Supplementary information

Table S1: Acid seep water quality. Seep water quality varied widely across the Pebble site, with very high concentrations of metals in mineralized areas. The median water quality at all seeps on mine site (n=648) and acid seeps (identified by PLP as SP26, SRK08, SRK09, SRK10, SRK11, SRK12, SRK13, SRK15, SRKST6) are shown; all data collected by PLP [13, Table 9.1-22 and Appendix 9.1I]. "Acid seeps median" is the median of the medians of each site.

Site	pH	SC µS/cm	SO4 mg/L	Na mg/L	Mg mg/L	Al µg/L	Mn µg/L	Fe µg/L	Cu µg/L	Zn µg/L	As µg/L	Mo µg/L
Natural seeps, med.	6.6	59	3	2	1	12	0.3	19	0.3	1	0.3	0.3
Acid seeps, median	3.4	160	67	3	3	3640	115	684	136	11	0.2	0.03
Acid seeps, range	2.3 to 7.2	25-405	29-214	2 to 5	2 to 8	29 - 18,200	1 to 805	11 to 7,520	1 to 6,410	0.5 to 76	0.2 to 0.8	0.01 to 0.3
Acidic seeps												
SP26, median	3.9	156	60	3	3	3,700	85	684	394	26	0.2	0.01
SP26 range	3.7-7.2[a]	101-191	29-69	2 to 3	2 to 3	1,590-4,770	45-101	103-2350	219-554	12 to 28	0.2-0.3	0.008-0.3
SRK08, median	3.3	269	193	4	4	6,700	265	490	2,990	11	0.2	0.03
SRK08, range	3.3 to 3.4	250-405	104-194	3 to 4	3 to 8	5070-18,200	241-805	280-710	2,880-6,410	11	0.2 to 0.3	0.02 to 0.3
SRK09, median	3.5	26	67	3	2	3,170	54	540	1,170	32	0.3	0.08
SRK09, range	3 to 3.7	25-32	34-128	3 to 4	2	29-4,460	7 to 56	168-3,670	1 to 1,210	2 to 36	0.2-0.8	0.02-0.3
SRK10, median	3.1	326	79	3	3	3,860	59	1,900	136	9	0.3	0.1
SRK10, range	2.9-3.2	310-341	62-96	2 to 3	2 to 4	2,890-4,820	45-73	1,740-2,060	123-149	8 to 11	0.3	0.03-0.3
SRK11, median	3.98	115	44	3	2	3,240	50	1,200	44	8.8	0.2	0.02
SRK11, range	3.9-4.1	96-122	40-48	2 to 3	1 to 2	2,240-3,250	45-61	482-1,870	34-44	5 to 11	0.2 -0.3	0.01-0.3
SRK12, median	2.7	290	139	3	3	3,400	186	5,340	45	29	0.2	0.01
SRK12, range	2.3-3.1	210-370	64-214	3	3 to 4	3000-3,730	146-226	3,150-7,520	28-63	19-38	0.2	0.01
SRK13, median	3.4	160	59	4	3	3,940	115	413	53	11	0.2	0.3
SRK13, range	3.3-3.6	130-241	36-97	3 to 5	3 to 4	27-7,370	1 to 161	11-450	2 to 71	0.5-18	0.2-0.3	0.02-0.3
SRK15, median	3.2	230	110	3	3	2,430	177	911	10	11	0.2	0.01
SRK15, range	3.1-3.4	190-270	46-174	2 to 3	2 to 3	1,310-3,550	75-279	692-1,130	5 to 15	6 to 15	0.2	0.01
SRKST6, median	3.7	145	57.00	2	3	3,640	236	631	1,610	70	0.2	0.06
SRKST6, range	3.4-4.1	105-234	45-97	2 to 4	2 to 4	2,170-6,730	141-334	587-790	1,140-2,540	28-76	0.2-0.3	0.03 to 0.3

[a] Seep SP26 had pH 7.2 at one of nine samples; all others were below pH 4.2. The pH 7.2 is presumed to be an outlier

Table S2. Artesian sites. Samples were collected from the drill stem or in adjacent wetlands. Data are compared to median water quality at all seeps on mine site (n=648) and to seeps geographically closest]. Seep data from PLP 2004-2008 includes SP41 (n=10), SRK02 (n=4), SRK04 (n=3), SP62 (n=9), SP 115 (n=3), and SP108 (n=7) [13, Table 9.1-22 and Appendix 9.1I. Data for DDH 7365 2008 was collected by USGS [20]. WQC relevant to groundwater are provided [23]. For hardness-dependent metals a hardness of 25 mg/L was applied. Concentrations above WQC are in bold.

Site	pH	SC	SO4	Na	Mg	Al	Mn	Fe	Cu	Zn	As	Mo
		µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Central area												
DDH 7386	6.3	185	8	13	28	**19,547**	617	**8,308**	**76**	**72**	**17**	0.7
Seep SP41, range (median)	**4.8- 5.8 (4.9)**	54- 105 (91)	22-35 (28)	2-3 (3)	2-3 (2)	**88-8,140 (345)**	6- 1,370 (51)	10-230 (13)	**48- 385 (141)**	14-25 (21)	0.2- 0.3 (0.2)	0.008- 2 (0.008)
Western area												
DDH 4202	6.2	111	36	7	3	**174**	169	**2,681**	**7**	12	5	4
Seep SRK02, range (median)	**5.8**- 6.6 (5.4)	50- 80 (77)	6-7 (6)	2- 3 (3)	1-3 (2)	54-**226 (181)**	1-7 (7)	25-172 (109)	0.3- 0.9 (0.6)	1-2 (1)	0.2- 0.3 (0.2)	0.8- 2 (2)
Seep SRK04, range (median)	**5.8**- 6.6 (6.4)	16- 51 (18)	7 – 14 (12)	2- 5 (3)	1- 4 (2)	20-**203** (40)	63- 2,560 (154)	180-**10,400** (720)	1- **6.8** (1.4)	1 -5 (1)	0.2- 3.9 (0.3)	0.2- 2.4 (0.3)
Northern area												
DDH 9475	7.1	1,546	**712**	195	33	**289**	139	603	2	3	9	2
Seep SP 62, range (median)	**5.1**- 6.8 (6.0)	75- 132 (125)	30- 36 (33)	4-5 (4)	3	3-39 (3)	0.1-1.6 (0.2)	10- 38 (20)	0.2- 0.3 (0.3)	4-6 (5)	0.2- 0.3 (0.2)	0.1- 0.3 (0.1)
Seep SP 115, range (median)	6.4- 6.6 (6.5)	73- 88 (73)	8- 19 (10)	3- 4 (3)	2	0.5-19 (3)	0.3	10- 25 (10)	0.3	1	0.3- 0.9 (0.3)	0.3
DDH 9475	7.1	1,546	**712**	195	33	**289**	139	603	2	3	9	2
Artesian plain												
DDH 7365, 2008	6.7	340	12	42	4	na	181	369	**3**	5	2	4
DDH 7365, 2016	7	292	11	35	3	24	175	**2,265**	**15**	7	4	5
DDH 7382	**5.2**[a]	148[a]	7	5	12	**15,60**	466	**177,61**	**215**	**127**	**84**	10

						9		**7**				
Unlabeled site	6.9	244	6	8	11	22	7	202	0.7	**66**	1	2
DDH 5330	6.8	210	5	<0.1	<0.1	<6	<0.4	<63	<0.4	<0.4	<0.1	<0.2
SP 108, range (median)	**5.8**-8.0 (7.0)	48-95 (89)	1- 3 (2)	2	2-3 (2)	4-**88** (19)	0.2- 5.7 (1.2)	10- 81 (30)	0.1- 0.3 (0.2)	1-5 (1)	0.8- 1.1 (1)	0.1- 0.3 (0.2)

[a] Field data. Not enough water was collected for laboratory analysis.

Table S3. Sump contents at wetland spring and sediment at pond 12551P. Drill sump material, the solid contents remaining in a drill waste sump at site DDH 11540 years after drilling, was collected in 2016. Pond sediment was collected at a single pond which may have received drilling waste.

Site	**pH**	**SC** µS/cm	**SO4** mg/kg	**Na** mg/kg	**Mg** mg/kg	**Al** mg/kg	**Mn** mg/kg	**Fe** mg/kg	**Cu** mg/kg	**Zn** mg/kg	**As** mg/kg	**Mo** mg/kg
Natural sediment (median)	na	na	9	186	3,680	10,600	414	20,400	13	53	10	0.9
Natural sediment (range)	na	na	2,600	630	7,970	25,200	6,970	83,400	200	313	270	22
2016 Sump waste, DDH 11540	6.3	1,150	502	209	5,067	10,000	233	20,000	475	33	4	38
2016 sediment, DDH 12551P	5.0	50	9	267	1,970	14,971	92	5,723	78	27	3	1

Table S4. Pond water chemistry. All ponds sampled were near drill holes. A "P" distinguishes samples from a pond from samples from the drill stem. Data from 2007-2008 was collected by USGS [20, 22] and used different identifiers: 3129P = USGS PB132, 12551P = USGS PB137, GH10-222P = PB139, 7365P = PB202; they did not sample near GH05-60. WQC = water quality criteria relevant to aquatic life [23]; for hardness-dependent metals a hardness of 25 mg/L was applied. Lake data is from [13 Table 9.1-31].

Site	pH	SC	SO4	Na	Mg	Al	Mn	Fe	Cu	Zn	As	Mo
		µS/cm	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Aquatic life WQC	6.5- 8.5	na	na	na	na	87	na	1,000	2.9	37	150	na
Lakes, range (median)	4.7-8.6 (7.4)	1-710 (43)	0.09-47 (3)	0.4-13 (2)	0.1-5 (1)	5-380 (32)	1-290 (12)	18-2,150 (180)	0.2-4 (0.4)	0.7-15 (2)	0.3-7 (0.3)	0.02-2 (0.2)
Meteoric- fed ponds												
DDH 3129P, 2008	5.9	4	2	0.3	0.1	na	6	23	2	3	0.2	0.02
DDH 3129P, 2016[a]	6.3	14	0.9	1	0.2	**130**	23	201	2	2	0.4	<0.2
DDH 12551P, 2007	**5.8**	145	65	4	4	**149**	72	<50	**51**	**63**	<LOD	<2
DDH 12551P, 2008	**5.6**	65	46	4	4	na	26	29	**17**	16	0.1	0.05
DDH 12551P, 2016[a]	6.7	42	11	2	1	**100**	10	<63	**8**	4	0.3	<0.2
Groundwater-fed ponds												
GH10-222P, 2007	6.7	10	2	0.6	0.2	**177**	4	<50	1	<0.5	1	<2
GH10-222P, 2008	6.6	7	1	0.5	0.1	na	2	9	1	2	0.1	0.05
GH10-222P, 2016	7.6	22	0.4	2	1	80	4	178	1	1	0.3	<0.2
DDH 7365P, 2008	6.7	75	<0.1	4	2	na	8	497	0.3	2	0.3	0.1
DDH 7365P, 2016	6.3	66	0.4	2	3	37	10	552	1	5	0.3	0.4
GH05- 60P, 2016	6.1	47	0.6	4	3	**157**	164	**3,522**	1	3	0.8	0.3

[a] Mean of duplicates

Table S5. Wetland spring water, downgradient of drill waste sump. Drill sump water was collected and analyzed in 2011 [24, Appendix III]; "sump material" is solid contents of the sump collected in 2016. Wetland sediment was analyzed for DRO but not for general chemistry. Natural seep and sediment data is from PLP [21, Table 10.2-2). WQC = water quality criteria relevant to aquatic life [23]; for hardness-dependent metals a hardness of 25 mg/L was applied. Analytes that exceeds WQC is in bold.

Site	pH	SC µS/cm	SO4 mg/L	Na mg/L	Mg mg/L	Al µg/L	Mn µg/L	Fe µg/L	Cu µg/L	Zn µg/L	As µg/L	Mo µg/L
Natural seeps (median)	6.6	59	3	2	1	12	0.3	19	0.3	1	0.3	0.3
Aquatic life WQC	6.5-8	na	na	na	na	87	na	1,000	2.9	37	150	na
2011 Sump water	8.1	308	32	32	28	**55,750**	865	**60,950**	**435**	**116**	15	27
2011 Wetland spring water[a]	6.7	65	10	3	2	35	7	88	0.3	1.8	na	0.7
2016 Wetland spring water	6.5	97	4	4	2	**230**	336	**7,000**	1.8	4	0.7	2

[a] Mean of duplicates