0000001	0.0000003	0.0000003	0.0000003	0.0000002	0.0000001	0.0000010	0.0000002	0.0000004	0.0000001	0.0000003	0.0000002	0.0000002	0.0000002	0.0000004	0.0000014	0.0000007	0.0000006	0.0000003	0.0000008	0.0000003	0.0000003	0.0000001	0.0000002	0.0000005	0.0000003	0.0000002	0.0000002		
Roof area (Section 3.4.3.8)	RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		
Annual rainfall in Cobar	Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MConc _{rain}	µg/L	0.0014	0.0017	0.0021	0.0010	0.0009	0.0004	0.0007	0.0007	0.0004	0.0004	0.0011	0.0009	0.0011	0.0008	0.0004	0.0032	0.0006	0.0014	0.0004	0.0010	0.0008	0.0006	0.0006	0.0013	0.0046	0.0023	0.0021	0.0018	0.0010	0.0027	0.0006	0.0011	0.0009	0.0007	0.0015	0.0008	0.0006	0.0006	
Age-specific tap water consumption rate per day (Section 4.4.1.1)	IR _{water, as}	L/day	0.5-3 yrs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
			3-13 yrs	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			
			13-18 yrs	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
			18-82 yrs	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
Fraction of total water intake that stems from rainwater tanks (Section 3.4.3.8)	F	unitless	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
Age-interval exposure duration (Section 4.4.1.1)	ED _a	years	0.5-3 yrs	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
			3-13 yrs	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
			13-18 yrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		
			18-82 yrs	64	64	64																																			

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Cadmium (Scenario 3)			R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40		
Parameter	Abbreviation	Unit																																									
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equation in Table 2-4)	C _s	µg metal/g soil	0.000005	0.000007	0.000007	0.000004	0.000003	0.000002	0.000003	0.000002	0.000002	0.000002	0.000004	0.000003	0.000004	0.000003	0.000002	0.000008	0.000002	0.000006	0.000002	0.000004	0.000003	0.000002	0.000003	0.000003	0.000013	0.000006	0.000007	0.000006	0.000004	0.000017	0.000002	0.000005	0.000003	0.000002	0.000003	0.000005	0.000003	0.000002	0.000002	0.000002	
Bioaccessibility of metal in soil/dust (Section 2.5.2)	BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Existing (i.e. background) soil metal conc. after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)	C _{background}	µg metal/g soil	0.04	0.04	0.14	0.15	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.14	0.14	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.08	0.04	0.04	0.04		
Exposure frequency (Exposure frequency of ingested metal) (i.e. absorption from diet)	EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absorption fraction (from diet)	BA _{ingest}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time	365	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day	IR _{soil,ys}	g/day	0.5-3 yrs 3-13 yrs 13-18 yrs 18-82 yrs	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08	0.1 0.1 0.05 0.08			
Annual metal deposition (from BMM 2020)	M _{soil,dep}	g/m ² /year	0.00000002	0.00000003	0.00000003	0.00000002	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000002	0.00000001	0.00000002	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001	0.00000001
Roof area (Section 3.4.3.8)	RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff (from Equation 2 in Table 3.3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	
Annual rainfall in Cobar	Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	Loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Estimated concentration of metal in rainwater tank (calculated from Equation 3 in Table 3.3)	MConc _{rain}	µg/L	0.00006	0.00009	0.00009	0.00005	0.00004	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00004	0.00002	0.00011	0.00003	0.00008	0.00002	0.00005	0.00003	0.00002	0.00005	0.00004	0.00017	0.00008	0.00009	0.00008	0.00005	0.00023	0.00003	0.00006	0.00004	0.00003	0.00004	0.00006	0.00004	0.00003	0.00004	0.00003	0.00003	
Age-specific tap water consumption rate per day (Section 4.4.1.1)	IR _{water,ys}	L/day	0.5-3 yrs 3-13 yrs 13-18 yrs 18-82 yrs	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2	0.3 0.3 0.8 1.2					
Fraction of total water intake that stems from rainwater tanks (Section 3.4.3.8)	f	unitless	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Age-interval exposure duration (Section 4.4.1.1)	ED _{ys}	years	0.5-3 yrs 3-13 yrs 13-18 yrs 18-82 yrs	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64		
Age-interval body weight (Section 4.4.1.1)	BW _{ys}	kg	0.5-3 yrs 3-13 yrs 13-18 yrs 18-82 yrs	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78	11 24 36 78		
Averaging time (Section 4.4.1.1)	AT _{ys}	yrs	0.5-3 yrs 3-13 yrs 13-18 yrs 18-82 yrs	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64	2.5 10 5 64		
Life stage intake of metal from soil/dust via ingestion (Calculated from Equation 1 in Table 4-3)	Intake _{soil,ingest,ys}	µg/kg/d	0.5-3 yrs 3-13 yrs 13-18 yrs 18-82 yrs	0.00000004 0.000000019 0.000000004 0.000000030	0.000000007 0.000000019 0.000000006 0.000000030	0.000000006 0.000000019 0.000000006 0.000000030	0.000000003 0.000000014 0.000000003 0.000000021	0.000000002 0.000000011 0.000000002 0.000000014	0.000000002 0.000000011 0.000000002 0.000000016	0.000000002 0.000000011 0.000000002 0.000000016	0.000000002 0.000000011 0.000000002 0.000000015	0.000000003 0.000000014 0.000000003 0.000000021	0.000000003 0.000000014 0.000000003 0.000000022	0.000000003 0.000000014 0.000000003 0.000000024	0.000000003 0.000000014 0.000000003 0.000000021	0.000000003 0.000000014 0.000000003 0.000000017	0.000000003 0.000000014 0.000000003 0.000000015	0.000000003 0.000000014 0.000000003 0.000000017	0.000000003 0.000000014 0.000000003 0.000000015	0.000000003 0.000000014 0.000000003 0.000000017	0.000000003 0.000000014 0.000000003 0.000000015	0.000000003 0.000000014 0.000000003 0.000000017	0.000000003 0.000000014 0.000000003 0.000000015	0.000000003 0.000000014 0.000000003 0.000000017	0.000000003 0.000000014 0.000000003 0.000000017	0.000000003 0.000000014																	

Cd S3

Parameter	Cadmium (Scenario 3)	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40	
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	C _s	0.00011	0.00014	0.00016	0.00008	0.00007	0.00003	0.00006	0.00005	0.00003	0.00003	0.00009	0.00007	0.00009	0.00006	0.00003	0.00025	0.00005	0.00011	0.00003	0.00008	0.00007	0.00005	0.00005	0.00010	0.00037	0.00018	0.00017	0.00014	0.00008	0.00022	0.00005	0.00009	0.00007	0.00003	0.00006	0.00012	0.00007	0.00005	0.00005	
Bioaccessibility of metal in soil/dust (Section 2.5.2)	BAC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Existing (i.e. "background") soil metal conc. after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)	C _{s_existing(land)}	0.04	0.04	0.14	0.15	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.14	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04		
Exposure frequency	EF	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{GI}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day	IR _{soil_d}	g/day	0.5-3 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
			3-13 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
			13-18 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
			18-82 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Annual metal deposition (from EMM 2020b)	M _{ann_dep}	g/m ² /year	0.0000007	0.0000006	0.0000007	0.0000003	0.0000003	0.0000003	0.0000001	0.0000002	0.0000001	0.0000004	0.0000003	0.0000003	0.0000004	0.0000003	0.0000002	0.0000003	0.0000003	0.0000003	0.0000003	0.0000003	0.0000003	0.0000003	0.0000003	0.0000003	0.0000003	0.0000007	0.0000004	0.0000003	0.0000003	0.0000004	0.0000003	0.0000001	0.0000002	0.0000003	0.0000002	0.0000002	0.0000002		
Roof area (Section 3.4.3.8)	RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	
Maximum rainfall runoff into rainwater tank (calculated from Equation 2 in Table 3-3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087		
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		
Annual rainfall in Cobarrain	Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MConc _{rain}	µg/L	0.0014	0.0018	0.0021	0.0011	0.0009	0.0004	0.0007	0.0007	0.0004	0.0004	0.0011	0.0010	0.0012	0.0008	0.0004	0.0031	0.0006	0.0014	0.0004	0.0010	0.0009	0.0006	0.0006	0.0011	0.0048	0.0023	0.0022	0.0019	0.0010	0.0025	0.0006	0.0011	0.0009	0.0003	0.0007	0.0016	0.0009	0.0007	0.0006
Age-specific tap water consumption rate per day (Section 4.4.1.1)	IR _{water_t}	L/day	0.5-3 yrs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
			3-13 yrs	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			
			13-18 yrs	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8</																				

Cr S1

Parameter	Chromium [Scenario 1]																																										
	Abbreviation	Unit	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40		
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	C _s	µg metal/g soil	0.023	0.045	0.036	0.017	0.013	0.006	0.010	0.009	0.007	0.006	0.018	0.015	0.018	0.012	0.005	0.054	0.008	0.029	0.004	0.016	0.010	0.005	0.011	0.007	0.085	0.037	0.036	0.031	0.017	0.049	0.008	0.018	0.013	0.005	0.010	0.022	0.011	0.007	0.007		
Bioaccessibility of metal in soil/dust (Section 2.5.2)	BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Existing (i.e. "background") soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)	C _{s existing(end)}	µg metal/g soil	26	36	48	33	14	18	30	11	23	23	30	23	17	33	23	27	24	27	24	28	17	23	20	20	27	28	48	48	14	27	24	33	23	23	23	30	17	18	18		
Exposure frequency	EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{ingest}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Part of averaging time	t _a	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365
Age-specific rate of soil/dust ingestion per day	IR _{soil,yr}	g/day	0.5-3 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
			3-13 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
			13-18 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
			18-82 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Annual metal deposition (from EMM 2020c)	M _{ann dep}	g/m ² /year	0.00005	0.00009	0.00007	0.00003	0.00003	0.00003	0.00001	0.00002	0.00002	0.00001	0.00001	0.00004	0.00003	0.00004	0.00002	0.00001	0.00011	0.00002	0.00006	0.00001	0.00003	0.00002	0.00001	0.00002	0.00001	0.00007	0.00007	0.00006	0.00003	0.00010	0.00002	0.00004	0.00003	0.00001	0.00002	0.00004	0.00002	0.00001	0.00001	0.00001	
Rooftop area (Section 3.4.3.8)	RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	
Annual rainfall in Cobarr	Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MConc _{tank}	µg/L	0.15	0.29	0.23	0.11	0.09	0.04	0.06	0.06	0.04	0.04	0.12	0.09	0.11	0.08	0.03	0.35	0.05	0.19	0.03	0.10	0.06	0.03	0.07	0.05	0.55	0.24	0.23	0.20	0.11	0.32	0.05	0.12	0.08	0.03	0.06	0.14	0.07	0.04	0.04		
			0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3			
			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			
			0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8			
Fraction of total water intake that stems from rainwater tanks (Section 3.4.3.8)	F	unitless	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Age-specific tap water consumption rate per day (Section 4.4.1.1)	IR _{water,yr}	L/day	0.5-3 yrs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
			3-13 yrs	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
			13-18 yrs	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
			18-82 yrs	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
Age-interval exposure duration (Section 4.4.1.1)	ED _i	years	0.5-3 yrs	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
			3-13 yrs	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	1																				

Cr S2

[illegible]

Cr S3

[illegible]

Mn S1

Parameter		Manganese (Scenario 1)																																										
Abbreviation		Unit	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40			
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)		C _s	µg metal/g soil	0.05	0.09	0.09	0.04	0.03	0.02	0.02	0.02	0.02	0.04	0.03	0.04	0.03	0.01	0.13	0.02	0.06	0.01	0.03	0.02	0.01	0.03	0.02	0.21	0.09	0.09	0.07	0.03	0.13	0.02	0.04	0.03	0.01	0.02	0.05	0.02	0.01	0.01	0.01		
Bioaccessibility of metal in soil/dust (Section 2.5.2)		BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Existing (i.e. "background") soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)		C _{s_existing(bg)}	µg metal/g soil	45	35	60	44	29	17	29	21	18	18	36	20	20	32	9	23	23	33	24	45	5	13	44	13	8	15	60	60	42	8	23	32	20	18	30	29	5	20	20		
Exposure frequency		EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)		B _a	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time		365	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day		IR _{soil_dust}	g/day	0-5.3 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
				3-13 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1				
				13-18 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
				18-82 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Annual metal deposition (from EMM 2020c)		M _{atm_dep}	g/m ² /year	0.00023	0.00041	0.00038	0.00016	0.00013	0.00007	0.00009	0.00008	0.00008	0.00007	0.00017	0.00014	0.00017	0.00012	0.00005	0.00009	0.00008	0.00018	0.00004	0.00015	0.00010	0.00005	0.00012	0.00009	0.00009	0.00040	0.00039	0.00032	0.00016	0.00057	0.00008	0.00019	0.00013	0.00006	0.00010	0.00014	0.00011	0.00005	0.00007		
Roof area (Section 3.4.3.8)		RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to g		CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)		Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.8)		Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		
Annual rainfall in Cobarr		Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)		loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)		MConc _{rain}	µg/L	0.7	1.3	1.2	0.5	0.4	0.2	0.3	0.3	0.3	0.2	0.6	0.4	0.6	0.4	0.2	1.9	0.3	0.9	0.1	0.5	0.3	0.2	0.4	0.3	3.0	1.3	1.3	1.0	0.5	1.8	0.3	0.6	0.4	0.2	0.3	0.8	0.3	0.2	0.2		
				0-5.3 yrs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3				
				3-13 yrs	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5				
				13-18 yrs	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8			
Fraction of total water intake that stems from rainwater tanks (Section 3.4.3.8)		F	unitless	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
				0-5.3 yrs	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5				
				3-13 yrs	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10			
				13-18 yrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5				
Age-interval body weight (Section 4.4.1.1)		BW _{int}	kg	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11			
				0-5.3 yrs	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24				
				3-13 yrs	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56			
				13-18 yrs	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	7																							

Mn S3

Parameter		Manganese (Scenario 3)																																										
Abbreviation	Unit	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40				
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)		C _s	µg metal/g soil	0.28	1.45	0.35	0.20	0.11	0.04	0.07	0.06	0.06	0.20	0.14	0.17	0.10	0.03	0.18	0.05	0.78	0.02	0.16	0.07	0.03	0.11	0.03	0.24	0.24	0.30	0.33	0.18	0.15	0.05	0.33	0.12	0.03	0.07	0.17	0.08	0.04	0.04			
Bioaccessibility of metal in soil/dust (Section 2.5.2)		BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Existing (i.e. 'background') soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)		C _{s_existing(ends)}	µg metal/g soil	45	35	60	44	29	17	29	21	18	18	36	20	20	32	9	23	23	33	24	45	5	13	44	13	8	15	60	60	42	8	23	32	20	18	30	29	5	20	20		
Exposure frequency		EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)		B _{A_gi}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time		365	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day		IR _{soil_ing}	g/day	0.5-3 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
				3-13 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
				13-18 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
				18-82 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Annual metal deposition (from GEM 2020b)		M _{atm_dep}	g/m ² /year	0.0012	0.0065	0.0016	0.0009	0.0005	0.0002	0.0003	0.0003	0.0002	0.0002	0.0009	0.0006	0.0008	0.0004	0.0001	0.0008	0.0002	0.0015	0.0001	0.0007	0.0003	0.0001	0.0005	0.0002	0.0011	0.0011	0.0013	0.0015	0.0008	0.0007	0.0002	0.0015	0.0005	0.0001	0.0003	0.0008	0.0004	0.0002	0.0002		
Roof area (Section 3.4.3.8)		RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206		
Unit conversion factor to convert from µg to g		CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)		Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.8)		Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		
Annual rainfall in Cobarrain		Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)		loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24		
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)		MConc _{rain}	µg/L	4.0	20.8	5.1	2.9	1.6	0.6	1.0	0.9	0.8	0.7	2.9	2.1	2.5	1.4	0.4	2.6	0.7	11.1	0.3	2.3	0.9	0.4	1.6	0.5	3.4	3.4	4.3	4.7	2.6	2.1	0.7	4.8	1.7	0.5	1.0	2.5	1.1	0.6	0.6		
				0.5-3 yrs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3			
				3-13 yrs	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
				13-18 yrs	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8		
18-82 yrs	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2			
Fraction of total water intake that stems from rainwater tanks (Section 3.4.3.8)		F	unitless	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
				0.5-3 yrs	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5			
				3-13 yrs	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
				13-18 yrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		
18-82 yrs	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64			
Age-interval body weight (Section 4.4.1.1)		BW _{ad}	kg	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11		
				0.5-3 yrs	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24			
				3-13 yrs	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	
				13-18 yrs	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	
Averaging time (Section 4.4.1.1)		AT _a	yrs	0.5-3 yrs	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5			
				3-13 yrs	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10				
				13-18 yrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5			
				18-82 yrs	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64		
Life stage intake of metal from rainwater tank via ingestion (calculated from Equation 1 in Table 4-3)		Intake _{rainwater_ing}	µg/kg/d	0.5-3 yrs	0.41	0.33	0.55	0.40	0.26	0.15	0.26	0.19	0.16	0.16	0.33	0.18	0.18	0.29	0.09	0.21	0.21	0.31	0.22	0.41	0.05	0.12	0.																	

Sb S1

Antimony (Scenario 1)		R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40				
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	C _s	µg metal/g soil	0.00003	0.00003	0.00004	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	0.00001	0.00001	0.00008	0.00001	0.00002	0.00001	0.00002	0.00002	0.00001	0.00001	0.00003	0.00010	0.00005	0.00004	0.00003	0.00002	0.00008	0.00001	0.00002	0.00002	0.00001	0.00001	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001		
Bioaccessibility of metal in soil/dust (Section 2.5.2)	BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Existing (i.e. "background") soil metal concn after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)	C _{existing(background)}	µg metal/g soil	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32		
Exposure frequency	EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{gut}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time	365	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365		
Age-specific rate of soil/dust ingestion per day	IR _{soil_in}	0.5-3 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
		3-13 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
		13-18 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
		18-82 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Annual metal deposition (from MMS 2020c)	M _{atmos_dep}	g/m ² /year	0.00000016	0.00000016	0.00000024	0.00000011	0.00000009	0.00000008	0.00000008	0.00000005	0.00000005	0.00000012	0.00000010	0.00000013	0.00000009	0.00000005	0.00000004	0.00000007	0.00000011	0.00000013	0.00000005	0.00000010	0.00000008	0.00000007	0.00000016	0.00000004	0.00000027	0.00000024	0.00000020	0.00000011	0.00000044	0.00000007	0.00000011	0.00000004	0.00000008	0.00000008	0.00000018	0.00000010	0.00000007	0.00000007	0.00000007	0.00000007		
Roof area (Section 3.4.3.8)	RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	
Annual rainfall in Cobarrain	Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MConc _{rain}	µg/L	0.0005	0.0005	0.0008	0.0003	0.0003	0.0002	0.0003	0.0003	0.0002	0.0004	0.0003	0.0004	0.0003	0.0002	0.0014	0.0002	0.0004	0.0002	0.0003	0.0003	0.0002	0.0002	0.0005	0.0020	0.0009	0.0008	0.0006	0.0003	0.0014	0.0002	0.0004	0.0003	0.0001	0.0002	0.0006	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	
Age-specific tap water consumption rate per day (Section 4.4.1.1)	IR _{water_in}	0.5-3 yrs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3																							

Sb S2[illegible]

Sb S3

Antimony (Scenario 3)			R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40			
Parameter	Abbreviation	Unit																																										
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	C _s	µg metal/g soil	0.00003	0.00003	0.00004	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	0.00002	0.00001	0.00001	0.00008	0.00001	0.00003	0.00001	0.00002	0.00002	0.00001	0.00001	0.00003	0.00010	0.00005	0.00004	0.00003	0.00002	0.00008	0.00001	0.00002	0.00008	0.00001	0.00001	0.00003	0.00002	0.00001	0.00001	0.00001	0.00001	
Bioaccessibility of metal in soil/dust (Section 2.5.2)	BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Existing (i.e. "background") soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)	C _{s,background}	µg metal/g soil	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	
Exposure frequency	EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{ingst}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Part of averaging time	IR _{soil,as}	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365
		0.5-3 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
		3-13 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
		13-18 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
Annual metal deposition (from EMM 2020c)	M _{atm,dep}	g/m ² /year	0.0000016	0.0000016	0.0000024	0.0000011	0.0000009	0.0000008	0.0000008	0.0000008	0.0000005	0.0000012	0.0000010	0.0000013	0.0000009	0.0000005	0.0000004	0.0000005	0.0000005	0.0000005	0.0000013	0.0000013	0.0000011	0.0000008	0.0000007	0.0000016	0.0000006	0.000000	0.000000	0.000000	0.000000	0.000000	0.0000011	0.00000044	0.00000007	0.00000011	0.00000010	0.00000004	0.00000008	0.00000018	0.00000010	0.00000007	0.00000007	
Roof area (Section 3.4.3.8)	RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206
Unit conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	
Annual rainfall in Cobar	Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	loss	L/m ² /year																																										
			24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MConc _{rain}	µg/L	0.0005	0.0005	0.0008	0.0003	0.0003	0.0002	0.0003	0.0003	0.0002	0.0003	0.0003	0.0002	0.0004	0.0003	0.0002	0.0014	0.0002	0.0004	0.0002	0.0003	0.0003	0.0002	0.0002	0.0005	0.0020	0.0009	0.0008	0.0006	0.0003	0.0014	0.0002	0.0004	0.0003	0.0001	0.0002	0.0006	0.0003	0.0002	0.0002	0.0002	0.0002	
Age-specific tap water consumption rate per day (Section 4.4.1.1)	IR _{water,as}	L/day	0.5-3 yrs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
		3-13 yrs	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			
		13-18 yrs	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8		
		18-82 yrs	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
Fraction of total water intake that stems from rainwater tanks (Section 3.4.3.8)	F	unitless	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Age-interval exposure duration (Section 4.4.1.1)	ED _a	years	0.5-3 yrs	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
		3-13 yrs	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
		13-18 yrs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5		
		18-82 yrs	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64</																									

Ba S1

Parameter		Barium [Scenario 1]																																											
Abbreviation	Unit	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40					
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)		C _s	µg metal/g soil	0.0012	0.0013	0.0021	0.0008	0.0007	0.0005	0.0006	0.0005	0.0005	0.0007	0.0010	0.0006	0.0004	0.0041	0.0005	0.0009	0.0004	0.0008	0.0007	0.0005	0.0007	0.0011	0.0059	0.0024	0.0023	0.0017	0.0008	0.0047	0.0005	0.0009	0.0007	0.0004	0.0006	0.0006	0.0015	0.0007	0.0005	0.0005	0.0005			
Bioaccessibility of metal in soil/dust (Section 2.5.2)		BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Existing (i.e. "background") soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)		C _{s, existing(end)}	µg metal/g soil	6	2	20	7	3	3	27	2	2	2	3	2	3	3	4	3	2	2	1	3	5	2	1	2	20	20	3	1	4	2	2	2	5	4	1	3	3	3	3	3		
Exposure frequency		EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)		B _{A, oral}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time		365	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day		IR _{soil, int}	g/day	0.5-3 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
				3-13 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
				13-18 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
				18-82 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
Annual metal deposition (from GEM 2020b)		M _{atm, dep}	g/m ² /year	0.000008	0.000008	0.000013	0.000005	0.000004	0.000003	0.000004	0.000003	0.000003	0.000003	0.000006	0.000005	0.000006	0.000004	0.000002	0.000026	0.000003	0.000006	0.000002	0.000005	0.000004	0.000003	0.000004	0.000007	0.000037	0.000015	0.000014	0.000011	0.000005	0.000030	0.000003	0.000006	0.000004	0.000003	0.000004	0.000009	0.000004	0.000003	0.000003	0.000003		
Roof area (Section 3.4.3.8)		RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to g		CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)		Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.8)		Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		
Annual rainfall in Cobar		Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)		loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)		MConc _{tank}	µg/L	0.03	0.03	0.04	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.08	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.12	0.05	0.05	0.03	0.02	0.10	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01		
Age-specific tap water consumption rate per day (Section 4.4.1.1)		IR _{water, pt}	L/day	0.5-3 yrs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3								

Ba S2

[illegible]

Ba S3

Parameter	Barium (Scenario 3)			R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40			
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	C _s	μg metal/g soil		0.0012	0.0013	0.0021	0.0008	0.0007	0.0005	0.0006	0.0005	0.0005	0.0005	0.0005	0.0006	0.0007	0.0010	0.0006	0.0004	0.0041	0.0005	0.0009	0.0004	0.0008	0.0007	0.0005	0.0007	0.0011	0.0059	0.0024	0.0023	0.0017	0.0008	0.0047	0.0005	0.0009	0.0007	0.0004	0.0006	0.0015	0.0007	0.0005	0.0005		
Bioaccessibility of metal in soil/dust (Section 2.5.2)	BAC	unitless		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Existing (i.e. 'background') soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)	C _{s,existing(ends)}	μg metal/g soil		6	2	20	7	3	3	27	2	2	2	4	2	3	2	3	3	4	3	2	2	1	3	5	2	1	2	20	20	3	1	4	2	2	2	5	4	1	3	3	3		
Exposure frequency	EF	days/yr		365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{ingest}	unitless		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time	365	days/yr		365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day	IR _{soil,20}	g/day	0-5.3 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
			3-13 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
			13-18 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
			18-82 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Annual metal deposition (from PM _{10-2.5})	M _{soil,dep}	g/m ² /year		0.000008	0.000008	0.000013	0.000005	0.000004	0.000003	0.000004	0.000003	0.000003	0.000003	0.000005	0.000005	0.000006	0.000004	0.000002	0.000026	0.000003	0.000006	0.000002	0.000005	0.000004	0.000003	0.000004	0.000007	0.000037	0.000015	0.000014	0.000011	0.000005	0.000030	0.000003	0.000006	0.000004	0.000003	0.000004	0.000009	0.000004	0.000003	0.000003			
Roof area (Section 3.4.3.8)	RoofArea	m ²		206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from μg to g	CF	μg/g		1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)	Runoff	L/yr		64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless		0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		
Annual rainfall in Cobarr	Rainfall	L/m ² /year		390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	loss	L/m ² /year		24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24		
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MConc _{rain}	μg/L		0.03	0.03	0.04	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.08	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.02	0.12	0.05	0.05	0.03	0.02	0.10	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.01	0.01		
Age-specific tap water consumption rate per day (Section 4.4.1.1)	IR _{water,20}	L/day		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3									

Be S1

Parameter	Beryllium (Scenario 1)		R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40	
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	C _s	µg metal/g soil	0.000019	0.000019	0.000032	0.000012	0.000010	0.000007	0.000009	0.000008	0.000008	0.000007	0.000014	0.000011	0.000015	0.000010	0.000006	0.000062	0.000008	0.000014	0.000006	0.000012	0.000011	0.000008	0.000010	0.000017	0.000088	0.000036	0.000035	0.000026	0.000012	0.000071	0.000008	0.000014	0.000011	0.000006	0.000009	0.000022	0.000011	0.000008	0.000007	
Bioaccessibility of metal in soil/dust (Section 2.5.2)	BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Existing (i.e. "background") soil metal conc. after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)	C _{s, existing/landfill}	µg metal/g soil	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	
Exposure frequency	EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{GI}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Part of averaging time	365	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365
Age-specific rate of soil/dust ingestion per day	IR _{soil, as}	g/day	0.5-3 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
			3-13 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
			13-18 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
			18-82 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
Annual metal deposition (from EMM 2020c)	M _{ann dep}	g/m ² /year	0.00000004	0.00000004	0.00000007	0.00000003	0.00000002	0.00000002	0.00000002	0.00000002	0.00000002	0.00000003	0.00000002	0.00000002	0.00000003	0.00000002	0.00000003	0.00000013	0.00000002	0.00000003	0.00000002	0.00000002	0.00000002	0.00000002	0.00000002	0.00000003	0.00000003	0.00000002	0.00000002	0.00000002	0.00000003	0.00000015	0.00000002	0.00000002	0.00000003	0.00000002	0.00000002	0.00000002	0.00000002	0.00000002	0.00000002	
Roof area (Section 3.4.3.8)	RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	
Annual rainfall in Cobarrain	Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MConc _{rain}	µg/L	0.00013	0.00013	0.00022	0.00008	0.00007	0.00005	0.00006	0.00006	0.00005	0.00005	0.00010	0.00008	0.00011	0.00007	0.00004	0.00043	0.00005	0.00010	0.00004	0.00008	0.00007	0.00006	0.00007	0.00012	0.00061	0.00025	0.00024	0.00018	0.00008	0.00049	0.00005	0.00010	0.00007	0.00004	0.00006	0.00016	0.00008	0.00005	0.00005	
Age-specific tap water consumption rate per day (Section 4.4.1.1)	IR _{water, as}	L/day	0.5-3 yrs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		

Be S2

[illegible]

Not Av = Not available; geochemistry profiles from site samples were not available for this metal, therefore no associated emissions could be modelled

Be S3

[illegible]

Cu S1

Parameter	Copper (Scenario 1)		R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40			
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	Abbreviation	Unit																																										
C _s	µg metal/g soil		0.05	0.08	0.09	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.04	0.03	0.04	0.03	0.01	0.16	0.02	0.06	0.01	0.03	0.02	0.02	0.03	0.03	0.24	0.10	0.10	0.08	0.04	0.16	0.02	0.04	0.03	0.02	0.02	0.06	0.03	0.02	0.02	0.02	0.02	
Bioaccessibility of metal in soil/dust (Section 2.5.2)	BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Existing (i.e. 'background') soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)	C _{s existing(end)}	µg metal/g soil	11	8	30	33	0	2	2	1	4	4	2	4	1	3	2	1	4	2	1	3	1	1	2	1	2	2	30	30	1	2	4	3	4	4	1	7	1	4	4			
Exposure frequency	EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{ingest}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time	BA _{total}	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day	IR _{soil,ys}	g/day	0.5-3 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
			3-13 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
			13-18 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
			18-82 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
Annual metal deposition (from EMM 2020c)	M _{ann dep}	g/m ² /year	0.00004	0.00006	0.0007	0.0003	0.0002	0.0001	0.0002	0.0002	0.0001	0.0001	0.0003	0.0002	0.0003	0.0002	0.0001	0.0011	0.0001	0.0004	0.0001	0.0002	0.0002	0.0001	0.0002	0.0002	0.0007	0.0007	0.0006	0.0003	0.0002	0.0001	0.0003	0.0002	0.0001	0.0002	0.0004	0.0002	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001
Roof area (Section 3.4.3.8)	RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		
Annual rainfall in Cobar	Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MConc _{tank}	µg/L	1.3	2.0	2.2	0.9	0.7	0.4	0.5	0.5	0.5	0.4	0.9	0.7	1.0	0.7	0.3	3.6	0.5	1.4	0.3	0.8	0.6	0.4	0.7	0.6	5.5	2.3	2.3	1.8	0.8	3.8	0.5	1.0	0.7	0.4	0.6	1.4	0.6	0.4	0.4	0.4		
			0.5-3 yrs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3							

Cu S2

Parameter	Abbreviation	Unit	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R25	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40			
Soil metal concentration after 15 yrs remaining practical mine life (Calculated from Equation in Table 2-4)	C _s	µg metal/g soil	0.15	0.91	0.18	0.11	0.06	0.02	0.03	0.03	0.03	0.03	0.03	0.11	0.08	0.09	0.05	0.01	0.03	0.02	0.48	0.03	0.09	0.03	0.01	0.06	0.01	0.02	0.10	0.14	0.17	0.10	0.03	0.02	0.19	0.06	0.01	0.03	0.08	0.04	0.02	0.02		
Bioaccessibility of metal in soil/dust (Section 2.3.2)	BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Dusting (i.e. background) soil metal conc. after 15 yrs remaining practical mine life (Calculated from Equation in Table 2-4)	C _{dust(background)}	µg metal/g soil	11	8	30	31	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Exposure frequency	EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{ingest}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Time of averaging time	365	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365
Age-specific rate of soil/dust ingestion per day	R _{soil,age}	g/day	0.5-3 yrs 0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
			3-13 yrs 0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	
			18-62 yrs 0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
Annual metal deposition from FANM 2020b	M _{area,depo}	kg/m ² /year	0.0011	0.0066	0.0013	0.0008	0.0004	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0008	0.0005	0.0007	0.0004	0.0001	0.0002	0.0002	0.0003	0.0003	0.0006	0.0002	0.0001	0.0004	0.0001	0.0001	0.0007	0.0010	0.0012	0.0007	0.0001	0.0002	0.0004	0.0004	0.0001	0.0002	0.0006	0.0003	0.0001	0.0001		
Roof area (Section 3.4.3.8)	RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to kg	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	
Maximum rainwater runoff into perimeter tank (calculated from Equation 2 in Table 3-3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.3)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		
Annual rainfall in Cedar (see of rainfall associated with absorption and wetting of surface (Section 3.4.3.6))	Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	
loss	loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MC _{conc,tank}	µg/L	3.5	21.2	4.2	2.6	1.3	0.4	0.8	0.7	0.6	0.5	2.5	1.8	2.1	1.1	0.2	0.8	0.5	11.1	0.3	0.2	2.0	0.7	0.3	1.4	0.2	0.5	2.3	3.3	4.0	2.3	0.4	0.5	4.5	1.4	0.3	0.7	1.9	0.9	0.4	0.4		
Age-specific tap water consumption rate per day (Equation 4.4.1.1)	R _{water,age}	L/day	0.5-3 yrs 0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
			3-13 yrs 0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03		
			18-62 yrs 0.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2		
Fraction of total water intake that comes from rainwater tanks (Section 3.4.3.8)	F	unitless	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
Age-interval exposure duration (Equation 4.4.1.1)	ED _{age}	years	0.5-3 yrs 2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5		
			3-13 yrs 10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
			18-62 yrs 64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	
Age-interval body weight (Section 4.4.1.1)	BW _{age}	kg	0.5-3 yrs 11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11		
			3-13 yrs 24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24		
			18-62 yrs 78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	
Averaging time (Section 4.4.1.1)	AT _{age}	hrs	0.5-3 yrs 10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
			3-13 yrs 64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64		
			18-62 yrs 0.0017231	0.0082348	0.0016379	0.0009974	0.0003457	0.0001475	0.00030197	0.00021793	0.00023383	0.00013221	0.00008905	0.00068619	0.00007710	0.00044221	0.00000151	0.00003364	0.000019919	0.000033254	0.00006474	0.000077278	0.000027275	0.00001768	0.00003648	0.000018695	0.000001683	0.00012978	0.00008793	0.00011784	0.000020298	0.00176481	0.00054491	0.00011572	0.00028933	0.00072820	0.00033965	0.00016299	0.00016340					
Life-stage intake of metal from soil/dust via ingestion (Calculated from Equation 4 in Table 4-3)	Intake _{soil,ingest}	µg/kg/d	0.000628974	0.00378972	0.000748819	0.000451206	0.000240428	0.000067631	0.000089097	0.000087711	0.0000818404	0.000007911	0.000008897	0.000014045	0.000017008	0.000020281	0.000004069	0.0000151818	0.0000019295	0.000198579	0.000004002	0.0000514189	0.0000126511	0.0000049153	0.0000143200	0.0000041939	0.0000056484	0.0000049663	0.0000194910	0.0000777466	0.0000411118	0.0000061177	0.0000093034	0.0000053023	0.0002506466	0.0000053029	0.0001101449	0.000319740	0.000155672	0.000174254				
			15-18 yrs 0.0000767614	0.0000149401	0.0000130942	0.0000079711	0.0000044941	0.0000021325	0.0000014491	0.0000011230	0.0000011491	0.0000011304	0.0000011897	0.0000011405	0.0000012795																													

Cu S3

Copper (Scenario 3)			R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40		
Parameter	Abbreviation	Unit																																									
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	C _s	µg metal/g soil	0.21	0.99	0.27	0.15	0.09	0.03	0.06	0.05	0.05	0.04	0.15	0.11	0.13	0.08	0.02	0.19	0.04	0.54	0.02	0.12	0.05	0.03	0.09	0.04	0.26	0.20	0.24	0.25	0.13	0.18	0.04	0.24	0.09	0.03	0.06	0.14	0.06	0.03	0.03		
Bioaccessibility of metal in soil/dust (Section 2.5.2)	BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Existing (i.e. 'background') soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)	C _{existing(ends)}	µg metal/g soil	11	8	30	33	0	2	2	1	4	4	2	4	1	3	2	1	4	2	1	3	1	1	1	2	1	2	2	30	30	1	2	4	3	4	4	1	7	1	4	4	
Exposure frequency	EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{GI,all}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time	Part of averaging time	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day	IR _{soil, 25}	g/day	0.5-3 yrs		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
			3-13 yrs		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
			13-18 yrs		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
			18-82 yrs		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
Annual metal deposition (from EMM 2020b)	M _{ann, dep}	g/m ² /year	0.0015	0.0072	0.0020	0.0011	0.0006	0.0002	0.0004	0.0004	0.0003	0.0003	0.0011	0.0008	0.0010	0.0006	0.0002	0.0014	0.0003	0.0019	0.0002	0.0009	0.0004	0.0002	0.0006	0.0003	0.0019	0.0014	0.0017	0.0018	0.0010	0.0013	0.0003	0.0017	0.0006	0.0002	0.0004	0.0010	0.0005	0.0003	0.0003		
Roof area (Section 3.4.3.8)	RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		
Annual rainfall in Cobar	Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MConc _{tank}	µg/L			4.8	23.1	6.3	3.4	2.0	0.8	1.3	1.1	1.1	0.9	3.5	2.5	3.1	1.8	0.6	4.4	1.0	12.5	0.5	2.8	1.3	0.6	2.1	0.9	6.0	4.6	5.6	5.7	3.1	4.2	1.0	5.5	2.1	0.7	1.3	3.3	1.5	0.8	0.8
			0.5-3 yrs		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3			
			3-13 yrs		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
			18-82 yrs		0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8		
Fraction of total water intake that stems from rainwater tanks (Section 3.4.3.8)	F	unitless			0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
			0.5-3 yrs		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5			
			3-13 yrs		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
			18-82 yrs		64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64		
Age-interval exposure duration (Section 4.4.1.1)	ED _s	years	0.5-3 yrs		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
			3-13 yrs		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5				
			13-18 yrs		64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64		
			18-82 yrs		11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11			
Age-interval body weight (Section 4.4.1.1)	BW _{s,t}	kg	0.5-3 yrs		24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24		
			3-13 yrs		56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56				
			13-18 yrs		78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78			
			18-82 yrs		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5			
Life stage intake of metal from soil/dust via ingestion (Calculated from Equation 1 in Table 4-3)	Intake _{soil,ing} (408-8)	µg/kg/d			64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64			
			0.5-3 yrs		0.102	0.085	0.271	0.209	0.005	0.017	0.015	0.004	0.041	0.041	0.021	0.013	0.013	0.006	0.011	0.005	0.024	0.013	0.024	0.007	0.007	0.021	0.005	0.021	0.009	0.020	0.010	0.009	0.125	0.125	0.003	0.009	0.015	0.012	0.015				
			3-13 yrs		0.047	0.039	0.125	0.093	0.003	0.008	0.007	0.001	0.019	0.019	0.010	0.015	0.006	0.012	0.007	0.005	0.015	0.011	0.006	0.012	0.003	0.003	0.009	0.003	0.010	0.009	0.003	0.010	0.009	0.003	0.010	0.009	0.015	0.012					

Hg S1

[illegible]

Hg S2

Mercury (Scenario 2)			R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40					
Parameter	Abbreviation	Unit																																												
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	C _s	µg metal/g soil	0.0000004	0.0000006	0.0000005	0.0000003	0.0000001	0.0000002	0.0000002	0.0000002	0.0000002	0.0000002	0.0000003	0.0000001	0.0000003	0.0000001	0.0000001	0.0000006	0.0000002	0.0000004	0.0000001	0.0000001	0.0000001	0.0000002	0.0000001	0.0000002	0.0000010	0.0000005	0.0000005	0.0000005	0.0000003	0.0000013	0.0000002	0.0000004	0.0000002	0.0000002	0.0000002	0.0000004	0.0000002	0.0000002	0.0000002	0.0000002	0.0000002			
Bioaccessibility of metal in soil/dust (Section 2.5.2)	BA _c	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Existing (i.e. "background") soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)	C _{e, existing}	µg metal/g soil	0.009	0.005	0.005	0.028	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005		
Exposure frequency	EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{ingest}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time		days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day	I _{soil, age}	g/day	0.5-9 yrs 0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
			10-18 yrs 0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
			18-62 yrs 0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Annual metal deposition (from Annex 2020)	M _{atm, dep}	g/m ² /year	0.000000002	0.000000003	0.000000003	0.000000002	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001	0.000000001
Roof area (Section 3.4.3.8)	RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206
Unit conversion factor to convert from µg to g		µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	
Annual rainfall in Cobarrainfall	Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	loss	L/m ² /year																																												
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MConc _{rain}	µg/L	0.000006	0.000009	0.000009	0.000005	0.000004	0.000003	0.000003	0.000003	0.000003	0.000003	0.000004	0.000005	0.000004	0.000002	0.000011	0.000003	0.000008	0.000002	0.000005	0.000003	0.000002	0.000005	0.000002	0.000005	0.000004	0.000017	0.000008	0.000008	0.000008	0.000005	0.000023	0.000003	0.000006	0.000004	0.000003	0.000006	0.000003	0.000006	0.000003	0.000003	0.000003	0.000003		
Age-specific tap water consumption rate per day (Section 4.4.1.1)	I _{R_{tap, age}}	L/day	0.5-9 yrs 0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
			10-18 yrs 0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2		
			18-62 yrs 1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
Fraction of total water intake that stems from rainwater tanks (Section 3.4.3.8)	F	unitless	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
Age-interval exposure duration (Section 4.4.1.1)	ED _{age}	years	0.5-9 yrs 2.5	3-13 yrs 10	10	10	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
			10-18 yrs 5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
			18-62 yrs 64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64
Age-interval body weight (Section 4.4.1.1)	BW _{age}	kg	0.5-9 yrs 11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	
			3-13 yrs 24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
			18-62 yrs 56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56
			18-62 yrs 78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Averaging time (Section 4.4.1.1)	AT _{age}	hrs	0.5-9 yrs 5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
			10-18 yrs 64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64
Life stage intake of metal from soil/dust via ingestion (calculated from Equation 1 in Table 4-3)	Intake _{soil, age}	µg/kg/d	0.5-9 yrs 0.000000003	0.000000005	0.0000000																																									

Hg S3

[illegible]

Ni S1

[illegible]

Ni S2

Parameter		Nickel (Scenario 2)																																									
Abbreviation	Unit	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40			
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	C _s	µg metal/g soil	0.000111	0.000171	0.000158	0.000089	0.000077	0.000052	0.000062	0.000058	0.000059	0.000055	0.000091	0.000080	0.000089	0.000077	0.000041	0.000195	0.000056	0.000136	0.000038	0.000084	0.000063	0.000044	0.000082	0.000064	0.000005	0.000148	0.000156	0.000142	0.000086	0.000407	0.000057	0.000112	0.000075	0.000046	0.000066	0.000116	0.000068	0.000048	0.000050		
Bioaccessibility of metal in soil/dust (Section 2.5.2)	BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Existing (i.e. "background") soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 2.5)	C _{s, existing}	µg metal/g soil	16	12	37	13	8	5	37	5	5	5	11	8	6	8	5	13	10	10	8	10	2	9	12	10	7	10	37	37	9	7	10	8	8	5	5	10	2	9	9		
Exposure frequency	EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{GI}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time	365	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day	IR _{soil, age}	g/day	0.5-3 yrs 0.1 3-13 yrs 0.1 13-18 yrs 0.05 18-82 yrs 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05	0.1 0.1 0.1 0.1 0.05 0.05				
Annual metal deposition (from BLM 2020c)	M _{dep, dust}	g/m ² /year	0.000002	0.000004	0.000003	0.000002	0.000002	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	0.000002	0.000002	0.000001	0.000004	0.000001	0.000001	0.000003	0.000001	0.000003	0.000001	0.000001	0.000001	0.000003	0.000003	0.000003	0.000003	0.000003	0.000003	0.000003	0.000003	0.000003	0.000003	0.000003	0.000003	0.000003	0.000003	0.000003	0.000003	0.000003	
Roof area (Section 3.4.3.8)	RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 3 in Table 3-3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		
Annual rainfall in Cabar	Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	Loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Estimated concentration of metal in rainwater tank (calculated from Equation 3 in Table 3-3)	MConc _{rain}	µg/L	0.0007	0.0011	0.0011	0.0006	0.0005	0.0003	0.0004	0.0004	0.0004	0.0004	0.0006	0.0005	0.0006	0.0005	0.0003	0.0003	0.0004	0.0009	0.0003	0.0006	0.0004	0.0003	0.0005	0.0004	0.0020	0.0010	0.0009	0.0006	0.0027	0.0004	0.0007	0.0005	0.0003	0.0004	0.0008	0.0005	0.0003	0.0003			
Age-specific tap water consumption rate per day (Section 4.4.1.1)	IR _{tap, age}	L/day	0.5-3 yrs 0.3 3-13 yrs 0.5 13-18 yrs 0.8 18-82 yrs 1.2	0.3 0.3 0.5 0.5 0.8 1.2	0.3 0.3 0.5 0.5 0.8 1.2	0.3 0.3 0.5 0.5 0.8 1.2	0.3 0.3 0.5 0.5 0.8 1.2	0.3 0.3 0.5 0.5 0.8 1.2	0.3 0.3 0.5 0.5 0.8 1.2	0.3 0.3 0.5 0.5 0.8 1.2	0.3 0.3 0.5 0.5 0.8 1.2	0.3 0.3 0.5 0.5 0.8 1.2	0.3 0.3 0.5 0.5 0.8 1.2	0.3 0.																													

Ni S3

[illegible]

Ag S1

Sheet (Scenario 1)		R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40			
Parameter	Abbreviation	Unit																																									
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equation in Table 4-4)	C _s	µg metal/g soil	0.000014	0.000015	0.000023	0.000010	0.000008	0.000005	0.000007	0.000007	0.000005	0.000005	0.000011	0.000009	0.000012	0.000008	0.000005	0.000044	0.000006	0.000011	0.000005	0.000010	0.000009	0.000007	0.000007	0.000014	0.000002	0.000026	0.000025	0.000019	0.000009	0.000047	0.000006	0.000011	0.000009	0.000004	0.000007	0.000017	0.000009	0.000006	0.000006		
Bioaccessibility of metal in soil (Section 3.3.3)	BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Testing (i.e. "background") soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 4-5)	C _{s, remaining}	µg metal/g soil	0.09	0.02	0.14	0.23	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.14	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02		
Exposure frequency	EF	days/yr	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	
Relative bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{ing}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time	365	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/food ingestion per day	IR _{soil, ing}	g/day	0.5-3 yrs	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
		3-18 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
		18-42 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05			
		18-42 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Annual metal deposition (from EMM 2020b)	M _{depos}	g/m ² /year	0.0000006	0.0000006	0.0000004	0.0000004	0.0000002	0.0000002	0.0000003	0.0000003	0.0000002	0.0000002	0.0000004	0.0000003	0.0000003	0.0000003	0.0000002	0.0000017	0.0000002	0.0000002	0.0000003	0.0000003	0.0000003	0.0000003	0.0000004	0.0000002	0.0000002	0.0000002	0.0000002	0.0000004	0.0000002	0.0000002	0.0000004	0.0000003	0.0000002	0.0000002	0.0000003	0.0000002	0.0000002	0.0000002	0.0000002		
Soil area (Section 3.4.3.8)	SoilArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3.3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087		
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		
Annual rainfall in Colar	Rainfall	L/m ² /year	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3.3)	MConc _{rain}	µg/L	0.00018	0.00018	0.00029	0.00012	0.00010	0.00007	0.00009	0.00008	0.00006	0.00006	0.00014	0.00011	0.00015	0.00010	0.00006	0.00054	0.00008	0.00014	0.00006	0.00012	0.00011	0.00008	0.00009	0.00017	0.00076	0.00003	0.00031	0.00024	0.00012	0.00058	0.00008	0.00013	0.00011	0.00005	0.00008	0.00021	0.00011	0.00008	0.00002	0.00002	
Age-specific tap water consumption rate per day (Section 4.4.1)	IR _{tap, ing}	L/day	0.5-3 yrs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3									

Ag S2

[illegible]

Ag S3

Sheet (Scenario 3)		R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40			
Parameter	Abbreviation	Unit																																									
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equation in Table 4-4)	C _s	µg metal/g soil	0.000014	0.000015	0.000023	0.000010	0.000008	0.000005	0.000007	0.000007	0.000005	0.000005	0.000011	0.000009	0.000012	0.000008	0.000005	0.000044	0.000006	0.000011	0.000005	0.000010	0.000009	0.000007	0.000007	0.000014	0.000002	0.000026	0.000025	0.000019	0.000009	0.000047	0.000006	0.000011	0.000009	0.000004	0.000007	0.000017	0.000009	0.000006	0.000006		
Bioaccessibility of metal in soil (Section 2.5.2)	BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Testing (i.e. "background") soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 4-5)	C _{s, remaining}	µg metal/g soil	0.09	0.02	0.14	0.23	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02		
Exposure frequency	EF	days/yr	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	165	
Relative bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{ing}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time	365	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/food ingestion per day	IR _{soil, fm}	g/day	0.5-3 yrs	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
		3-18 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
		18-42 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
		18-42 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Annual metal deposition (from EMM 2020b)	M _{depos}	g/m ² /year	0.00000004	0.00000004	0.00000004	0.00000004	0.00000004	0.00000002	0.00000002	0.00000003	0.00000002	0.00000002	0.00000004	0.00000003	0.00000003	0.00000003	0.00000017	0.00000002	0.00000002	0.00000002	0.00000002	0.00000002	0.00000003	0.00000003	0.00000004	0.00000002	0.00000019	0.00000007	0.00000004	0.00000011	0.00000002	0.00000004	0.00000003	0.00000004	0.00000002	0.00000003	0.00000003	0.00000007	0.00000002	0.00000002	0.00000002		
Soil area (Section 3.4.3.8)	SoilArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3.3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087		
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		
Annual rainfall in Colar	Rainfall	L/m ² /year	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3.3)	MConc _{rain}	µg/L	0.00018	0.00018	0.00029	0.00012	0.00010	0.00007	0.00009	0.00008	0.00006	0.00006	0.00014	0.00011	0.00015	0.00010	0.00006	0.00054	0.00008	0.00014	0.00006	0.00012	0.00011	0.00008	0.00009	0.00017	0.00076	0.00033	0.00031	0.00024	0.00012	0.00058	0.00008	0.00013	0.00011	0.00005	0.00008	0.00021	0.00011	0.00008	0.00007	0.000002	
Age-specific tap water consumption rate per day (Section 4.4.1)	IR _{tap, fm}	L/day	0.5-3 yrs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.													

Zn S1

Zinc (Scenario 1)			R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40			
Parameter	Abbreviation	Unit																																										
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	C _i	µg metal/g soil	0.13	0.24	0.19	0.10	0.08	0.03	0.06	0.05	0.04	0.03	0.10	0.08	0.10	0.07	0.03	0.29	0.05	0.16	0.03	0.09	0.06	0.03	0.06	0.05	0.45	0.20	0.19	0.17	0.09	0.25	0.05	0.10	0.07	0.03	0.06	0.12	0.06	0.04	0.04			
Bioaccessibility of metal in soil/dust (Section 2.5.2)	BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Existing (i.e. 'background') soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)	C _{i, existing(lead)}	µg metal/g soil	41	14	107	80	4	10	15	4	16	16	9	16	5	13	11	5	16	16	9	19	11	6	10	5	5	9	107	107	5	5	16	13	16	16	10	49	11	26	26			
Exposure Frequency	EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{g,fd}	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time	365	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day	IR _{soil,as}	g/day	0.5-3 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
			3-13 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
			13-18 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
			18-82 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
Annual metal deposition (from ENM 2020c)	M _{ann dep}	g/m ² /year	0.0006	0.0011	0.0009	0.0005	0.0003	0.0002	0.0003	0.0002	0.0002	0.0002	0.0005	0.0004	0.0005	0.0003	0.0001	0.0013	0.0002	0.0007	0.0001	0.0004	0.0003	0.0001	0.0003	0.0002	0.0021	0.0009	0.0009	0.0008	0.0004	0.0012	0.0002	0.0005	0.0003	0.0001	0.0003	0.0006	0.0003	0.0002	0.0002	0.0002		
Roof area (Section 3.4.3.8)	RoofArea	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85		
Annual rainfall in Cobar	Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	Loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MConc _{rain}	µg/L	1.9	3.6	2.8	1.5	1.1	0.5	0.8	0.7	0.5	0.5	1.5	1.2	1.5	1.0	0.4	4.3	0.7	2.4	0.4	1.3	0.8	0.5	0.9	0.8	6.6	3.0	2.9	2.5	1.4	3.8	0.7	1.5	1.1	0.4	0.8	1.8	0.9	0.6	0.6			
Age-specific tap water consumption rate per day (Section 4.4.1.1)	IR _{water,as}	L/day	0.5-3 yrs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3											

Zn S2

Parameter	Zinc (Scenario 2)			R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40				
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	C _s	μg metal/g soil		0.79	4.82	0.94	0.58	0.30	0.08	0.17	0.15	0.13	0.11	0.57	0.39	0.48	0.25	0.05	0.16	0.11	2.53	0.05	0.45	0.15	0.06	0.31	0.05	0.08	0.51	0.75	0.89	0.52	0.05	0.11	1.02	0.31	0.06	0.16	0.42	0.19	0.09	0.09				
Bioaccessibility of metal in soil/dust (Section 2.5.2)	BAC	unitless		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Existing (i.e. 'background') soil metal conc after 15 yrs remaining practical mine life (calculated from Equations in Table 2-5)	C _{s,existing(end)}	μg metal/g soil		41	14	107	80	4	10	15	4	16	16	9	16	5	13	11	5	16	16	9	19	11	6	10	5	5	9	107	107	5	5	16	13	16	16	10	49	11	26	26				
Exposure frequency	EF	days/yr		365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	BA _{g,ing}	unitless		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time		days/yr		365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day	IR _{soil,20}	g/day	0-5.3 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
			3-13 yrs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1			
			13-18 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
			18-82 yrs	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
Annual metal deposition (from EMM 2020)	M _{soil,dep}	g/m ² /year		0.0037	0.0222	0.0043	0.0027	0.0014	0.0004	0.0008	0.0007	0.0006	0.0005	0.0026	0.0018	0.0022	0.0012	0.0002	0.0007	0.0005	0.0116	0.0002	0.0021	0.0007	0.0003	0.0014	0.0002	0.0004	0.0023	0.0034	0.0041	0.0024	0.0002	0.0005	0.0047	0.0014	0.0003	0.0007	0.0019	0.0009	0.0004	0.0004				
Roof area (Section 3.4.3.8)	RoofArea	m ²		206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	
Unit conversion factor to convert from μg to g	CF	μg/g		1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)	Runoff	L/yr		64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless		0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	
Annual rainfall in Cobarr	Rainfall	L/m ² /year		390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	loss	L/m ² /year		24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MConc _{rain}	μg/L		11.8	71.4	14.0	8.5	4.5	1.2	2.5	2.2	2.0	1.6	8.5	5.8	7.1	3.7	0.8	2.3	1.7	37.4	0.7	6.6	2.3	0.9	4.5	0.7	1.3	7.6	11.1	13.2	7.7	0.7	1.7	15.1	4.7	0.9	2.4	6.2	2.9	1.4	1.3	1.2			
Age-specific tap water consumption rate per day (Section 4.4.1.1)	IR _{water,20}	L/day	0-5.3 yrs	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.										

Zn S3

Zinc (Scenario 3)			R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40		
Parameter	Abbreviation	Unit																																									
Soil metal concentration after 15 yrs remaining practical mine life (calculated from Equations in Table 2-4)	C _s	µg metal/g soil	0.92	5.07	1.14	0.68	0.38	0.12	0.23	0.20	0.17	0.14	0.67	0.48	0.58	0.32	0.08	0.45	0.16	2.68	0.07	0.53	0.21	0.09	0.36	0.10	0.53	0.71	0.94	1.06	0.61	0.30	0.16	1.12	0.39	0.09	0.22	0.54	0.26	0.13	0.13		
Bioaccessibility of metal in soil/dust (Section 2.5.2)	BAC	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Existing (i.e. "background") soil metal conc after 15 yrs remaining practical mine life (calculated from Equation in Table 2-5)	C _{s_existing(eng)}	µg metal/g soil	41	14	107	80	4	10	15	4	16	16	9	16	5	13	11	5	16	16	9	19	11	6	10	5	5	9	107	107	5	5	16	13	16	16	10	49	11	26	26		
Exposure frequency	EF	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Absolute bioavailability of ingested metal (i.e. absorption from GI tract)	B _a	unitless	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Part of averaging time	365	days/yr	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365	
Age-specific rate of soil/dust ingestion per day	IR _{soil_dust}	g/day																																									
			0.5-3 yrs																																								
			3-13 yrs																																								
			13-18 yrs																																								
Annual metal deposition (from EMM 2020c)	M _{atm_dep}	g/m ² /year																																									
			0.0043																																								
			0.0233																																								
			0.0052																																								
Roof/area	CF	m ²	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206		
Unit conversion factor to convert from µg to g	CF	µg/g	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
Maximum rainwater runoff into rainwater tank (calculated from Equation 2 in Table 3-3)	Runoff	L/yr	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087	64087
Efficiency of collection by rainwater tank (Section 3.4.3.8)	Collection efficiency	unitless	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	
Annual rainfall in Cobarr	Rainfall	L/m ² /year	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
Loss of rainfall associated with absorption and wetting of surfaces (Section 3.4.3.8)	loss	L/m ² /year	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Estimated concentration of metal in rainwater tank (calculated from Equation 1 in Table 3-3)	MConc _{rain}	µg/L																																									
			13.7																																								
			75.0																																								
			16.8																																								
Age-specific tap water consumption rate per day (Section 4.4.1.1)	IR _{water_dust}	L/day																																									
			0.5-3 yrs																																								
			3-13 yrs																																								
			13-18 yrs																																								
Fraction of total water intake that stems from rainwater tanks (Section 3.4.3.8)	F	unitless																																									
			0.1																																								
			0.1																																								
			0.1																																								
Age-interval exposure duration (Section 4.4.1.1)	ED _i	years																																									
			0.5-3 yrs																																								
			3-13 yrs																																								
			13-18 yrs																																								
Age-interval body weight (Section 4.4.1.1)	BW _{it}	kg																																									
			0.5-3 yrs																																								
			3-13 yrs																																								
			13-18 yrs																																								
Averaging time (Section 4.4.1.1)	AT _i	yrs																																									
			0.5-3 yrs																																								
			3-13 yrs																																								
			13-18 yrs																																								
Life stage intake of metal from soil/dust via ingestion (Calculated from Equation 1 in Table 4-3)	Intake _{soil_dust_ingest}	µg/kg/d																																									
			0.5-3 yrs																																								
			3-13 yrs																																								
			13-18 yrs																																								
Life stage intake of metal from ingestion of rainwater (Calculated from Equation 2 in Table 4-3)	Intake _{rainwater_ingest}	µg/kg/d																																									
			0.5-3 yrs																																								
			3-13 yrs																																								
			13-18 yrs																																								
Life stage oral combined intake from metal in soil/dust and rainwater (calculated from Equation 3 in Table 4-3)	Intake _{soil_dust_rainwater}	µg/kg/d																																									
			0.5-3 yrs																																								
			3-13 yrs																																								
			13-18 yrs																																								
Averaging time for lifetime exposure	AT _{lifetime}	days																																									
			29930																																								
			29930																																								
			29930																																								
Oral TWADI of metal over a lifetime (Calculated from Equation 4 in Table 4-3)	Intake _{oral_TWADI}	µg/kg/d																																									
			0.28																																								
			1.24																																								
			0.42																																								
Tolerable daily intake adjusted for background intakes from diet, water & air	TDIadj	µg/kg/d																																									
			320																																								
			320																																								
			320																																								
Hazard quotient from oral intake (Calculated from Equation 5 in Table 4-3)	HQ _{oral}	unitless																																									
			0.0009																																								
			0.0039																																								
			0.0013																																								
Modelled annual avg conc of metal in PM ₁₀ from EMM 2020b)	C _a	µg/m ³																																									
			0.0013																																								
			0.0071																																								
			0.0012																																								
Chronic air guideline value	AGV	µg/m ³																																									
			1248																																								
			1248																																								
			1248																																								
Hazard quotient from inhalation 1 in Table 4-4)	HQ _{inhalation}	unitless																																									
			0.0000010																																								
			0.0000057																																								
			0.0000010																																								
Overall Hazard quotient	HQ _{overall}	unitless																																									
			0.0009																																								
			0.004																																								
			0.001																																								

HQ & HI summary

HQs S1 (Existing Situation)																																									
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40		
As	0.0004	0.0004	0.0006	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0009	0.0009	0.0001	0.0003	0.0008	0.0002	0.0002	0.0001	0.0002	0.0002	0.001	0.0006	0.0006	0.0005	0.0002	0.0009	0.0001	0.0003	0.0002	0.0009	0.0002	0.0004	0.0002	0.0001	0.0001	
Cd	0.001	0.002	0.004	0.004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001		
Cr	0.0003	0.0004	0.0005	0.0003	0.0002	0.0002	0.0003	0.0002	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0004	0.0002	0.0004	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0006	0.0004	0.0005	0.0004	0.0002	0.0005	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002		
Mn	0.01	0.01	0.02	0.01	0.008	0.005	0.008	0.006	0.005	0.005	0.005	0.01	0.006	0.007	0.009	0.003	0.01	0.006	0.01	0.006	0.01	0.003	0.004	0.01	0.004	0.013	0.01	0.02	0.02	0.011	0.009	0.01	0.010	0.006	0.005	0.008	0.009	0.003	0.005		
Sb	0.00008	0.00008	0.00008	0.00008	0.00008	0.00007	0.00008	0.00007	0.00007	0.00007	0.00007	0.00008	0.00008	0.00008	0.00007	0.00008	0.00007	0.00007	0.00008	0.00007	0.00008	0.00008	0.00007	0.00007	0.00008	0.00008	0.00008	0.00008	0.00008	0.00008	0.00007	0.00008	0.00008	0.00007	0.00007	0.00008	0.00007	0.00007	0.00007		
Ba	0.0002	0.00009	0.0006	0.0002	0.00009	0.00007	0.00007	0.00006	0.00007	0.00007	0.00007	0.00001	0.00008	0.00009	0.00008	0.00008	0.0001	0.0001	0.0001	0.00008	0.00009	0.00004	0.00008	0.00008	0.00002	0.00008	0.00001	0.00009	0.00006	0.00006	0.0001	0.0001	0.0001	0.00009	0.00007	0.0001	0.00004	0.0001	0.0001		
Cu	0.001	0.002	0.003	0.002	0.0007	0.0006	0.0007	0.0006	0.0007	0.0007	0.0007	0.001	0.0009	0.0009	0.0008	0.0005	0.002	0.0007	0.001	0.0004	0.0009	0.0006	0.0005	0.0008	0.0006	0.004	0.002	0.003	0.0008	0.0003	0.0007	0.001	0.0008	0.0006	0.0007	0.001	0.0007	0.0006			
Hg	0.00006	0.00004	0.00004	0.00016	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00004	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00005	0.00004	0.00004	0.00003	0.00004	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003			
Ni	0.01	0.01	0.03	0.01	0.006	0.004	0.004	0.004	0.004	0.004	0.004	0.008	0.006	0.006	0.004	0.01	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008			
Ag	0.0000003	0.0000008	0.0000005	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000001	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008	0.0000008			
Zn	0.0003	0.0002	0.0006	0.0004	0.00007	0.00007	0.0001	0.00006	0.0001	0.00009	0.0001	0.0001	0.00009	0.0001	0.00007	0.0002	0.0001	0.0002	0.00006	0.0001	0.00009	0.00005	0.00009	0.00006	0.0004	0.0002	0.0006	0.0006	0.0006	0.00009	0.0002	0.0001	0.0001	0.00009	0.00009	0.00009	0.00009	0.0001	0.0001		
Overall HI	0.03	0.03	0.06	0.03	0.02	0.01	0.04	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.03	0.02	0.02	0.02	0.02	0.008	0.01	0.02	0.02	0.03	0.02	0.06	0.05	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.02		
HQs S2 (Proposed Increment)																																									
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40		
As	0.00003	0.00004	0.00004	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	0.00002	0.00001	0.00004	0.00001	0.00003	0.00001	0.00002	0.00001	0.00001	0.00002	0.00001	0.00007	0.00003	0.00004	0.00003	0.00002	0.00009	0.00001	0.00003	0.00002	0.00001	0.00002	0.00003	0.00002	0.00001	0.00001		
Cd	0.00002	0.00004	0.00001	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00002	0.00002	0.00001	0.00004	0.00001	0.00003	0.00001	0.00002	0.00001	0.00002	0.00001	0.00002	0.00006	0.00003	0.00003	0.00002	0.00001	0.00002	0.00001	0.00002	0.00002	0.00001	0.00002	0.00001	0.00001	0.00001			
Cr	0.0006	0.0042	0.0006	0.0004	0.0004	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0004	0.0003	0.0001	0.0001	0.0002	0.0002	0.0001	0.0002	0.0001	0.0002	0.0001	0.0004	0.0001	0.0002	0.0004	0.0005	0.0004	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001			
Mn	0.01	0.01	0.06	0.01	0.01	0.00	0.001	0.003	0.002	0.002	0.002	0.01	0.005	0.01	0.00	0.001	0.002	0.002	0.03	0.001	0.01	0.002	0.001	0.00	0.001	0.002	0.006	0.01	0.01	0.01	0.002	0.01	0.004	0.001	0.002	0.01	0.003	0.001			
Sb	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av			
Ba	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av			
Cu	0.002	0.01	0.002	0.001	0.0008	0.0003	0.0005	0.0004	0.0004	0.0003	0.001	0.001	0.001	0.001	0.0002	0.0004	0.0003	0.006	0.0002	0.001	0.0004	0.0002	0.0008	0.0002	0.0003	0.001	0.002	0.002	0.001	0.0002	0.0003	0.002	0.0007	0.0002	0.0004	0.001	0.0005				
Hg	0.000002	0.000011	0.000002	0.000002	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000002	0.000001	0.000002	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001				
Ni	0.00003	0.00005	0.00004	0.00003	0.00003	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00003	0.00003	0.00003	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002				
Ag	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av	Not Av			
Zn	0.0006	0.004	0.001	0.0004	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0004	0.0003	0.0004	0.0002	0.00004	0.0001	0.0001	0.002	0.00004	0.0003	0.0001	0.00005	0.0002	0.00004	0.00006	0.0004	0.001	0.001	0.0004	0.00004	0.0001	0.0008	0.0002	0.0001	0.0001	0.0001				
Overall HI	0.01	0.08	0.01	0.04	0.006	0.002	0.003	0.003	0.002	0.003	0.002	0.01	0.007	0.008	0.005	0.0004	0.003	0.003	0.04	0.004	0.008	0.003	0.009	0.006	0.002	0.006	0.004	0.01	0.01	0.009	0.0004	0.0002	0.003	0.006	0.002	0.003	0.001	0.002			
HQs S3 (Cumulative Proposed Situation)																																									
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20	R21	R22	R23	R24	R26	R27	R28	R29	R30	R31	R32	R33	R34	R35	R36	R37	R38	R39	R40		
As	0.0004	0.0005	0.0005	0.0003	0.0002	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0003	0.0002	0.0003	0.0002	0.0001	0.0009	0.0001	0.0004	0.00009	0.0002	0.0002	0.0001	0.0002	0.0002	0.001	0.0006	0.0006	0.0005	0.0002	0.0001	0.0001	0.0003	0.0002	0.0001	0.0004	0.0002	0.0001			
Cd	0.001	0.002	0.004	0.004	0.001	0.001	0.002	0.001	0																																

APPENDIX K

Conservative screening risk assessment for acute exposure to metals in dust

Acute air guideline values for metals assessed in this HHRA were sourced from competent national and international agencies. The values selected for use in this HHRA are summarised in Table K.1 below.

Table K.1: Acute air guidelines for metals assessed in this HHRA

Metal/ Metalloid	Health endpoint for guideline value	Critical effect level [mg/m ³] (²)	Uncertainty factor (³)	Air Guideline Value [µg/m ³] (¹)	Averaging time for guideline value	Reference
Antimony (Sb) (⁴)	Pulmonary toxicity (human)	0.5 (OEL) (⁴)	6.7	75 (⁴)	30 min	Ontario MoH 1975
Arsenic (As)	Developmental toxicity (rat)	0.2 (LOAEC)	1,000	0.2 (0.2) (⁵)	4 hours (1 hour) (⁵)	OEHHA 2008
Beryllium (Be)	Sensitisation	0.00005 (OEL)	-	0.1 (⁶)	1 hr	ACGIH 2015
Cadmium (Cd)	Slight respiratory irritation in rats	0.55 (LOEC)	10	100 (AEGL-1) (⁷)	1 hr	US EPA 2010a
Chromium (as Cr ^{VI}) (⁸)	Increased relative lung weight in 30-d study with rats	0.016 (BMCL ₁₀) 0.038 (POD _{HEC})	30	1.3	24 hr	TCEQ 2014
Copper (Cu)	Based on prevention of metal fume fever in workers	1 (NOAEC)	10	100	1 hr	OEHHA 2008
Mercury (Hg)	Central Nervous System disturbances in offspring	1.8 (LOAEC)	3,000	0.6	1 hr	OEHHA 2008
Manganese (Mn)	Inflammatory airway changes in rhesus monkeys	1.5 (minimal LOAEC) 2.72 (POD _{HEC})	300	9.1 (⁹)	1 hr	TCEQ 2017b
Nickel (Ni)	Slight changes in lung function in asthmatics	0.033 (LOAEC)	6	6	1 hr	OEHHA 2008
Zinc (Zn) (¹⁰)	Metal fume fever	2 (OEL) 5.33 (OEL _{ADJ})	10	530 (as ZnO) 430 (as Zn) (¹⁰)	1 hr	ACGIH 2015

Metal/ Metalloid	Health endpoint for guideline value	Critical effect level [mg/m ³] (²)	Uncertainty factor (³)	Air Guideline Value [µg/m ³] (¹)	Averaging time for guideline value	Reference
Barium (Ba)	No acute health guideline value located.					
Silver (Ag)	No acute health guideline value located.					
Lead (Pb)	No acute health guideline value located.					
1. Obtained from a variety of competent authorities where documentation is available for subsequent verification of the guideline if required. 2. NOAEC = No Observed Adverse Effect Concentration, LOAEC = Lowest Observed Adverse Effect Concentration, OEL = Occupational Exposure Level, BMCL₁₀ = Lower bound Benchmark Concentration for 10% effect, POD_{HEC} = Point of departure (human equivalent concentration), NOAEC_{ADJ} = Time-adjusted NOAEC, BC₀₅ = 95% lower confidence limit of benchmark concentration expected to produce a response rate of 5%. 3. UF = Uncertainty factor applied to the critical effect level (i.e. NOAEL or LOAEL). 4. Only limited information was available regarding the derivation of the acute AGV for antimony. The 24-hr air guideline value (AGV) for Sb was based on a rationale prepared by a consultant to the Ontario Ministry of Health in 1975. Sb had been linked to abnormalities in blood pressure and mortality resulting from chronic thrombosis and lesions in the respiratory system of humans. The consultant recommended a 24-hr AGV of 25 µg/m³, i.e. 1/20th of the ACGIH OEL of 500 µg/m³. The 30-minute AGV was set by Ontario MoE by applying a conversion factor of 3 to the 24-hr value (i.e. 25 µg/m³ x 3 = 75 µg/m³). Although the rationale for the acute AGV is not well described, and the setting of the AGV is dated, the OEL for Sb from the ACGIH (2015) remains unchanged. 5. The OEHHHA (2008) acute air guideline value for arsenic is based on a 4-hour experimental exposure, however OEHHHA (2008) indicate it can be applied to a 1-hour averaging time without temporal adjustment. This is because the critical period of exposure for a developmental effect may be very short relative to the study duration. 6. The ACGIH (2015) occupational exposure limit for beryllium is 0.00005 mg/m³, as an 8-hr time-weighted average (TWA), to protect against sensitisation to soluble beryllium compounds. Sensitisation is an immune response, not a disease, and does not have any symptoms. The effect of concern with Be exposure is chronic beryllium disease (CBD), however since CBD involves a Be-specific, cell-mediated immune response, CBD cannot occur without sensitisation (NRC 2007). The 8-hr TWA was converted to a 1-hr averaging time using Haber's rule as per guidance in NHMRC (2006): (C₁⁻³ x t₁) = (C₂⁻³ x t₂) C₂ = (0.05 µg/m³) x (8 hr/ 1 hr)^{1/3} C₂ = 0.1 µg/m³ 7. An Acute Exposure Guideline Level-1 (AEG1-1) is defined as the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic, non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure (US EPA 2010a). As a starting point, US EPA (2010a) used an experimental concentration of 0.55 mg Cd/m³ which resulted in slight respiratory irritation in female rats exposed to ultrafine cadmium oxide for 6 hours. They applied a rounded uncertainty factor of 10 (3x for interspecies, 3x for intraspecies differences) to the experimental concentration, and then applied Haber's rule for time scaling as follows: 0.55 mg/m³ ÷ 10 = 0.055 mg/m³ (C₁⁻³ x t₁) = (C₂⁻³ x t₂) C₂ = (55 µg/m³) x (360 min/ 60 min)^{1/3} C₂ = 100 µg/m³ 8. No acute air guideline value was found in the literature consulted for Cr^{III}. Therefore the value for Cr^{VI} has been conservatively used in this HHRA. 9. TCEQ (2017b) derived an acute reference value for manganese using a sub-chronic inhalation study in which rhesus monkeys were exposed to MnSO₄ at 1.5 mg Mn/m³ for 6 hrs/day, 5 days/week and evaluated after 15 days. The exposure resulted in pulmonary pathology including mild subacute bronchiolitis and alveolar duct inflammation (3/4 monkeys) and proliferation of bronchus-associated lymphoid tissue (2/4 monkeys). These effects did not occur in any control monkeys. This was adjusted by TCEQ (2017) to a 1-hour exposure concentration using Haber's rule as follows: C₂ = (1.5 mg Mn/m³) x (6 hr/1hr)^{1/3} C₂ = 2.72 mg Mn/m³. The UF consisted of 10x for human variability, 3x for toxicodynamic differences between rhesus monkeys and humans, 2x for use of a LOAEL, and 6x for limitations/uncertainties in the toxicological database. Although the total UF amounts to 360x, in accordance with TCEQ policy, the maximum UF of 300x was applied.						

Metal/ Metalloid	Health endpoint for guideline value	Critical effect level [mg/m ³] (²)	Uncertainty factor (³)	Air Guideline Value [µg/m ³] (¹)	Averaging time for guideline value	Reference
10. No acute air guideline value was located for zinc. However, the ACGIH has an occupational exposure limit (OEL) for zinc oxide which is based on the development of “metal fume fever” following inhalation to zinc oxide fumes and to a lesser extent zinc metal and many other zinc compound fumes. Symptoms for “metal fume fever” generally appear a few hours after exposure, and are reversible 1-4 days following cessation of exposure. Therefore, the symptoms are related to acute exposure to zinc oxide fume, making the endpoint suitable for derivation of an acute AGV. The 8-hr OEL was converted to a 1-hr average using Haber’s rule as per NHMRC (2006) guidance: $(C_1^3 \times t_1) = (C_2^3 \times t_2)$ $C_2 = (2,000 \mu\text{g}/\text{m}^3) \times (8 \text{ hr} / 1 \text{ hr})^{1/3}$ $C_2 = 5,333 \mu\text{g}/\text{m}^3 \text{ as ZnO}$ An uncertainty factor of 10 was applied to account for potential increased susceptibility in the general population, this was then multiplied by 0.8 to account for the molecular weight ratio of zinc in zinc oxide, giving a total UF of 8. The resulting AGV is 430µg Zn/m³ (rounded) over a 1-hour averaging time. The derived AGV is for toxicological effects related to zinc oxide fume (i.e. very fine particles with diameter of 0.2 – 1 µm) exposure. It should be noted metal fume fever is unlikely to occur from dusts. This is a conservative extrapolation of the effects of zinc oxide fumes to possible effects from exposure to Zn in emissions the Proposal.						

The maximum modelled cumulative 30-minute, 1-hour or 24-hour air concentration (i.e. existing situation plus increment from Proposal) provided by EMM (2020b) was compared with the published acute air guideline values in Table K.1. The resulting comparison is the hazard quotient, which are shown in Table K.2 below. This comparison showed acute HQs for individual metals ranged from 0.000002 to 0.19, with a HI of 0.25 (i.e. the sum of all acute HQs for all metals). Thus, the risk of harm to health from acute exposure to metals as a result of the Proposal is negligible.

Table K.2: Acute hazard quotients and hazard index for 100th percentile (i.e. maximum) ground level concentrations at maximum modelled location

Metal/Metalloid	Acute air guideline value (µg/m ³) (¹)	Maximum cumulative ground level concentration at maximum modelled location and relevant averaging time (µg/m ³) (²)	Hazard Quotient
Antimony (Sb)	75	0.001 (³)	0.00001
Arsenic (As)	0.2	0.0015	0.008
Beryllium (Be)	0.1	0.00005	0.0005
Cadmium (Cd)	100	0.0002	0.000002
Chromium (as Cr ^{VI})	1.3	0.03	0.02
Copper (Cu)	100	1.83	0.02
Mercury (Hg)	0.6	0.0003	0.0004
Manganese (Mn)	9.1	1.7	0.2
Nickel (Ni)	6.0	0.0008	0.0001
Zinc (Zn)	430	6.2	0.01
Hazard Index			0.25
1. From Table K.1 2. From EMM (2020b), see Appendix D. 3. 1-hour modelled ground level concentration was converted to a 30-minute averaging time using Haber’s Rule and n=3 as per guidance in NHMRC (2008).			

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Surface Soil / Dust Investigation Report

New Cobar Complex

Prepared for Peak Gold Mines Pty Ltd
September 2020





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Surface Soil / Dust Investigation Report

New Cobar Complex

Report Number

J190278 CLM1

Client

Peak Gold Mines Pty Ltd

Date

14 September 2020

Version

v1 Final

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Executive Summary

EMM Consulting Pty Limited (EMM) was commissioned by Peak Gold Mines Pty Ltd (PGM) to undertake a surface soil/dust investigation to support a human health risk assessment (HHRA). The investigation included sampling at and in the vicinity of proposed extensions to existing mining operations near Cobar, NSW (the Site).

PGM is in the process of investigating options for extending the life of the New Cobar Complex, and has identified the Gladstone and Great Cobar deposits as targets. The Great Cobar deposit was historically exploited by surface and underground mining between 1870 and 1919, but no mining activity has been undertaken since that time.

Approval is being sought under Section 4.2 of the *Environmental Planning and Assessment Act 1979* for the New Cobar Complex Underground Expansion Project as a State Significant Development (SSD). A scoping report was submitted to the Department of Planning, Industry and Environment (DPIE) in December 2019, and the Secretary's Environmental Assessment Requirements (SEARs) were issued in February. A requirement of the SEARs was to carry out a HHRA to assess the potential impacts of the project on the health of the local community in relation to air quality (including deposition of dust which may contain heavy metals).

The objective of this investigation is to develop an understanding of existing metal concentrations in surface soil/dust at the Site and surrounding township (herein referred to as the investigation area) that could impact on the proposed development, including a baseline assessment within the surrounding township.

To achieve the above objective, and in accordance with the requirements of the guidelines published by the NSW Environment Protection Authority (EPA), EMM undertook the following tasks:

- a review of the investigation area using publicly available information regarding current sensitive land uses to develop a Sampling Analysis and Quality Plan (SAQP);
- a review of the current investigation area environmental setting and characteristics, including geological maps and climate data;
- a Site inspection to assess the presence of sensitive human receptors, chemicals of potential concern (CoPC) or activities on-site and in the surrounding area which may contribute to CoPC presence in surface soil/dust;
- collection and analysis of 48 primary surface soil/dust samples;
- laboratory analysis of the fine dust fraction (<250 µm) for CoPC including bioaccessibility testing to support the HHRA; and
- preparation of this report, documenting the findings of the investigation and surface soil/dust sampling, in the context of current and future land use.

The results indicate that the investigation area features predominantly silty surface soil, which contains concentrations of CoPC (metals) less than the adopted site acceptance criteria (SAC) for the current applicable land uses, with the following exceptions:

- One minor exceedance (sample COB_004) of the residential land use (with accessible soil) guideline for lead in the township of Cobar. The lead concentration reported at COB_004 (370 mg/kg) exceeds the SAC (300 mg/kg) by ~23%, which is inconsistent with the remainder of the Cobar township dataset.

The source of lead present at this location is unknown. EMM notes that the sample was taken outside of the property boundary due to being unable to gain access to the property (ie the nature strip) and not within the

landscaped areas within the property (eg the backyard where direct soil contact by sensitive receptors is more likely to occur). As such, the sample location and analytical results are:

- not directly representative of the potential exposure scenario by sensitive receptors such as young children; and
- more likely to be influenced by a broader range of community activities and potential sources such as:
 - the sample was taken adjacent to a rusty fence, which may have contributed to the analytical result;
 - deposition of historic vehicle emissions from the adjacent road and prior use of leaded fuel; and
 - activities which may have occurred on the nature strip, for example vehicle washdown, paint flaking and/or equipment washdown of lead-based paint.

The land use at this sample location could be considered to be public open space (which has a SAC of 600 mg/kg), however a conservative approach has been adopted by applying the residential land use (and SAC of 300 mg/kg) as the screening criteria.

- Four sample locations within the mine site (a potential source area) which exceeded the guideline for lead for commercial/industrial land use (1,500 mg/kg). These results were not unexpected as the samples were taken on the tailings storage facility, in front of the change-house (which is frequented by employees in dirty clothes and boots at the end of shift) and on the Run-of-Mine (ROM) pad at New Cobar Complex. These exceedances can be addressed through the application of adequate WHS and environmental management controls to prevent occupational exposure and potential migration.

Background concentrations of lead (represented by three samples collected between 7 to 11 km to the south of Cobar/the mine) ranged from 7.6 to 11 mg/kg. Excluding sample COB_004 discussed above, the concentrations of lead reported for the remaining 29 samples collected from the township of Cobar ranged from 7.3 to 200 mg/kg, with an average of 44.2 mg/kg. These results indicate that lead concentrations in surface soil / dust across the township of Cobar are generally consistent with background concentrations with potentially some minor anthropogenic influences.

It is understood that the proposed development is expected to result in negligible *additional* surface disturbance outside of the areas permitted under the current approval (subject to detailed design). Application of soil resources management objectives and strategies would be undertaken in accordance with the existing Mining Operations Plan and Erosion and Sediment Control Plan which is incorporated in the Water Management Plan.

Additionally, EMM considers that all future surface disturbance works on the Site would be undertaken in accordance with responsibilities under relevant Work Health and Safety legislation and industry guidelines and as such, the potential risk of exposure to potential contaminants present on the site can be managed accordingly.

The data generated from this investigation provide a baseline assessment of the concentrations of metals in surface soil / dust at both the mine site and Cobar. This data will be utilised, in conjunction with air quality modelling, in a quantitative HHRA.

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Acronyms

List of Acronyms

Term	Definition
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
ASC NEPM	National Environmental Protection (Assessment of Site Contamination) Measure, as amended (2013)
ASS	Acid sulfate soils
CSC	Cobar Shire Council
CLM Act	Contaminated Land Management Act 1997 (NSW)
COC	Chain of custody
CoPC	Contaminants of potential concern
CSM	Conceptual site model
DA	Development application
DEE	Department of the Environment and Energy (Commonwealth)
DP	Deposited Plan
DPIE	Department of Planning, Industry and Environment (NSW)
DQI	Data quality indicators
DQO	Data quality objectives
DSI	Detailed Site Investigation
EMM	EMM Consulting Pty Ltd
EPA	Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
EPL	Environment Protection Licence
ha	Hectares
HEPA	Australia and New Zealand Heads of EPA
HHRA	Human Health Risk Assessment
HIL	Health investigation level
LGA	Local Government Authority
LOR	Limits of Reporting
m bgl	Metres below ground level
NEPC	National Environment Protection Council
NSW	New South Wales
PGM	Peak Gold Mines Pty Ltd

List of Acronyms

Term	Definition
POEO Act	Protection of the Environment Operations Act 1997 (NSW)
PPE	Personal protective equipment
ppm	Parts per million
QA/QC	Quality assurance/quality control
ROM	Run of mine
SAC	Site assessment criteria
SAQP	Sampling analysis and quality plan
SEAR	Secretary's Environmental Assessment Requirement (NSW)
SEPP 55	State Environmental Planning Policy No 55 – Remediation of Land (NSW)
SSD	State Significant Development
tpa	Tonnes per annum
TSF	Tailings storage facility
WRE	Waste rock emplacements
USCS	United Soil Classification System
USEPA	United States Environmental Protection Agency
WWTP	Wastewater Treatment Plant

1 Introduction

1.1 Background

Peak Gold Mines Pty Ltd (PGM), a wholly owned and operated subsidiary of Aurelia Metals Limited (Aurelia), owns and operates the Peak Gold Mines operation south-east of Cobar, far western New South Wales (NSW) see Figure 1.1.

The PGM operation comprises the New Cobar Complex located 3 kilometres (km) to the south-east of Cobar town centre and the Peak Complex located 10 km south-east of the town centre. Both complexes are located adjacent to Kidman Way, which connects Cobar to Hillston and Griffith to the south.

PGM has been operational since modern mining commenced at the Peak Complex in 1991 and all current mining operates under development approvals issued by Cobar Shire Council (CSC).

The New Cobar Complex Project State Significant Development (SSD) (the project) is an amalgamation of underground mining at New Cobar, Chesney and Jubilee deposits and development of new underground workings of the Great Cobar and Gladstone deposits to create the New Cobar Complex Project.

PGM is also seeking to consolidate all existing development approvals applicable to the New Cobar Complex into a single modern consent issued by the Department of Planning, Industry and Environment (DPIE). Approval will be sought for project elements accessed from, and undertaken within, the existing New Cobar Complex located within consolidated mining lease (CML) 6, mining purposes lease (MPL) 0854 and mining leases (ML) ML 1483 and ML 1805 (see Figure 1.1).

A scoping report was submitted to DPIE in December 2019, and the Secretary's Environmental Assessment Requirements (SEARs) were issued in February. A requirement of the SEARs was to carry out a Human Health Risk Assessment (HHRA) to assess the potential impacts of the project on the health of the local community in relation to air quality (including heavy metals) and noise.

EMM Consulting Pty Limited (EMM) has prepared this investigation report in general accordance with the National Environment Protection (Assessment of Site Contamination) Measure, 1999 as amended in 2013 (the ASC NEPM).

1.2 Objective

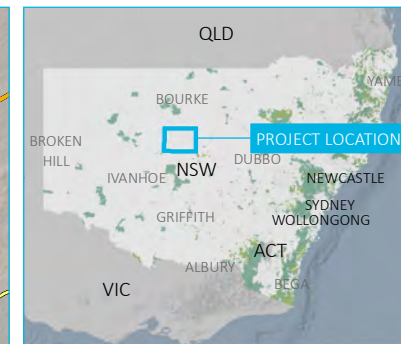
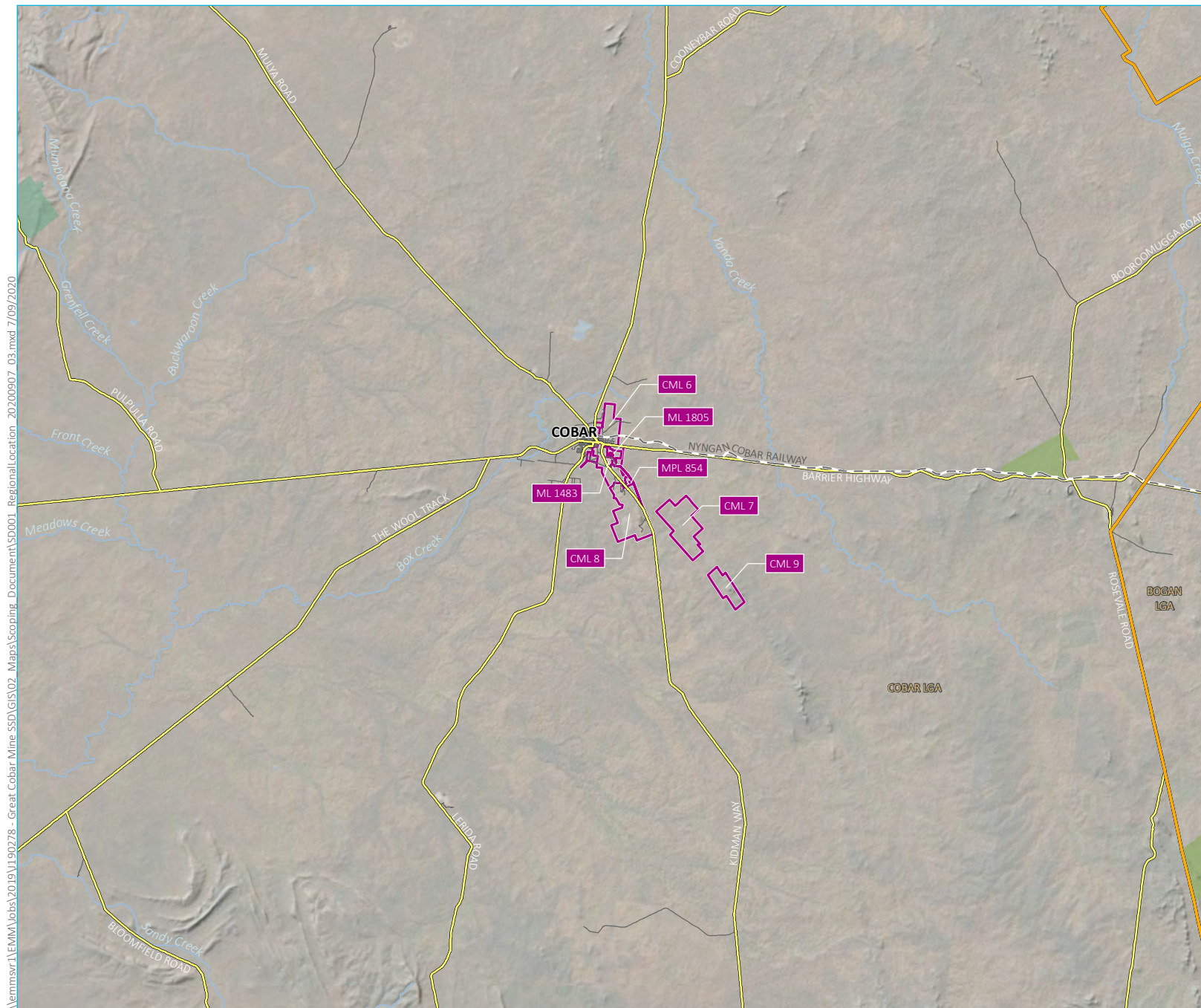
The objective of this investigation is to develop an understanding of existing metal concentrations in surface soil/dust at the mine Site and surrounding township (herein collectively referred to as the investigation area) that could impact on the proposed development, including a baseline assessment within the township. The investigation area is shown in Figure 1.1.

1.3 Scope of work

To achieve the above objective, and in accordance with the requirements of the ASC NEPM and guidelines published by the NSW Environment Protection Authority (EPA), EMM undertook the following tasks:

- a review of the investigation area using publicly available information regarding current sensitive land uses to develop a Sampling Analysis and Quality Plan (SAQP);
- a review of the current investigation area environmental setting and characteristics, including geological and hydrogeological maps;

- an inspection of the Site and surrounds to assess the presence of sensitive human receptors, chemicals of potential concern (CoPC) and activities in the investigation area which may contribute to CoPC presence in surface soil/dust;
- collection and analysis of 48 primary surface soil/dust samples;
- laboratory analysis of the fine dust fraction (<250 µm) for CoPC including bioaccessibility testing to support the HHRA; and
- preparation of this report, documenting the findings of the investigation and soil sampling, in the context of future land use.



KEY

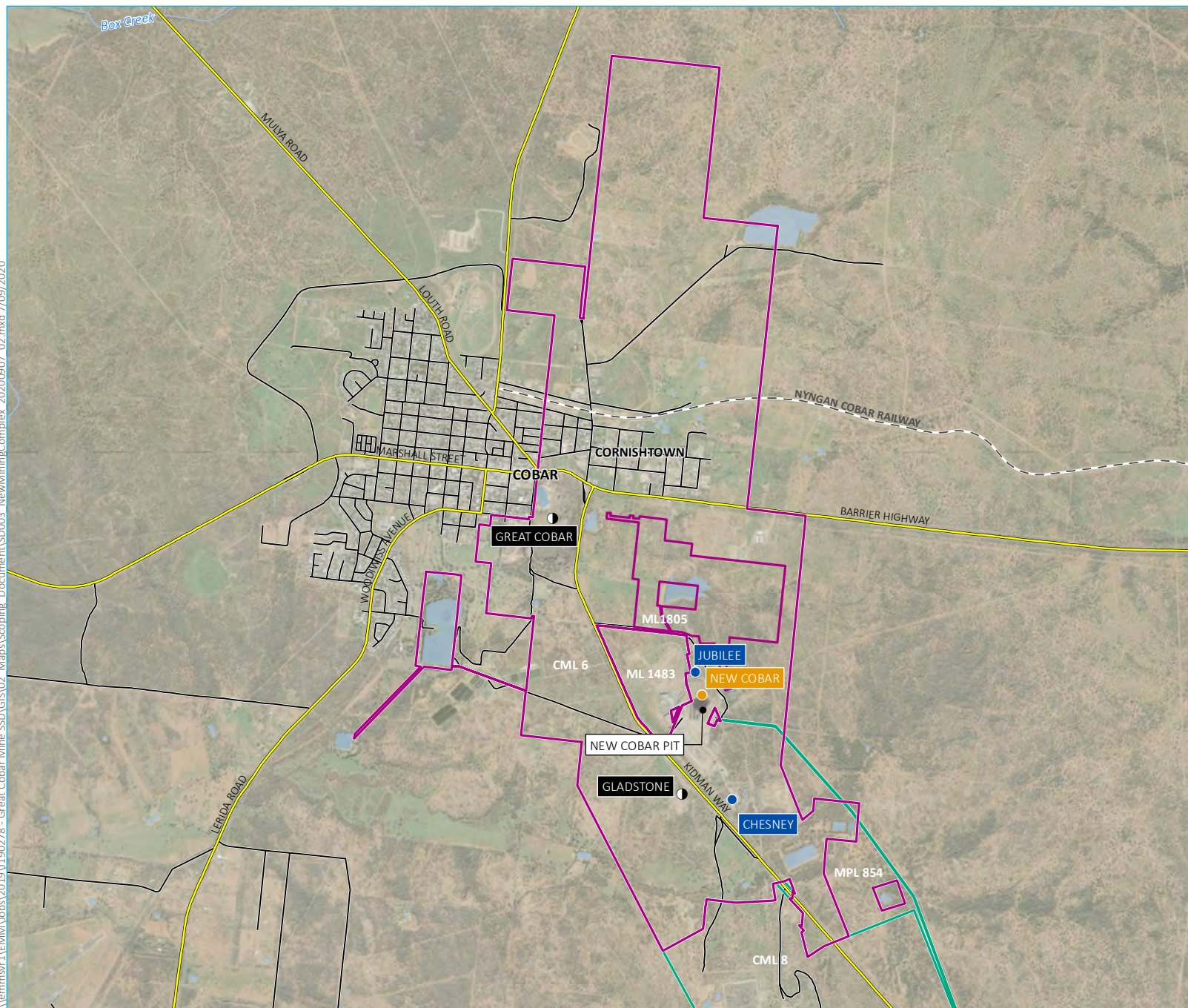
- Mining lease boundary
- Rail line
- Major road
- Minor road
- Named watercourse
- Waterbody
- Local government area
- NPWS reserve
- State forest

Regional location of the Peak Gold Mines

Peak Gold Mines
New Cobar Complex Underground Project EIS
Surface soil/dust investigation
Figure 1.1



\\lemmsvr1\EMM\Jobs\2019\190278 - Great Cobar Mine SSD\GIS\02 Maps\Scoping Document\SD003 NewMiningComplex 20200907 02.mxd 7/09/2020



- KEY**
- Completed working
 - Current working
 - Future working
 - - Rail line
 - Main road
 - Local road
 - Named watercourse
 - Waterbody
 - Mining lease boundaries
 - New Cobar Complex
 - Peak Complex

New Cobar Complex

Peak Gold Mines
New Cobar Complex Underground Project EIS
Surface soil/dust investigation
Figure 1.2



Source: EMM (2020); DFSI (2017); GA (2011); DPE (2019)

0 1 2 km
GDA 1994 MGA Zone 55

1.4 Regulatory framework

The ASC NEPM establishes a nationally consistent approach to the assessment and management of contaminated land in Australia and is given effect by legislation and guidelines in each state and territory. Contaminated land in NSW is primarily dealt with by the NSW EPA and planning authorities (state and local governments). Relevant NSW legislation, policies and guidelines are described below.

1.4.1 NSW Contaminated Land Management Act 1997

The NSW *Contaminated Land Management Act 1997* (CLM Act) aims to better promote the management of contaminated land. The objectives of the CLM Act are to establish a process for investigating and (where appropriate) remediating land areas where contamination presents a significant risk of harm to human health or some factor of the environment.

The NSW EPA has powers to respond to contamination that is causing significant risk of harm to human health or the environment. The NSW EPA can direct landowners to investigate or remediate contaminated land and requires landowners to report contamination where there is a significant risk of harm (duty to report). The CLM Act may be triggered if contamination migrates beyond site boundaries.

1.4.2 NSW Protection of the Environment Operations Act 1997

The NSW *Protection of the Environment Operations Act 1997* (POEO Act) is also administered by the NSW EPA. It prohibits any person to cause pollution of waters, land or air and provides penalties for specified offences. The POEO Act enables the NSW Government to set out explicit protection of the environment policies and adopt more innovative approaches to reducing pollution. The POEO Act also requires "scheduled activities" listed at Schedule 1 to the POEO Act to be carried out in accordance with an Environment Protection Licence (EPL).

1.4.3 Environmental Planning and Assessment Act 2000 and State Environmental Planning Policy (SEPP) 55 – Remediation of Land

SEPP 55 – Remediation of Land (SEPP 55) is a planning instrument under the *Environmental Planning and Assessment Act 2000* (EPA Act) that applies to land in NSW.

SEPP 55 Clause 7 outlines considerations regarding contamination and remediation in determining development applications by local government authorities and provides requirements for investigations to be undertaken where a change of land use is proposed.

SEPP 55 also specifies when remediation works will require Development Consent from the Local Government Authority (LGA).

1.4.4 Guidelines

Relevant guidelines made or endorsed by the NSW EPA that have been considered in this investigation include:

- National Environment Protection Council, 1999 (as amended 2013). *National Environment Protection (Assessment of Site Contamination) Measure* (ASC NEPM);
- NSW Environment Protection Authority (NSW EPA), 2017. *Guidelines for the NSW Site Auditor Scheme (3rd edition)*;
- NSW Office of Environment and Heritage (OEH), 2011. *Guidelines for Consultants Reporting on Contaminated Sites*; and

- NSW Department of Urban Affairs and Planning (DUAP), 1998. *Managing Land Contamination: Planning Guidelines SEPP55 Remediation of Land*.

EMM has also referred to the following sampling procedure:

- United States Environment Protection Authority (US EPA), 1993. *Compilation of Air Pollutant Emission Factors, AP-42, 5th Edition, Volume I. Stationary Point and Area Sources. Appendix C-1: Procedures for Sampling Surface/Bulk Dust Loading*.

1.5 Proposed development

All surface works associated with the project will be located underground or in an existing, operational mining complex (the New Cobar Complex) except for a short (no more than 400 m) powerline from an existing 22 kV line servicing PGM to a compact substation within the exploration box cut.

PGM proposes to use the decline, infrastructure and intake and exhaust ventilation elements developed for the Great Cobar exploration drive (approved, but not yet constructed) to facilitate project development. Ventilation fans are not required during the development of exploration activities, however as they will be necessary during operation of mining, construction of a new powerline and compact substation, to be located adjacent to the vent riser is required. No additional new surface infrastructure is proposed.

The existing surface infrastructure and facilities at the New Cobar Complex currently support underground mining of the New Cobar, Chesney and Jubilee deposits, and will continue to be used for this project (Figure 2.1). Access to all underground workings in the complex is from a portal and decline at the base of the New Cobar open cut pit. SSD approval will be sought for the following project elements accessed from, and undertaken within, the existing New Cobar Complex:

- Underground mining of the New Cobar Complex including, but not limited to, New Cobar, Jubilee and Chesney (presently operating under an existing development approval issued by CSC).
- Underground mining of the New Cobar Complex including Great Cobar and Gladstone (not yet approved).
- Groundwater dewatering of the relevant historic and proposed underground workings via the historic Great Cobar Shaft (existing development approval issued by CSC).
- Increase of the number of ore haulage trucks between the New Cobar Complex and Peak Complex from 25 loaded trips per day (50 movements in and out) to 50 loaded trips (100 movements in and out) per day (daylight hours only) averaged over a calendar year. The increase of daily truck movements will provide flexibility to PGM if there are unforeseen production disruptions (eg bad weather).
- Crushing and screening of ore within the existing surface ROM pad at the New Cobar Complex (existing approval by CSC).
- Transportation of ore to the Peak Complex via Kidman Way for processing, using road registered heavy vehicles (existing approval by CSC).
- Harvesting of waste rock and:
 - immediately deploying the material underground for use in stope backfilling operations (waste rock will remain underground and will not be transported to the surface as a preference); and
 - transportation of non-acid forming material to the surface for use across the complexes for construction/rehabilitation tasks (eg tailings dam lifts).

- Deposition of potentially acid forming waste rock brought to the surface and stored within the waste rock emplacements (WRE) where at end of mine life it would be capped, or progressively returned underground for disposal.
- Continuation of all other approved activities within the New Cobar Complex.

Processing will remain at the existing approved rate of up to 800,000 tonnes per annum (tpa), with production of ore from the Great Cobar and Gladstone deposits making up for the future decrease in production from other workings across PGM.

Additionally, there are remaining resources in the New Cobar, Jubilee and Chesney deposits that are mineral rich, but which are currently not economical to mine in isolation. Keeping the New Cobar Complex operational and gaining access to Great Cobar and Gladstone deposits will lead to increases in economies of scale and maximise opportunities to mine these resources, and keep PGM operational until 2035.

2 Environmental setting

2.1 Site location and description

The Site is situated in far western NSW, approximately 270 km linearly north-west of Dubbo, 310 km north of Griffith and 550 km north-west of Sydney (refer to Figure 2.1). The PGM operation is comprised of:

- the New Cobar Complex, located 3 km to the south-east of Cobar; and
- the Peak Complex, located 10 km south-east of Cobar.

Both Complexes are located adjacent to the Kidman Way which connects Cobar to Hillston and Griffith to the south.

The investigation study area included the Cobar NSW township, New Cobar Complex (2 km south-east of township), Peak Complex (7 km south-east of township), and background locations up to 2 km north-east of Cobar, 11 km south of Cobar and 7 km south of the Peak Complex.

2.2 Site layout and operations

Geologically, the area around Cobar comprises a series of polymetallic high-grade ore bodies dominated by gold, silver, copper, lead and zinc, with a long history of stable, large-scale, low cost production that has produced more than 200,000 tonnes of copper and three million ounces of gold since mining began in the area in 1870.

PGM has been operational since modern mining commenced at the Peak deposit in 1991 and operates under development approvals issued by CSC. Mineral production commenced in 1992, producing gold, copper, lead, zinc and silver.

Modern mining at the New Cobar Complex commenced with the open cut in 2000, then transitioned to underground mining in 2004. The current approvals at Peak and New Cobar allow for the operations to continue indefinitely and process up to 800,000 tpa of ore at the Peak processing facility; tailings are placed at the Peak TSF, both located at the Peak Complex.

Historical mining in and surrounding Cobar has been ongoing for approximately 150 years. There are a number of historic operations surrounding Cobar and the Peak Gold Mines including Great Cobar (1871), Chesney (1887), Young Australia (1896), Occidental (1889 – later New Occidental), Peak (1896), Cobar Gold Mine (1890 – later New Cobar), Queen Bee (1902) and Mount Pleasant (1895).

The existing surface infrastructure and facilities at the New Cobar Complex support underground mining of the New Cobar, Chesney and Jubilee deposits. Access to all underground workings in the complex is from a portal and decline in the base of the New Cobar open cut which operated as an open cut mine before mining transferred to an underground operation. Surface facilities include:

- administration and car parking;
- workshop and laydown yard;
- magazine;
- run-of-mine (ROM) pad;
- waste rock emplacements (WRE);

- sulphide pit;
- soil stockpiles;
- sediment basins (stormwater);
- settling ponds (mine dewatering); and
- dewatering/stormwater storage (Spain's and Young Australia dams) and mine dewatering lines.

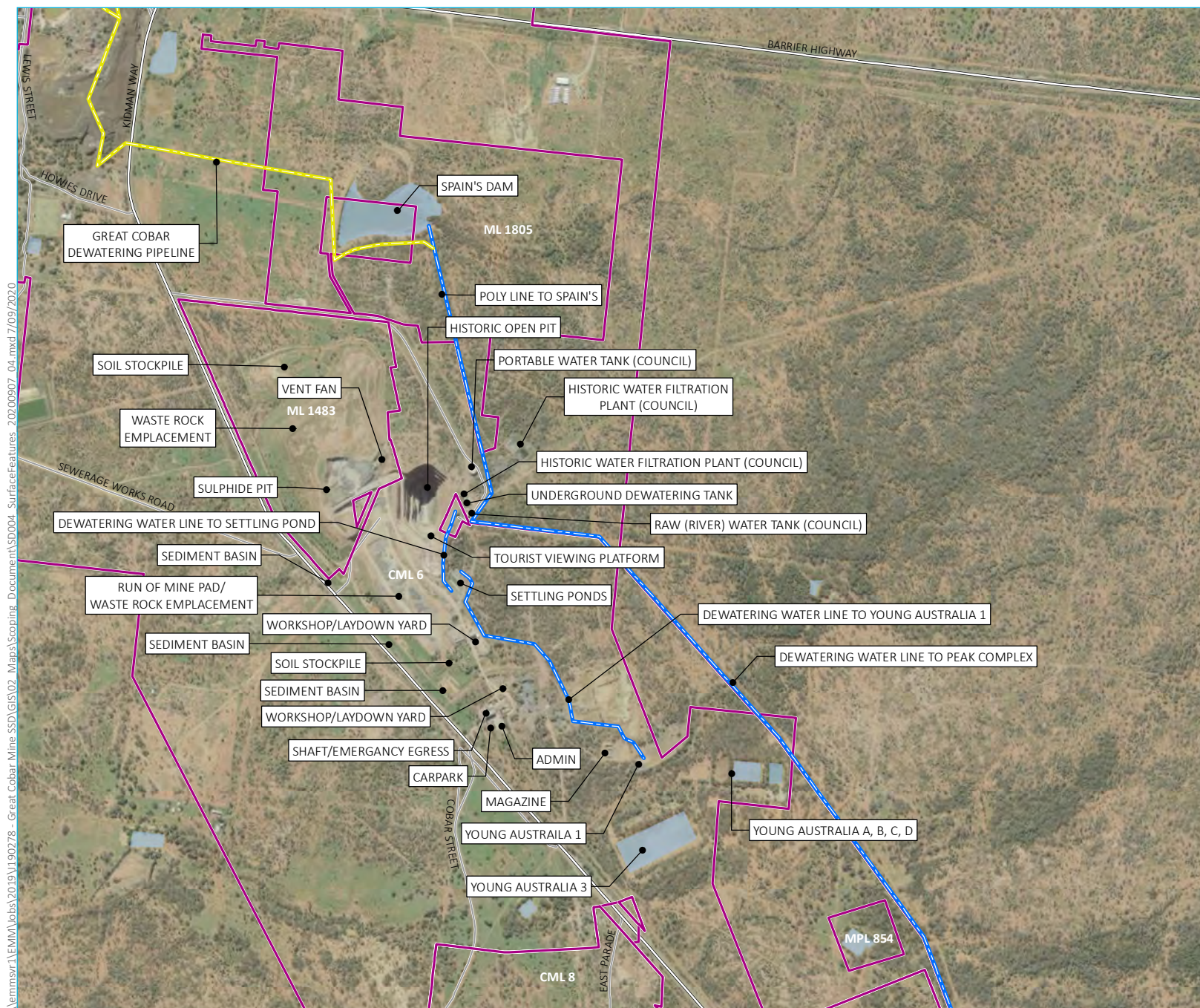
Current mining operations at the New Cobar Complex are undertaken by bench and open stoping methods. Mining generally progresses from the base upwards in each panel. Drifts are driven along strikes in the ore, a slot is developed, and ore is blasted into the void created by the slot. Ore is then extracted. Waste rock is then used to backfill mining stopes. Waste rock from the Peak Complex is also transported to the New Cobar Complex to be used as backfill and vice versa.

Ore is transported to the surface ROM pad where, if necessary, oversized material is broken up by a rock breaker, or it may be crushed, graded and loaded onto road registered haul trucks then transported along Kidman Way to the Peak Complex for processing. Trucks returning from the processing facility are backloaded with waste rock for backfilling at New Cobar, as required.

Features of the New Cobar Complex are shown in Figure 2.1 below. The site is highly disturbed, with a surface area of approximately 1,350 hectares (ha) and incorporates all areas and components of the New Cobar Complex.

The New Cobar open cut extends to a depth of 100 m below ground level (bgl). Development of underground working at New Cobar Complex extends from a portal at the base of the New Cobar open cut. The Great Cobar and Gladstone deposits will also be accessed through this portal.

To the north and west of the pit is a vent fan and WRE which have been wholly or partially rehabilitated. To the south and south-east of the pit are the ROM pad, water retention infrastructure, workshops and administration buildings.



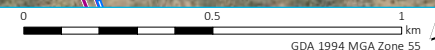
- KEY
- Indicative pipeline route (existing)
 - Great Cobar dewatering pipeline (existing)
 - Main road
 - Local road
 - Waterbody
 - Mining lease boundary
 - New Cobar Complex
 - Peak Complex

Existing surface features

Peak Gold Mines
New Cobar Complex Underground Project EIS
Surface soil/dust investigation
Figure 2.1



Source: EMM (2020); DFSI (2017); GA (2011); DPE (2019)



2.3 Surrounding land uses

Notable features in the surrounding area are summarised in Table 2.1.

Table 2.1 Surrounding land use

Direction	Land use and features
North	The Barrier Highway and privately owned properties within the township of Cobar are located to the north of the mine site. The Nyngan–Cobar railway runs in an east-west direction to the north of the residential area, followed by Crown Land.
East	Crown Land and Cobar Shire Council land is located to the east of the mine.
South	Additional mining activities and scrubland occur to the south.
West	Privately held land (including residential), recreational and some areas of Crown Land are located to the west of the mine.

2.4 Geology and soils

The landscape of the Cobar region is typically comprised of plains, rolling downs, drainage lines and undulating rounded ridges with a maximum elevation of ~300 m Australian Height Datum (AHD). Substantial modification from both historic and current mining activities has been made in certain areas with open cuts, slag and tailings repositories.

The soils across the region are similar within each landscape feature, as follows:

- The soils are typically thin on the ridges and crests, comprised of stony red loam which increases in depth downslope and transitions to subsoil with a large proportion of stones.
- Lower slopes contain fewer stony inclusions, and transition from red to yellow subsoils.
- Brown clay is more common in drainage lines, and red and earthy sands are present within the plains.

The geology of the study area consists of siltstone and mudstone layers of varying thickness, and alluvial gravels with sand, silt and clay.

2.5 Surface water and drainage

The study area is located within the Yanda Mulga Sandy Creeks Catchment, which is one of six surface water catchments forming the Intersecting Streams Water Resource Plan Area (WRPA, NSW DPIE 2019). The WRPA is approximately 120,431 km² and represents approximately 11.4% of the Murray Darling Basin.

The Yanda Catchment is located in the Cobar Peneplain Bioregion, and is comprised predominantly of ephemeral streams, flowing through the arid landscapes to the Darling River. Catchment flow records indicate >90% of the flow is <1 megalitres per day (ML/day) (NSW DPIE, 2019).

2.6 Climate

The climate of the Cobar region is semi-arid, with cool to mild winters and hot summers. Average monthly maximum temperatures range from ~13 to 20°C in winter and ~28 to 39°C in summer (Bureau of Meteorology¹).

Rainfall is unreliable and extremely variable, with an annual average of 390 millimetres (mm). Higher rainfall typically occurs in late summer, and the average rainfall in January, February and April is more than double the median rainfall.

Humidity is low, with an average relative humidity of 30 to 50% in the summer months, and 45 to 75% in winter.

Prevailing wind directions vary throughout the year, however winds towards the southwest dominate across all seasons. The frequency of winds originating from the west noticeably increases during the winter and spring months.

The highest rate of evaporation typically occurs in the months of December and January.

¹ <http://www.bom.gov.au/nsw/cobar/climate.shtml>

3 Data gap analysis

The following key issues were identified:

- Community members have raised concerns regarding the potential for increased exposure to lead via deposition and contact with lead-bearing dust associated with the proposed vent rises. These concerns have arisen in the community as:

- The proposed underground mining operations will occur in closer proximity to the town than current operations. It is noted the proposed development will be wholly underground excluding the vent rises.

The installation of vent rises and vent fans with the potential for dispersion of dust from the mine over the town. Air dispersion modelling for the Review of Environmental Factors (REF) associated with the Great Cobar Exploration Decline has indicated the likelihood of increased dust levels is negligible. Community consultation during the scoping stage revealed a strong community perception that emissions from the exhaust vent approved for the Great Cobar Exploration Drive, will have a negative impact on local air quality and health.

In response to these concerns, PGM collaborated with the community and has revised the location and design of this infrastructure. Given that the exhaust vent would continue operation post EIS approval, it has been relocated approximately 500 m to the southeast of its originally proposed location. The outlet has also been redesigned to direct emissions away from the town and the vent fan will be installed 100 m below ground level at the base of a 500 m service decline. *This will be fully assessed in the air quality impact assessment, as such this has not been considered further in this investigation.*

- The height of the current tailings storage facility will be raised. This is currently being assessed under a separate approval.
- There is a long history of mining activities in the Cobar region, with gold first reported in the area in 1887. Deposits of high-grade gold, silver and base metals (including copper, lead and zinc) have been mined over approximately 150 years. PGM's operations currently produce gold, lead, zinc, copper and silver.

There are no known previous studies of potential contamination and/or associated human health risks conducted in the township of Cobar.

Uncertainties were identified regarding the following:

- The background concentrations of metals including copper, lead and zinc.
- The present "baseline" level of risk of exposure to residents in the township of Cobar associated with the presence of metals including copper, lead and zinc.
- The potential increase in risk of exposure above the "baseline" posed by the expansion of the mine (if any).

Specific concerns have been raised by members of the community with respect to potential impacts to schools, preschools and recreational facilities within the Cobar township.

As such, a site-specific quantitative HHRA is required to assess potential human health risks associated with the presence of deposited dust under the current land use scenario and mining activities. The HHRA will evaluate the human health risks of existing exposures to metals in surface soil/dust in Cobar, as well as evaluating potential future exposures. This will inform the expansion of mining operations and assist in identifying modifications or mitigations which may assist in reducing potential future human health risks. The HHRA requires data inputs which are representative of concentrations of CoPCs which community members may encounter. This investigation was designed to provide the required information.

4 Conceptual site model

Based on EMM's review of the environmental setting, proposed development and data gap analysis, a conceptual site model (CSM) has been developed to identify complete or potentially complete linkages between contaminant sources and sensitive receptors. The preliminary CSM developed in conjunction with the Sampling and Analysis Quality Plan (SAQP) is summarised below. Information obtained during this investigation has been utilised to refine the preliminary CSM (refer to Section 7.3).

4.1 Chemicals of potential concern

Based on the data gaps identified and views expressed during the course of community consultation, metals/ metalloids were the focus of this study. Based on the mineralogy of the region and similar studies conducted in other mining regions (eg Broken Hill), the CoPCs identified for this study were:

- Arsenic (As);
- Barium (Ba);
- Beryllium (Be);
- Cadmium (Cd);
- Speciated chromium (Cr III and Cr IV);
- Copper (Cu);
- Iron (Fe);
- Nickel (Ni);
- Lead (Pb);
- Manganese (Mn);
- Zinc (Zn);
- Mercury (Hg);
- Silver (Ag);
- Gold (Au); and
- Antimony (Sb).

Based on assessments conducted in other townships with similar circumstances (eg Broken Hill, NSW), EMM understood that the risk driver was likely to be the presence of CoPCs in surface soil and surficial dust deposits. As such, these media were targeted in the investigation.

4.2 Potential sources

Potential sources of the CoPCs from the mine site where soil disturbance occurs and where windborne dust may be generated currently and/or in future were identified as follows:

- the TSF, where tailings are currently placed post-processing. This area will continue to be utilised during future operations of the proposed underground operational expansion;
- the ROM pad (to the south of the open cut) and waste rock emplacement areas (to the south and north-west of the pit), where dust may be generated during materials handling activities;
- stockpiles of soil material placed to the north and south of the pit;
- areas where vehicular traffic and/or maintenance works may periodically occur, including:
 - the tourist viewing platform;
 - the settling ponds and sediment basin; and
 - the workshop and laydown yard;
- construction of the proposed pipeline to the south and west of the pit; and
- the proposed outlet exhaust vent, as noted in Section 3 above. *This will be fully assessed in the air quality impact assessment, as such this has not been considered further in this investigation.*

The proposed development is expected to result in negligible *additional* surface disturbance outside of the areas permitted under the current approval (subject to detailed design). Application of soil resources management objectives and strategies would be undertaken in accordance with the existing Mining Operations Plan and Water Management Plan incorporating an Erosion and Sediment Control Plan.

It is noted that there may be other sources of CoPCs in and around the township of Cobar, including:

- naturally occurring/background concentrations present in soil/dust across the region; and
- other historical activities within the town which may have contributed to soil CoPC concentrations (if any), for example historic use of lead-based paints and fuels, application of timber treatment products, surface spills and waste disposal activities.

4.3 Potential sensitive receptors

The focus of the study is potentially sensitive receptors in the township of Cobar, including the following:

- adult residents;
- child residents, with younger children (eg 1 to 5 years old) being the most susceptible;
- child and adult attendees at schools (primary and high schools), pre-schools, day care centres and kindergartens; and
- child and adult users of public recreational and other community facilities.

5 Data quality objectives and data quality indicators

5.1 Data quality objectives

The process of establishing appropriate Data Quality Objectives (DQOs) is defined by the seven-step planning approach presented in the ASC NEPM (NEPC, 2013). The methodology presented was designed to meet the objectives for the investigation and to achieve the nominated DQOs.

The approach adopted relative to the seven steps was outlined in the SAQP prepared for the investigation (EMM, 2020), and is presented in Table 5.1 below.

Table 5.1 Data quality objectives

DQO Step	Description
Step 1: State the problem	<i>The first step involves summarising the problem that will require new environmental data, identifying the resources available to resolve the problem, and developing a CSM.¹</i> The overarching problem to be addressed was that there was a degree of uncertainty regarding the generation of airborne dust from the Site and potential health risks to residents of the township of Cobar. It was unknown whether a complete linkage exists between the CoPCs (refer to Section 4.1) and potential human receptors (adults and children in the township of Cobar) until appropriate, site-specific data was available. Therefore, the objective of this study was to assess the current baseline conditions by conducting a targeted sampling program, air quality modelling program, and subsequently a HHRA, to ascertain the current level of risk and to determine whether it could be amplified by the proposed expansion of the underground mining operations. As such, the program was designed to: • collect appropriate, site-specific data (both on-site and off-site); • refine the initial understanding of exposure potential; and • provide suitable input data to inform and support the quantitative HHRA. The team nominated to deliver this study was as follows: • Task Lead: Victoria Buchanan (EMM); • Human Health Risk Assessor: Tarah Hagen (SLR); • Bioaccessibility Specialist: Dr. Albert Juhasz (University of South Australia); • Task Manager/Field Manager: Lachlan Lewis (EMM); and • Field Support: Andrew Badham (EMM).

Table 5.1 **Data quality objectives**

DQO Step	Description
Step 2: Identify the decisions	<i>The second step involves identifying the decisions that need to be made about the problem and the new environmental data required to make them.¹</i> Given the extensive history of mining activities in the Cobar region and the proposed expansion of PGM operations, site-specific data suitable for a quantitative HHRA are required. The HHRA will further support and inform community engagement activities. The targeted sampling program to generate this data included: • assessment of background (ie naturally occurring) concentrations of CoPCs by collection of soil samples upgradient of the Site (based on predominant/prevaling wind conditions); • assessment of concentrations of CoPCs by collection of soil samples at potential source areas at the Site which could potentially mobilise as windborne dust and migrate off-site; • assessment of existing concentrations of CoPCs in surface soil/dust by collection of soil samples downwind of the Site and in the vicinity of potentially sensitive receptors in the township of Cobar; and • analysis of the bioaccessibility of arsenic (As) and lead (Pb) present in surface soil/dust in Cobar.
Step 3: Identify inputs to the decision	<i>The third step involves identifying the information needed to support any decision and whether new environmental measurements will be needed.¹</i> Information inputs included: • the identified CoPCs (refer to Section 4.1); • identification of potential sensitive receptors and the environmental media to be investigated (refer to Section 4.2); • the adopted assessment criteria (refer to Section 6.4); • identification of representative sampling locations (refer to Section 6.1.2); • field observations made during execution of the sampling program (refer to Section 7.1); • suitable analytical methods to produce the requisite data (refer to Section 6.3); and The environmental data generated by the sampling program (and subsequent data quality validation tasks) will serve as inputs to the risk assessment processes.
Step 4: Define the study boundaries	<i>The fourth step involves specifying the spatial and temporal aspects of the environmental media that the data must represent to support decision(s).¹</i> The boundaries of the study are: • Lateral: as outlined in Section 2.1. This study area includes: – background areas located upgradient of the Site (with respect to predominant wind direction); – on-site areas where generation of windborne dust was considered most likely; and – within the township of Cobar. PGM representatives assisted by EMM’s Communications and Engagement team facilitated access to private property where required. • Vertical: soil/dust samples were collected at the ground surface, as per US EPA (1993). • Temporal: samples were collected in April 2020. The outcomes of the subsequent HHRA and community engagement activities will determine whether or not further sampling is required.

Table 5.1 **Data quality objectives**

DQO Step	Description
Step 5: Develop a decision rule	<i>The fifth step involves defining the parameter of interest, specifying the action level, and integrating information from Steps 1–4 into a single statement that gives a logical basis for choosing from alternative actions.¹</i> Laboratories for sample analysis were National Associated of Testing Authorities (NATA) accredited for the requested analysis with the exception of bioaccessibility testing. Analysis for the bioaccessibility of arsenic and lead was undertaken by the University of South Australia (UniSA). No laboratory is NATA accredited for bioaccessibility testing, however UniSA has an alternate approach to quality assurance (refer to Section 6.3.2). The decision rules adopted to address the problem identified in Step 1 above are as follows: • <i>Is the data of acceptable quality for interpretive purposes?</i> Acceptance of the analytical data will be made on the basis of the data quality indicators (DQIs, refer to Section 5.2). – If the DQIs are satisfied, the acceptance decision is Yes. – If the DQIs are not satisfied, the acceptance decision may be No, and further evaluation of the quality, reliability and useability of the data may be required. • <i>Is there an appropriate level of understanding of background concentrations to inform the investigation outcomes?</i> Background sampling was conducted during the targeted sampling program, which is intended to inform both the investigation and the HHRA. – If the DQIs are satisfied (as per the decision step above), then the decision is Yes. – If the DQIs are not satisfied, the acceptance decision may be No, and further evaluation of background concentrations may be required. • <i>Has sufficient environmental data been collected to address the study objectives?</i> The targeted sampling program has been developed in consultation with the Risk Assessor. However: – If the DQIs are met and statistical analysis of the range of concentrations indicate that the data is suitable for input to the HHRA, then the decision is Yes. – If the DQIs are not met and/or the statistical analysis indicates that there is insufficient data for the purposes of the HHRA, then the data set will be further evaluated for useability and the decision may be No and additional data will need to be collected. • <i>Are there potentially unacceptable risks to human health associated with the identified CoPCs and receptors?</i> – If the contaminant concentrations are less than the adopted Tier 1 screening criteria (refer to Section 6.4), then the decision will be ‘no’ and risks will be assumed to be negligible. – If the concentrations are equal to or greater than the adopted assessment criteria, then the decision will be ‘potentially yes’ and data will be utilised in the quantitative HHRA (which will inform future actions, if required).
Step 6: Specify limits on decision errors	<i>The sixth step involves specifying the decision-maker’s acceptable limits on decision errors, which are used to establish performance goals for limiting uncertainties in the data.¹</i> This step is to establish the tolerable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data. Data generated during this project must be appropriate to allow decisions to be made with confidence. A decision error may lead to either underestimation or overestimation of the risk level associated with a sample location. Decision errors/limitations may include: • Access restrictions which may limit the field team’s ability to acquire representative data (eg landowner/ occupant denies access). This was mitigated to the extent possible via the Communications and Engagement tasks. • Errors can occur during sample collection, handling, preparation and analysis; for example, incorrect completion of Chain of Custody (COC) documentation or failing to meet preservation requirements. This is mitigated via details provided in the SAQP, an appropriate and thorough field brief, and regular communication (as per the project Communication Plan) during fieldwork between the sampling team, Project Manager and Technical Lead. • Data may not be representative of site conditions. This was considered unlikely to occur as each of the proposed sampling locations were selected to target specific potential CoPC sources and/or receptors.

Table 5.1 Data quality objectives

DQO Step	Description
Step 7: Optimise the design for obtaining data	<i>The seventh step involves identifying the most resource-effective sampling and analysis design for generating the data that are required to satisfy the DQOs.¹</i> The methodology presented in the SAQP presented a targeted sampling program which was designed to: • meet the scope objectives; and • achieve the nominated DQOs. Optimisation of the data collection process is informed by the review of relevant existing information, community feedback provided during the initial engagement session and observations made at the time of the investigation. As previously noted, sampling was undertaken to assess the nature and extent of existing CoPC concentrations in surface soil/dust. These data will be used to inform the HHRA, recommendations for further sampling (if required), and implementation of management actions to address potential risk to identified receptors (if required). The scope of work was carried out in accordance with the ASC NEPM (NEPC, 2013), and utilising the methodology presented in US EPA (1993).

¹ From ASC NEPM, Schedule B2 Appendix B: Data quality objectives (DQO) process

5.2 Data quality indicators

The project data quality indicators (DQIs) were established to set acceptance limits on field and laboratory data collected as part of this study. Acceptance limits are set at different levels for different projects and by the laboratories for both field and laboratory procedures.

Non-compliances with acceptance limits have been documented and discussed in Section 7.3 of this report.

The DQIs for this study are presented in Table 5.2 below.

Table 5.2 Data quality indicators

DQI	Field	Laboratory	Acceptability limits
Completeness	All critical locations sampled	All critical samples analysed and for all CoPCs	As per ASC NEPM (NEPC, 2013)
	All samples collected	Appropriate methods implemented	
	Standard Operating Procedures (SOPs) appropriate and complied with	Appropriate laboratory limits of reporting (LORs)	
	Experienced sampler	Sample documentation complete	
	Documentation correct	Sample holding times complied with	
Comparability	SOPs used on each occasion	Consistent analytical methods used	As per ASC NEPM (NEPC, 2013)
	Experienced sampler	Sample laboratory LORs (justify/quantify if different)	
	Climatic conditions	Consistent laboratories (NATA accredited)	
	Same types of samples collected	Consistent reported units of measurement	

Table 5.2 Data quality indicators

DQI	Field	Laboratory	Acceptability limits
Representativeness	Appropriate media sampled	All critical samples analysed and for all CoPCs as required for the project objectives	Appropriate samples analysed
	Sample locations are representative of conditions likely to be conducted by identified human receptors during daily activities		
Precision	SOPs appropriate and complied with	Analysis of:	Relative Percent Differences (RPDs):
	Collection of intra and inter-laboratory duplicate samples	Intra-laboratory duplicate samples (1 in 20 samples)	RPDs less than 50% ^{(1) (2)}
		Inter-laboratory duplicate samples (1 in 20 samples)	RPDs less than 50% ^{(1) (2)}
Accuracy		Laboratory duplicate samples	RPDs less than 50% ^{(1) (2)}
	Sampling methods are appropriate and complied with	Analysis of:	
	Collection of rinsate blanks	Rinsate blanks (1/matrix/equipment/day)	Non-detect for CoPC in blanks
		Method blanks	Non-detect for CoPC in blanks
		Laboratory control samples	Recovery of 70 to 130% in LCS ⁽³⁾

Notes:

1. Potential exceptions to these criteria may occur where the results are close to the LOR. This typical RPD range is obtained from AS 4482.1-2005 Guide to the investigation and sampling of sites with potentially contaminated soil. The standard suggests that ≤50% RPD be used as a 'trigger' and values above this level of repeatability need to be noted and explained.
2. If the results are close to the LOR, then higher results will be accepted.
3. 80% of the compounds tested must fall within the control limits. Control limits are dynamic and vary for individual tests as per USEPA Method 8000B.

6 Methodology

As previously noted, the focus of the investigation was on surface soil/deposited dust. As such, intrusive works were not required. Additional sample types and/or locations were included where additional potentially significant sources, exposure pathways and/or data gaps were identified during the document review and development of the CSM and sampling program.

The methods used for the collection, preservation, transportation and laboratory analysis of soil/dust samples are described below. All health and safety procedures, including the use of appropriate personal protective equipment (PPE) is described separately in the project Health, Safety and Environmental Plan.

6.1 Sampling program

6.1.1 Rationale

The objective of the sampling program was to produce the data required to inform and support the HHRA, subsequent community engagement activities and management actions (if required).

The sampling program was prepared in consultation with the Human Health Risk Assessor and Community Engagement team to ensure that the sample locations aligned with:

- the most sensitive receptors close to the proposed development; and
- community concerns, as expressed during the initial community consultation process.

The bioaccessibility analysis for arsenic and lead will assist in framing realistic and representative assumptions in the HHRA.

6.1.2 Sample locations and analyses

Samples were collected and analysed in accordance with Table 6.1 below. Refer to Appendix A for a detailed Sample Register.

Table 6.1 Sample locations and analyses

Sample ID	Objective	Location	Metals analysis	Bioaccessibility analysis	Swab sample*
PGM_001	Mine site/source area assessment	Peak - TSF - north side	✓		
PGM_002	Mine site/source area assessment	Peak - TSF - south side	✓		
PGM_003	Mine site/upwind pit/downwind of TSF	Young Australia Reservoir – north-western corner	✓		
PGM_004	Mine site/source area assessment	New Cobar sediment basin - southwestern corner	✓		
PGM_005	Mine site/source area assessment	New Cobar - ROM pad	✓	✓	
PGM_006	Upwind of mine/background	Background sample - 8 km south of Hospital along Lerida Road	✓		

Table 6.1 Sample locations and analyses

Sample ID	Objective	Location	Metals analysis	Bioaccessibility analysis	Swab sample*
PGM_007	Mine site/source area assessment	Fort Bourke Lookout	✓		Information display frames
PGM_008	Receptor	Water Treatment Plant - near main gate	✓		
PGM_009	Mine site/source area assessment	New Cobar - waste rock emplacement area	✓		
PGM_010	Mine site/source area assessment	New Cobar - soil stockpile	✓		
PGM_011	Mine site/source area assessment	Proposed exhaust vent, near Kidman Way residence	✓		
PGM_012	Mine site/source area assessment	Exhaust air rise - beside fence near Kidman Way	✓		
PGM_013	Mine site/source area assessment	Peak - Picnic area beside administration buildings	✓		BBQ
PGM_014	Mine site/source area assessment	New Occidental tailings heap	✓		
PGM_015	Mine site/source area assessment	New Cobar - Magazine – south-eastern corner	✓		
PGM_016	Upwind of mine/background	Background sample - 11 km south of Hospital along Lerida Road	✓		
PGM_017	Upwind of mine/background	Background sample – approx. 7 km south of PGM along Kidman Way	✓		
COB_001	Township/downwind of mine/receptor	Residence, 82 Old Bourke Rd - beside fence in driveway	✓	✓	
COB_002	Downwind of mine/receptor	7 Fourteenth St - backyard beside clothesline	✓		
COB_003	Township/downwind of mine/receptor	Cobar Lions Club Children's Playground (next to Bowling and Golf Club) - beside slide	✓		Bathroom sink
COB_004	Township/downwind of mine / receptor	Residence, 6 Harcourt Street - next to eastern boundary (no. 2/4) on nature strip	✓		
COB_005	Township / downwind of mine/receptor	Cobar Public School - mud kitchen	✓	✓	PVC basin pipe inside mud kitchen
COB_006	Township/downwind of mine/receptor	Cobar High School - picnic table in top quad	✓	✓	
COB_007	Township/downwind of mine/receptor	St Johns Primary School - beside playground	✓		Play equipment
COB_008	Township/downwind of mine/receptor	Kubbi Child Care - beside sand pit	✓		Inside cubby house
COB_009	Township/downwind of mine/receptor	Cobar District Hospital - near old hospital building	✓		

Table 6.1 **Sample locations and analyses**

Sample ID	Objective	Location	Metals analysis	Bioaccessibility analysis	Swab sample*
COB_010	Township/downwind of mine/receptor	Golf Course - next to fairway near creek	✓	✓	
COB_011	Township/downwind of mine/receptor	Heritage Museum - car park	✓		BBQ benchtop
COB_012	Township/downwind of mine/receptor	Drummond Park - nature strip beside playground			
COB_012a	Township/downwind of mine/receptor	Drummond Park - inside playground area beside swing set	✓		Play equipment
COB_013	Township/downwind of mine/receptor	Miners Heritage Park - beside pear tree	✓		
COB_014	Township/downwind of mine/receptor	Ward Oval - oval	✓		
COB_015	Township/downwind of mine/receptor	Caravan Park	✓		
COB_016	Downwind of mine/receptor	TI Hospitality Group - between carpark and accommodation units	✓		
COB_017	Township/downwind of mine/receptor	Swimming pool - garden bed beside main entrance	✓		
COB_018	Downwind of mine/receptor	Rugby Club, Lewis Street - beside spectator seats near clubhouse	✓	✓	Deflated jumping castle
COB_019	Township/downwind of mine/receptor	Tom Knight Oval - near goal posts	✓		
COB_020	Township/downwind of mine/receptor	Memorial Services Club - former bowling green	✓		
COB_021	Township/downwind of mine/receptor	Railway Station - beside main building	✓		
COB_022	Township/downwind of mine/receptor	Dalton Park Race Course - Pony Club playground	✓		
COB_023	Township/downwind of mine/receptor	Newey Reserve - picnic area	✓		
COB_024	Downwind of mine/receptor	Old Reservoir - 2.5 km northeast of Cobar	✓		
COB_025	Township/downwind of mine/receptor	Western Auto & Engineering, 7-9 Dunstan Street - within rear yard beside fence	✓		
COB_026	Township/downwind of mine/receptor	Cobar Preschool Centre - beside playground	✓		Inside cubby house
COB_027	Township/downwind of mine/receptor	1 Cornish Street - across road from residence in vacant lot	✓		
COB_028	Township/downwind of mine	Cobar Uniting Church COOSH - beside sand pit	✓		Picnic table

Table 6.1 Sample locations and analyses

Sample ID	Objective	Location	Metals analysis	Bioaccessibility analysis	Swab sample*
COB_029	Township/downwind of mine	Residence, 25 Green Street - nature strip in front of front garden fence	✓		
COB_030	Township/downwind of mine/receptor	Ngali Preschool	✓	✓	Cubby house benchtop
QC100	QA/QC - Intra-lab duplicate	PGM_014	✓		
QC101	QA/QC - Intra-lab duplicate	PGM_015	✓		
QC102	QA/QC - Intra-lab duplicate	PGM_009	✓		
QC200	QA/QC - Inter-lab duplicate	PGM_001	✓		
QC201	QA/QC - Inter-lab duplicate	PGM_005	✓		
QC202	QA/QC - Inter-lab duplicate	PGM_007	✓		
QC300	QA/QC - Daily rinsate blank	N/A	✓		
QC301	QA/QC - Daily rinsate blank	N/A	✓		
QC302	QA/QC - Daily rinsate blank	N/A	✓		
QC400	QA/QC – Field blank (swab)	N/A			Motel shower screen

* Provision for collection of swab samples for Pb analysis was made. Undertaking analysis of these samples would be subject to field observations and client approval. Locations targeted children's play equipment, tables in eating / play areas in schools, preschools and recreational areas.

Sample locations are shown on Figure 6.2a and Figure 6.2b.

6.2 Surface soil/dust sampling

Samples were collected in accordance with US EPA (1993)², which provides procedures recommended for the collection of material samples from paved and unpaved roads and from bulk storage piles. Whilst the methods were developed for the purpose of evaluating particulate emissions from roads, the sampling procedures are relevant and applicable for the purposes of this study.

The US EPA procedures were amended as required to suit site-specific conditions, as detailed below.

6.2.1 Exposed soil/dust sample locations

Where sample locations occur in areas where the surface soil is exposed (ie not hardstand or vegetated/turfed), the sampling procedure described in US EPA (1993) in *Section C.1.1 Samples From Unpaved Roads* was adopted.

Samples were collected following the steps below:

1. Slowly sweep the ground surface of an area ~0.5 to 1.0 m² using a hand brush and dustpan, ensuring that fine surface material is captured in the dustpan, and not disturbed into the air.

² *Compilation of Air Pollutant Emission Factors, AP-42, 5th Edition, Volume I. Stationary Point and Area Sources. Appendix C-1: Procedures for Sampling Surface / Bulk Dust Loading*.

2. Do not abrade the underlying material.
3. Carefully place the contents of the dustpan into a labelled laboratory-supplied 250 g soil sample jar.
4. Continue the surface sweeping in the general vicinity as required to ensure that sufficient surface dust/soil is collected for the purpose of laboratory analysis (minimum 250 g, however 2 x 250 g will be collected as contingency).
5. Carefully mix the contents of the jar prior to sealing.
6. Whilst maintaining all WHS control measures, beat the bristles of the brush to dislodge and remove any residual dust/soil.
7. Gently wipe the brush and dustpan with an alcohol wipe and ensure both items are dry prior to collection of the next sample to avoid cross-contamination.
8. Record all location-specific data for each sample, including:
 - a) sample number, time and co-ordinates;
 - b) surface area sampled (m²);
 - c) equipment used;
 - d) soil description;
 - e) sample mass;
 - f) weather conditions;
 - g) photographic records; and
 - h) any other notes and observations made at each location, as required.

6.2.2 Sealed or partially sealed soil/dust sample locations

Where sample locations occurred in areas where the surface soil was sealed or partially sealed (ie not exposed or vegetated/turfed), the sampling procedure described in US EPA (1993) in *Section C.1.2 Samples From Paved Roads* was adopted.

Samples were collected following the steps below:

1. Using a hand vacuum, slowly pass over the ground surface, ensuring minimal disturbance of fine surface material.
2. Carefully place the contents of the vacuum into a labelled laboratory-supplied 250 g soil sample jar.
3. Continue the vacuuming in the general vicinity as required to ensure that sufficient surface dust/soil is collected for the purpose of laboratory analysis (minimum 250 g, however 2 x 250 g will be collected as contingency).
4. Carefully mix the contents of the jar prior to sealing.

5. Whilst maintaining all WHS control measures, gently wipe the suction point/nozzle and the dust bowl of the hand vacuum with an alcohol wipe and ensure both areas are dry prior to collection of the next sample to avoid cross-contamination.
6. Record all location-specific data for each sample, including:
 - a) sample number, time and co-ordinates;
 - b) surface area sampled (m²);
 - c) equipment used;
 - d) soil description;
 - e) sample mass;
 - f) weather conditions;
 - g) photographic records; and
 - h) any other notes and observations made at each location, as required.

6.2.3 Turfed or vegetated soil/dust sample locations

Where sample locations occurred in areas where the surface soil was covered by turf or other vegetation (eg playgrounds, residential properties, nature strips and sporting facilities), a modified form of the sampling procedure described in US EPA (1993) in *Section C.1.2 Samples From Paved Roads* was adopted.

Samples were collected following the steps below:

1. Using a hand vacuum, slowly pass over the ground surface to capture dust which may be deposited on the vegetation surface and any loose underlying surface soil, ensuring minimal disturbance of fine surface material.
2. Carefully place the contents of the vacuum into a labelled laboratory-supplied 250 g soil sample jar.
3. Continue the vacuuming in the general vicinity as required to ensure that sufficient surface dust/soil is collected for the purpose of laboratory analysis (minimum 250 g, however 2 x 250 g will be collected as contingency).
4. As vacuuming alone may not return sufficient sample mass for analytical purposes, utilise a small stainless-steel hand tool to penetrate the surface in a small area.
5. Carefully extract the surface vegetation and gently dislodge soil/dust held within the roots into the sample jar.
6. Continue until sufficient sample mass is collected, taking care to distribute the surface penetrations so as not to create any significant damage.
7. Carefully mix the contents of the jar prior to sealing.

8. Whilst maintaining all WHS control measures, gently wipe the suction point/nozzle, the steel hand tool (where used) and the dust bowl of the hand vacuum with an alcohol wipe and ensure both areas are dry prior to collection of the next sample to avoid cross-contamination.
9. Record all location-specific data for each sample, including:
 - a) sample number, time and co-ordinates;
 - b) surface area sampled (m²);
 - c) equipment used;
 - d) soil description;
 - e) sample mass;
 - f) weather conditions;
 - g) photographic records; and
 - h) any other notes and observations made at each location, as required.

6.2.4 Stockpile sample locations

Where samples were collected from stockpiles (eg the TSF and stockpiled soil at the Site), the sampling procedure described in US EPA (1993) in *Section C.1.3 Samples From Storage Piles* was adopted.

Samples were collected following the steps below:

1. Where possible, *and noting potential access constraints and safety hazards*, collect samples from:
 - a) several positions across the surface of material recently placed in stockpile; and
 - b) surfaces exposed to prevailing winds.
2. In accordance with the US EPA (1993) guidelines, the stockpiles at the Site are characterised as “large piles”. As such, each sample should be comprised of a minimum of 10 increments/sub-samples.
3. Using hand tools (small spade or similar), carefully collect material from each sub-sample location/increment by skimming the surface of the stockpile in an upwards direction to a depth of ~2 to 3 cm. Ensure minimal disturbance of fine material.
4. Carefully place the material into a labelled laboratory-supplied 250 g soil sample jar.
5. Continue to collect material at each sub-sample/increment to ensure that:
 - a) a minimum of 10 sub-samples have been collected; and
 - b) sufficient surface dust/soil is collected for the purpose of laboratory analysis (minimum 250 g, however 2 x 250 g will be collected as contingency).
6. Carefully mix the contents of the jar prior to sealing.

7. Whilst maintaining all WHS control measures, gently wipe the hand tools with an alcohol wipe and ensure they are dry prior to collection of the next sample to avoid cross-contamination.
8. Record all location-specific data for each sample, including:
 - a) sample number, time and co-ordinates;
 - b) a sketch of the stockpile and positions of the sample locations and sub-sample/incremental sample areas of which the sample is comprised, noting inaccessible areas;
 - c) surface area sampled (m²);
 - d) equipment used;
 - e) depth of samples;
 - f) soil description;
 - g) sample mass;
 - h) weather conditions;
 - i) photographic records; and
 - j) any other notes and observations made at each location, as required.

6.2.5 Swab sample collection

Swab samples were taken from surfaces where sensitive receptors may come into contact with deposited dust (other than the ground surface). The samples were collected and placed on hold at the primary laboratory, pending receipt and review of analytical results of the surface soil/dust samples, and confirmation from the Risk Assessor and PGM that proceeding with the analysis was warranted and approved. At the time of issue of this report, the swab samples remain on hold at the primary laboratory (refer to Section 6.3 below).

The swab samples were collected by following these steps:

1. Select the sample area (minimum of 10 cm², and up to 1 m² where only trace levels are anticipated).
2. Utilising laboratory-provided swabs, wipe the swab across the surface from left to right (see (a) in Figure 6.1 below), using an even pressure and holding the swab flat against the surface.
3. Continue until the surface has been wiped.
4. Re-wipe again top to bottom (see (b) in Figure 6.1 below).
5. Re-wipe again bottom left to top right (see (c) in Figure 6.1 below).
6. Re-wipe again top left to bottom right (see (d) in Figure 6.1 below).

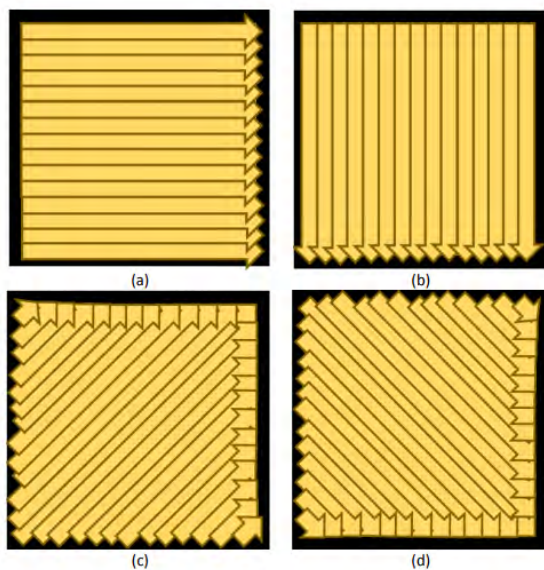


Figure 6.1 Swab sample collection method

7. Place the swab into a sealed, labelled laboratory-supplied sample container.
8. Record all location-specific data for each sample, including:
 - a) sample number, time and co-ordinates;
 - b) surface area sampled (m²);
 - c) weather conditions;
 - d) photographic records; and
 - e) any other notes and observations made at each location, as required.

6.3 Laboratory analysis

6.3.1 Surface soil/dust sample analysis

The primary and secondary laboratories engaged to undertake the sample analyses were Eurofins Pty Ltd (Eurofins), and Envirolab respectively. Contact details are as follows:

- Eurofins:
 - Quotation number: #200330EMM
 - Point of contact is Alena Bounkeua. P: (02) 9900 8414. E: AlenaBounkeua@eurofins.com
 - Laboratory address: 6/16 Mars Road, Lane Cove West NSW 2066
- Envirolab:
 - Point of contact is David Springer. P: (02) 9910 6200. E: dspringer@envirolab.com.au

- Laboratory address: 12 Ashley Street, Chatswood NSW 2067

Both laboratories were NATA accredited for the metals analyses undertaken. Method references and LORs for each laboratory are provided in Table 6.2 below.

Table 6.2 Analytical methods and LORs

Analyte	Eurofins		Envirolab	
	Method	LOR	Method	LOR
8 Metals by ICP/AES: As, Cd, Cr, Cu, Ni, Pb, Zn, Hg	USEPA3050 and 6020	0.1-5 mg/kg	USEPA 200.2 /ICP-AES, USEPA 245.1/ Cold Vapour AAS	0.1-4 mg/kg
Additional metals by ICP/AES: Sb, Ba, Be, Fe, Mn, Ag	USEPA3050 and 6020	0.2-20 mg/kg	USEPA 6010 ICP/AES	1-10 mg/kg
Metals by ICP/MS: Au	USEPA3050 and 6020	5 mg/kg	USEPA 6020 ICP/MS	1 mg/kg
Hexavalent Chromium - Alkaline Digestion	APHA 3500-Cr	1 mg/kg	NIOSH/OSHA 7600, APHA 3500 Cr	1 mg/kg
Trivalent Chromium (<i>must be requested with Hexavalent Chromium and Total Chromium</i>)	By calculation	5 mg/kg	In-house method Inorg-024/APHA 3500 B	1 mg/kg

6.3.2 Bioaccessibility analysis

The arsenic and lead bioaccessibility testing was conducted by the University of South Australia (UniSA). The point of contact and laboratory address is as follows:

Dr Albert Juhasz
Associate Research Professor
E: Albert.Juhasz@unisa.edu.au
P: 0418 818 121
Future Industries Institute, University of South Australia
Building X, X1-17, Mawson Lakes Campus
Mawson Lakes SA 5095

The steps involved in the analytical method is described as follows:

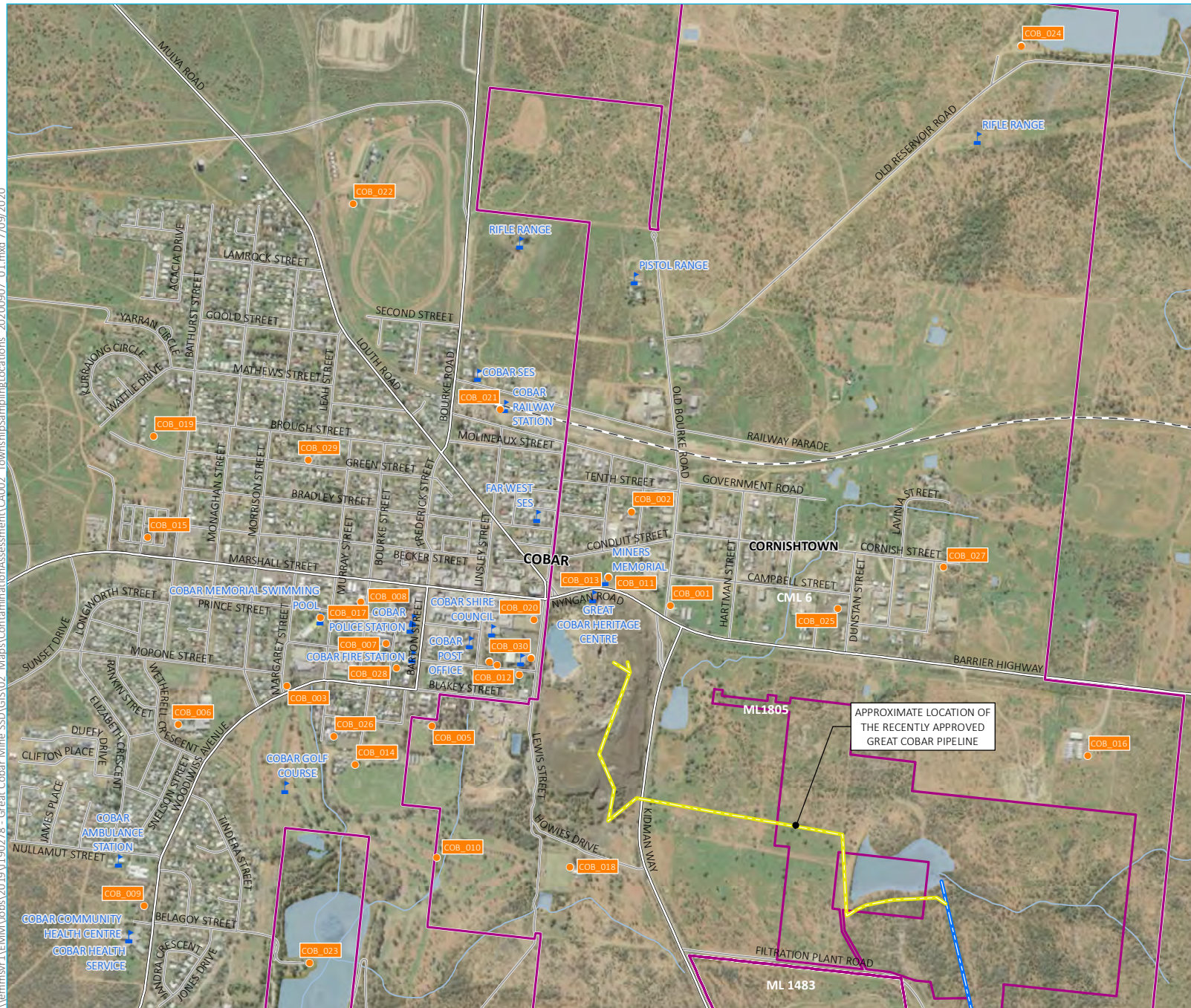
- Soil processing: drying and sieving to recover the <2 mm and <250 µm soil particle size fractions.
- Determination of As and Pb concentration in the <2 mm fraction (in duplicate).
- Determination of As and Pb concentration in the <250 µm fraction (in duplicate).
- Determination of As and Pb bioaccessibility following gastric phase extraction using the Solubility Bioaccessibility Research Consortium Assay (SBRC-G, also known as RBALP or SBET) (in duplicate).
- Determination of Pb bioaccessibility following intestinal phase extraction using the Solubility Bioaccessibility Research Consortium Assay (SBRC-I) (in duplicate).
- Determination of As and Pb dissolution in a soil reference material.

UniSA utilises the SBRC method for the assessment of As and Pb bioaccessibility, the gastric phase of which is also commonly referred to as the RBALP or USEPA method 1340. The difference between the Australian and the US approach is that UniSA utilises the <250 µm soil particle size fraction (compared to <150 µm in the US). Running both gastric and intestinal phase extractions are recommended by UniSA.

UniSA also advised that *“although gastric phase extraction has been recommended by the USEPA for estimating Pb relative bioavailability, there are issues using this methodology when Pb mineralogy is not the controlling parameter for Pb dissolution (a caveat detailed in USEPA, 2012). This may be the case when Pb ore has been weathered or manipulated (ie smelting) or for other Pb sources (eg paint, fuel); once these Pb sources have entered the environment, it’s the mineralogy of the environmental matrix that influences dissolution-precipitation events that controls Pb relative bioavailability. Refer to: <https://www.epa.gov/hw-sw846/sw-846-test-method-1340-vitro-bioaccessibility-assay-lead-soil>”*

The laboratory facilities at UniSA are not NATA accredited, however, no laboratory is NATA accredited for bioaccessibility testing as far as UniSA/EMM is aware. As such, the approach adopted was to run the assays in-house with the inclusion of reference materials and send all soils and extracts to a NATA accredited lab for analysis.

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- KEY**
- Surface soil/dust sampling location
 - 📍 Landmark
 - Indicative pipeline
 - Great Cobar pipeline
 - Rail line
 - Main road
 - Local road
 - Watercourse/drainage line
 - Waterbody
 - ▭ New Cobar Complex mining lease boundary

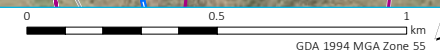
Location ID	Description
COB_001	Residence, 82 Old Bourke Rd - beside fence in driveway
COB_002	7 Fourteenth St - backyard beside clothes line
COB_003	Cobar Lions Club Children's Playground (next to Bowling and Golf Club) - beside slide
COB_004	Residence, 6 Harcourt Street - next to eastern boundary (no. 2/4) on nature strip
COB_005	Cobar Public School - mud kitchen
COB_006	Cobar High School - picnic table in top quad
COB_007	St Johns Primary School - beside playground
COB_008	Kubbi Child Care - beside sand pit
COB_009	Cobar District Hospital - near old hospital building
COB_010	Golf Course - next to fairway near creek
COB_011	Heritage Museum - car park
COB_012	Drummond Park - nature strip beside playground
COB_012a	Drummond Park - inside playground area beside swing set
COB_013	Miners Heritage Park - beside pear tree
COB_014	Ward Oval - oval
COB_015	Caravan Park
COB_016	TI Hospitality Group - between carpark and accommodation units
COB_017	Swimming pool - garden bed beside main entrance
COB_018	Rugby Club, Lewis St - beside spectator stands near clubhouse
COB_019	Tom Knight Oval - near goal posts
COB_020	Memorial Services Club - former bowling green
COB_021	Railway Station - beside main building
COB_022	Dalton Park Race Course - Pony Club playground
COB_023	Newey Reserve - picnic area
COB_024	Old Reservoir
COB_025	Western Auto & Engineering, 7-9 Dunstan St - within rear yard beside fence
COB_026	Cobar Preschool Centre - beside playground
COB_027	1 Cornish St - across road from residence in vacant lot
COB_028	Cobar Uniting Church COOSH - beside sand pit
COB_029	Residence, 25 Green Street - nature strip in front of front garden fence
COB_030	Ngali Preschool

Sampling locations - Cobar township area

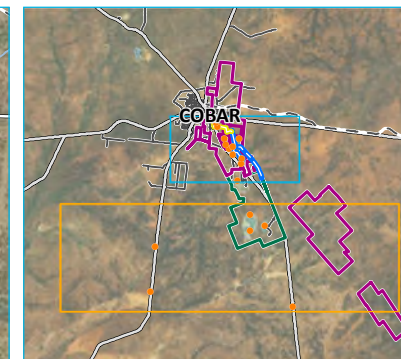
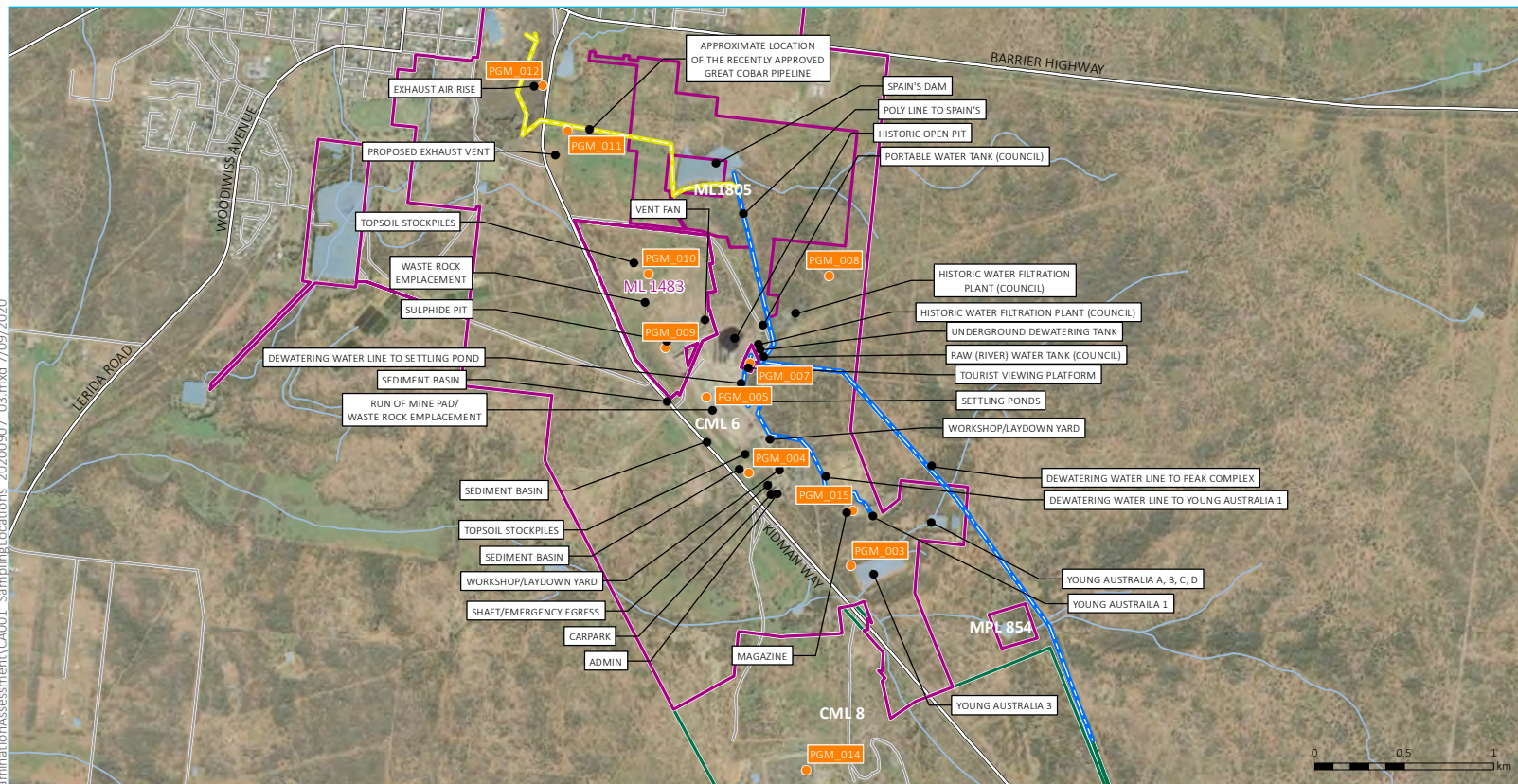
Peak Gold Mines
New Cobar Complex Underground Project EIS
Surface soil/dust investigation
Figure 6.2a



Source: EMM (2020); DFSI (2017); GA (2011); DPE (2019)



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KEY

- Surface soil/dust sampling location
- Indicative pipeline
- Great Cobar pipeline
- Rail line
- Main road
- Local road
- Watercourse/drainage line
- Waterbody
- Mining lease boundaries
- New Cobar Complex
- Peak Complex



Source: EMM (2020); DFSI (2017); GA (2011); DPE (2019)

Sampling locations - Peak Gold Mine (PGM) site area

Peak Gold Mines
New Cobar Complex Underground Project EIS
Surface soil/dust investigation
Figure 6.2b



6.4 Site assessment criteria

Site assessment criteria (SAC) for this investigation were sourced from the ASC NEPM (as amended 2013) – Soil Health Investigation Levels (HILs) for metals. The HILs are scientifically based, generic assessment criteria designed to be used in the first stage of an assessment of potential risks to human health from chronic exposure to contaminants. They are intentionally conservative and are based on a reasonable worst-case scenario for generic land use settings.

For the HIL values, land use scenarios A, C and D, for standard residential with garden/accessible soil, recreational open space and commercial/industrial land use settings are identified as being most applicable to the project:

- **HIL A:** standard residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake, no poultry), includes children's day care centres, preschools and primary schools.
- **HIL C:** includes developed open space areas such as parks, playgrounds, playing fields (eg ovals), secondary schools and footpaths. This does not include undeveloped public open space which should be subject to a site-specific assessment, where appropriate.
- **HIL D:** commercial/industrial includes premises such as shops, offices and industrial sites.

The analytical results of swab samples (if analysed), will be evaluated with reference to the assessment criteria for surface dust lead loadings in AS4361.2 – 1998, *Australian Standard 4361.2 Guide To Lead Paint Management Preventing Lead Poisoning in Australia*.

6.5 Quality assurance and quality control (QAQC)

6.5.1 Laboratory QAQC

Analytical data validation is the process of assessing whether the data is compliant with method requirements and project specifications. The primary objective of this process is to ensure that data of known quality are reported and to identify if data can be used to fulfil the overall project objectives.

The adopted data validation process is based upon the following data validation guidance documents published by the National Environmental Protection Council (NEPC) and the United States Environmental Protection Agency (USEPA):

- ASC NEPM;
- USEPA, October 2002, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (USEPA, 2004); and
- USEPA, October 1999, *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review* (USEPA, 2008).

The process involves a review of analytical procedure compliance and the assessment of the accuracy and precision of analytical data from a range of quality control measurements, generated from both field sampling and analytical programs.

Laboratory specific elements that have been checked and assessed for this project include:

- preservation and storage of samples upon collection and during transport to the laboratory;
- sample holding times;
- use of appropriate analytical procedures;
- limits of reporting;
- frequency of conducting quality control measurements;
- rinsate and field blank results;
- laboratory blank results;
- field duplicate results;
- laboratory duplicate results;
- matrix spike results;
- surrogate spike results; and
- occurrence of apparently unusual or anomalous results, eg laboratory results that appear to be inconsistent with field observations or measurements

A summary of the quality control samples collected during the sampling program is provided in Table 6.3 below.

Table 6.3 **Quality control samples**

Sample type	Media	Analysis
1 x intra-laboratory duplicate per 20 primary samples	Surface soil/dust	As, Cd, Cr, Cu, Ni, Pb, Zn, Hg, Sb, Ba, Be, Fe, Mn, Ag, Au
1 x inter-laboratory duplicate per 20 primary samples	Surface soil/dust	As, Cd, Cr, Cu, Ni, Pb, Zn, Hg, Sb, Ba, Be, Fe, Mn, Ag, Au
1 x rinsate blank per day of sampling	Water	Standard metals suite (8 heavy metals)

6.5.2 Field QA/QC

Samples were collected in laboratory provided sample containers, with appropriate preservation. Samples were collected and sent to the laboratory under appropriate chain-of-custody (COC) protocols.

The field QA/QC procedures used to establish accurate, reliable and precise results included:

- calibration of equipment;
- submitting laboratory samples within recommended holding times;
- keeping samples chilled and appropriately preserved;
- wearing disposable nitrile gloves during sampling which are changed between sample locations; and
- decontamination of equipment before sampling and between each location.

7 Results

7.1 Field observations

In general, the natural surface soil conditions encountered throughout Cobar and surrounds during the site investigation consisted of red-brown gravelly silt. A number of locations within the township and Site(s) were identified as fill material, predominantly sand. This is not uncommon in built up areas where fill material and reworked residual material is often encountered.

The soils were dry to moist, with the exception of the south side of the TSF which was noted as being saturated. Weather conditions were clear to overcast for the duration of the investigation, except for a light shower when sampling COB_001.

All samples were collected using a dustpan/brush or a direct hand grab over surface areas ranging from 0.5 to 7 m² per location.

Refer to Appendix A for a complete list of field observations and sample descriptions. A photographic log of all sample locations is provided in Appendix B.

7.2 Laboratory results

The laboratory analytical results are presented in Appendix C, laboratory reports are included in Appendix D and the QA/QC evaluation is provided in Appendix E.

The bioaccessibility report is contained in Appendix F, with the findings summarised as follows:

- arsenic bioaccessibility for COB_001 and PGM_005 was 3.3 and 3.8% respectively, while values could not be calculated for other COB samples as concentrations in gastric phase solutions were below the level of reporting; and lead bioaccessibility determined using gastric phase extraction (SBRC-G) ranged from 19.0 (PGM_005) to 65.7% (COB_010). Intestinal phase lead bioaccessibility was 2.9, 5.9 and 6.0% for COB_001, COB_010 and PGM_005 respectively; values could not be calculated for other samples as Pb concentrations in intestinal phase solutions were below the level of reporting.

The key findings of the laboratory results are summarised below:

- concentrations of arsenic were less than the applicable adopted SAC for all samples, but elevated (>100 mg/kg) at four locations within the mine site source area(s) (PGM_005, PGM_014, PGM_015 and PGM_016);
- concentrations of copper were less than the applicable adopted SAC for all samples, but elevated at PGM_005 (30,000 mg/kg);
- concentrations of lead were less than the applicable adopted SAC, with the following exceptions:
 - COB_004 (370 mg/kg), residence, 6 Harcourt Street - next to eastern boundary (no. 2/4) on nature strip (HIL A, 300 mg/kg considered applicable SAC);
 - PGM_001 (2,500 mg/kg), Peak mine - TSF - north side (HIL D, 1,500 mg/kg considered applicable SAC);
 - PGM_002 (2,800 mg/kg), Peak mine - TSF - south side (HIL D, 1,500 mg/kg considered applicable SAC);
 - PGM_005 (3,600 mg/kg), New Cobar - ROM pad (HIL D, 1,500 mg/kg considered applicable SAC); and

- PGM_013 (3,000 mg/kg), Peak mine - Picnic area beside administration buildings (HIL D, 1,500 mg/kg considered applicable SAC);
- concentrations of lead were also elevated (>300 mg/kg) at three locations within the mine site source area(s) but less than the applicable adopted SAC (PGM_012, PGM_014 and PGM_015);
- concentrations of gold, beryllium and hexavalent chromium were all less than the laboratory LOR; and
- all other analytes were less than the adopted SAC.

7.3 QA/QC

On the basis of the analytical data validation procedures employed, no significant QA/QC issues were identified in the field or laboratory datasets that are considered to have a material implication to decision-making on the project.

However, it was noted that a number of high RPDs were calculated for the inter-laboratory duplicate samples. As the secondary laboratory concentrations were generally lower than the primary laboratory, this is not expected to be an issue as the higher results will be used as a conservative measure for reporting purposes.

The laboratory quality control report is included with the laboratory analytical certificates in Appendix D, and the EMM QA/QC report, including RPD calculations, is attached in Appendix E.

7.4 Revised CSM

Based on the analytical results reported above, the preliminary CSM provided in Section 4 is refined as follows:

- The CoPCs are narrowed to Pb only, due to:
 - the elevated concentrations (above the HIL D SAC) reported for four samples collected from the mine site; and
 - one minor exceedance of the HIL A SAC for the township of Cobar.
- The exposure pathway of direct contact with surface soil/dust for the residents of Cobar is potentially complete (ie direct contact could occur), however the potential risk is considered low due to the concentrations being predominantly well below the risk-based SAC.

Potential health risks will be further evaluated through the HHRA process, taking into consideration the air quality modelling being undertaken concurrently to this soil investigation.

8 Conclusions and recommendations

This investigation was undertaken to provide information on surface soil metal concentrations within the investigation area (consisting of the mine site(s), Cobar township and surrounds), in the context of the proposed future development of the mine (the Site). EMM considers that the investigation has derived sufficient data to confirm the general characteristics of the surface soil within the investigation area.

The results indicate that the investigation area features predominantly silty surface soil, which contains concentrations of CoPC (metals) less than the adopted site acceptance criteria (SAC) for the current applicable land uses, with the following exceptions:

- One minor exceedance (sample COB_004) of the residential land use (with accessible soil) guideline for lead in the township of Cobar. The lead concentration reported at COB_004 (370 mg/kg) exceeds the SAC (300 mg/kg) by ~23%, which is inconsistent with the remainder of the Cobar township dataset.

The source of lead present at this location is unknown. EMM notes that due to being unable to access the property, the sample was taken outside of the property boundary (ie the nature strip) and not within the landscaped areas within the property (eg the backyard where direct soil contact by sensitive receptors is more likely to occur). As such, the sample location and analytical results are:

- not directly representative of the potential exposure scenario by sensitive receptors such as young children; and
- more likely to be influenced by a broader range of community activities and potential sources such as:
 - the sample was taken adjacent to a rusty fence, which may have contributed to the analytical result;
 - deposition of historic vehicle emissions from the adjacent road and historic use of leaded fuel (noting that very few samples were collected in close proximity to a roadway); and
 - activities which may have occurred on the nature strip, for example vehicle washdown, paint flaking and/or equipment washdown of lead-based paint.

The land use at this sample location could be considered to be public open space (which has a SAC of 600 mg/kg), however a conservative approach has been adopted by applying the residential land use (and SAC of 300 mg/kg) as the screening criteria.

- Four sample locations within the Site (a potential source area) which exceeded the guideline for lead for commercial/industrial land use (1,500 mg/kg). This was not unexpected as the samples were taken in the TSF, on the ROM pad and in an area adjacent to the change-house where personnel in dirty clothes and boots frequent. These exceedances can be addressed through the application of adequate WHS and environmental management controls to prevent occupational exposure and potential migration.

The proposed development is expected to result in negligible *additional* surface disturbance outside of the areas permitted under the current approval (subject to detailed design). Application of soil resources management objectives and strategies would be undertaken in accordance with the existing Mining Operations Plan and Water Management Plan incorporating an Erosion and Sediment Control Plan.

Additionally, EMM considers that all future surface disturbance works on the Site would be undertaken in accordance with responsibilities under relevant Work Health and Safety legislation and industry guidelines and as such, the potential risk of exposure to potential contaminants present on the Site can be managed accordingly.

The data generated from this soil investigation provide a baseline assessment of surface soil/dust concentrations at both the Site and Cobar. This data will be utilised, in conjunction with air quality modelling, in a quantitative HHRA.

9 References

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