



Appendix E Baseline Groundwater Quality - Golder Associates

2012 Groundwater Quality Results

Parameter ⁽¹⁾	Unit	Method Detection Limit	Ontario Drinking Water Standards ⁽¹⁾⁽²⁾		Canadian Water Quality Guidelines ⁽⁴⁾	Provincial Water Quality Objective ⁽⁶⁾	Open Pit Footprint											
			MAC	IMAC			BH12-1			BH12-2A			BH12-2B			BH12-3A		
							18-May-12	14-Aug-12	5-Dec-12	18-May-12	14-Aug-12	5-Dec-12	19-May-12	14-Aug-12	5-Dec-12	20-May-12	14-Aug-12	5-Dec-12
FIELD PARAMETERS																		
pH	pH units	--	--	--	6.5-9	6.5-8.5	6.33	6.71	7.66	6.02	6.49	8.6	6.41	5.96	8.86	7.53	6.32	7.87
Conductivity	µs/cm	--	--	--	--	--	396	263	272	142	192	187	105	94	187	218	236	231
Temperature	degrees Celsius	--	--	--	--	--	7.5	17.3	6.7	11.8	11.4	5.5	10.8	12.1	6.5	16.5	17	6.5
GENERAL PARAMETERS																		
pH	pH units	--	--	--	6.5-9	6.5-8.5	7.79	7.84	7.92	7.77	7.95	7.96	7.9	7.91	7.88	7.66	7.95	7.84
Alkalinity	µg/L as CaCO ₃	<5000	--	--	--	-25%	113000	135000	139000	92000	89000	92000	86000	48000	53000	115000	95000	108000
Acidity	µg/L as CaCO ₃	<5000	--	--	--	--	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000
Electrical Conductivity (EC)	µS/cm	<2	--	--	--	--	240	276	283	205	191	198	121	102	90	246	224	248
Total Suspended Solids (TSS)	µg/L	<10000	--	--	+5000-25000 ⁽⁶⁾	--	820000	131000	110000	9120000	4640000	13000000	10500000	39400000	17600000	1240000	516000	208000
Total Dissolved Solids (TDS)	µg/L	<20000	--	--	--	--	128000	172000	160000	120000	128000	120000	320000	134000	58000	148000	144000	152000
Total Hardness	µg/L as CaCO ₃	<500	--	--	--	--	105000	144000	144000	94300	106000	90100	43600	69600	39500	119000	120000	123000
MAJOR IONS																		
Calcium (Ca)	µg/L	<50	--	--	--	--	35500	49900	51600	27700	30300	25900	14000	20600	12300	41700	41800	43000
Chloride (Cl)	µg/L	<100	--	--	--	--	1920	2850	2200	720	560	670	500	830	420	1690	570	1220
Sodium (Na)	µg/L	<50	--	--	--	--	4140	3480	1840	6970	4910	3540	9920	2390	1310	5190	3170	2340
Fluoride (F)	µg/L	<50, <100, <50000	1500 ⁽⁷⁾	--	--	--	120	<50	<100	50	<50	<50	60	<50	<50	120	90	<50
Magnesium (Mg)	µg/L	<50	--	--	--	--	4070	4740	3790	6100	7470	6180	2100	4420	2140	3670	3810	3760
Potassium (K)	µg/L	<50	--	--	--	--	1870	2100	1010	1190	1540	950	628	1840	500	1560	1260	690
Sulphate (SO ₄)	µg/L	<100	--	--	--	--	7320	6810	7980	13700	13600	12200	5610	5840	5550	14100	20400	23300
METALS																		
Aluminum (Al)	µg/L	<4	--	--	100 ⁽⁸⁾	75 ⁽⁹⁾	34	43	20	7	8	11	14	64	22	13	15	10
Antimony (Sb)	µg/L	<6	--	6	--	20	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
Arsenic (As)	µg/L	<3	--	25	5	5	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Barium (Ba)	µg/L	<2	1000	--	--	--	35	40	35	13	12	10	<2	3	2	17	18	16
Beryllium (Be)	µg/L	<1	--	--	--	11 ⁽¹⁰⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Boron (B)	µg/L	<10	--	5000	1500 ⁽¹¹⁾	200	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium (Cd)	µg/L	<0.1	--	5	0.058 ⁽¹²⁾	0.1 ⁽¹³⁾	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (Cr)	µg/L	<3	50	--	8.9 ⁽¹⁴⁾	8.9 ⁽¹⁴⁾	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Cobalt (Co)	µg/L	<0.5	--	--	--	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5
Copper (Cu)	µg/L	<2	--	--	2 ⁽¹⁵⁾	5 ⁽¹⁶⁾	3	<2	<2	<2	<2	<2	<2	<2	<2	4	2	<2
Iron (Fe)	µg/L	<10	--	--	300	300	<10	<10	<10	10	10	45	<10	<10	<10	122	<10	<10
Lead (Pb)	µg/L	<1	10 ⁽¹⁷⁾	--	1 ⁽¹⁸⁾	3 ⁽¹⁹⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese (Mn)	µg/L	<2	--	--	--	--	123	107	<2	73	71	71	3	7	3	126	81	43
Mercury (Hg)	µg/L	<0.10	1	--	0.026	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
Molybdenum (Mo)	µg/L	<2	--	--	73	40	8	6	13	7	5	<2	<2	<2	<2	41	73	89
Nickel (Ni)	µg/L	<3	--	--	25 ⁽²⁰⁾	25	<3	3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Selenium (Se)	µg/L	<4	10	--	1	100	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Silver (Ag)	µg/L	<0.1	--	--	0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium (Sr)	µg/L	<5	--	--	--	82	72	59	47	40	39	27	31	23	46	40	40	40
Thallium (Tl)	µg/L	<0.3, <4	--	--	0.8	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Titanium (Ti)	µg/L	<0.1, <2	--	--	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Tungsten (W)	µg/L	<0.1, <10	--	--	--	30	13	<10	20	<10	<10	<10	<10	<10	<10	78	55	22
Uranium (U)	µg/L	<2, <4	20	--	15	5	<2	2	<2	2	<2	<2	6	<2	<2	6	9	9
Vanadium (V)	µg/L	<0.1, <2	--	--	--	6	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Zinc (Zn)	µg/L	<4, <5	--	--	30	20	45	54	12	5	<5	<5	7	78	<5	6	<5	<5
Zirconium (Zr)	µg/L	<0.1, <4	--	--	--	4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
NUTRIENTS																		
Nitrate (NO ₃ ⁻)	µg/L as N	<50	10000	--	13000 ⁽²¹⁾	--	170	--	720	<50	--	<50	90	--	<50	<50	<50	<50
Nitrite (NO ₂ ⁻)	µg/L as N	<50	1000	--	60 ⁽²²⁾	--	<50	--	<50	<50	--	<50	<50	--	<50	<50	--	<50
Total Ammonia (NH ₃ + NH ₄)	µg/L as N	<20	--	--	6980	--	<20	<20	<20	40	40	140	220	560	790	<20	<20	20
Un-ionized Ammonia	µg/L as N	<20	--	--	19 ⁽²³⁾	20 ⁽²³⁾	<20	<20	<20	<20	<20	<20	<20	<20	30	<20	<20	<20
NUTRIENTS																		
Free Cyanide	µg/L	<2	200	--	5	5	<2	2	<2	<2	3	<2	<2	<2	<2	<2	<2	<2
Sulphur (S)	µg/L	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

2012 Groundwater Quality Results

Parameter ⁽¹⁾	Unit	Method Detection Limit	Ontario Drinking Water Standards ⁽¹⁾⁽²⁾		Canadian Water Quality Guidelines ⁽⁴⁾	Provincial Water Quality Objective ⁽⁵⁾	Open Pit Footprint														
			Standards				BH12-3B			BH12-4			BH12-6		BH12-BULK1			DH12-PO-10			
			MAC	IMAC			20-May-12	14-Aug-12	5-Dec-12	18-May-12	14-Aug-12	5-Dec-12	18-May-12	28-May-12	14-Aug-12	5-Dec-12	7-Jun-12	16-Aug-12	5-Dec-12		
FIELD PARAMETERS																					
pH	pH units	--	--	--	6.5-9	6.5-8.5	7.46	6.69	7.68	6.45	6.67	7.9	6.9	6.63	6.5	7.78	8.08	6.28	8.06		
Conductivity	µs/cm	--	--	--	--	--	107	99	127	162	133	130	134	268	279	287	273	335	282		
Temperature	degrees Celsius	--	--	--	--	--	13.6	11.6	7.4	9.1	12.7	6.5	8.1	10.2	17.4	7.3	1.8	12.7	5.8		
GENERAL PARAMETERS																					
pH	pH units	--	--	--	6.5-9	6.5-8.5	7.22	7.51	7.22	7.64	7.77	7.65	7.74	7.72	7.96	7.87	7.87	7.98	7.88		
Alkalinity	µg/L as CaCO3	<5000	--	--	--	-25%	48000	40000	61000	80000	53000	59000	83000	112000	114000	121000	147000	149000	142000		
Acidity	µg/L as CaCO3	<5000	--	--	--	--	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000		
Electrical Conductivity (EC)	µS/cm	<2	--	--	--	--	115	103	140	164	124	137	173	265	275	299	279	344	289		
Total Suspended Solids (TSS)	µg/L	<10000	--	--	+5000-25000 ⁽⁶⁾	--	27800000	4330000	2430000	7050000	1760000	283000	14400000	69000	130000	120000	1310000	924000	2000000		
Total Dissolved Solids (TDS)	µg/L	<20000	--	--	--	--	172000	86000	88000	116000	84000	90000	188000	152000	176000	178000	160000	234000	188000		
Total Hardness	µg/L as CaCO3	<500	--	--	--	--	52200	51600	65400	64500	71300	61700	48400	133000	142000	150000	137000	149000	144000		
MAJOR IONS																					
Calcium (Ca)	µg/L	<50	--	--	--	--	19400	18700	24400	21900	22300	20600	14500	48700	51700	55100	42100	46400	44500		
Chloride (Cl)	µg/L	<100	--	--	--	--	950	1150	1790	1930	640	1290	1670	1630	1430	1500	900	2710	1760		
Sodium (Na)	µg/L	<50	--	--	--	--	1740	2030	2160	10500	3380	1820	19600	3030	3160	2720	3320	19800	7700		
Fluoride (F)	µg/L	<50, <100, <50000	1500 ⁽⁷⁾	--	--	--	60	<50	<50	110	<50	<50	70	110	90	<50	140	110	110		
Magnesium (Mg)	µg/L	<50	--	--	--	--	910	1190	1080	2380	3790	2480	2950	2870	3140	3030	7720	8060	8010		
Potassium (K)	µg/L	<50	--	--	--	--	380	680	260	1060	1410	550	380	1330	1520	1160	1280	1710	1400		
Sulphate (SO ₄)	µg/L	<100	--	--	--	--	10600	8140	7040	7420	8770	8390	6610	25400	29200	34000	5080	32600	11200		
METALS																					
Aluminum (Al)	µg/L	<4	--	--	100 ⁽⁸⁾	75 ⁽⁹⁾	100	30	29	74	30	17	73	8	15	11	195	22	18		
Antimony (Sb)	µg/L	<6	--	6	--	20	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6		
Arsenic (As)	µg/L	<3	--	25	--	5	<3	<3	<3	<3	<3	<3	<3	5	<3	<3	6	<3			
Barium (Ba)	µg/L	<2	1000	--	--	--	3	2	4	13	12	11	2	25	43	36	7	38	30		
Beryllium (Be)	µg/L	<1	--	--	--	11 ⁽¹⁰⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Boron (B)	µg/L	<10	--	5000	1500 ⁽¹¹⁾	200	<10	<10	11	11	<10	<10	13	10	12	<10	<10	15	13		
Cadmium (Cd)	µg/L	<0.1	--	5	0.058 ⁽¹²⁾	0.1 ⁽¹³⁾	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.1		
Chromium (Cr)	µg/L	<3	50	--	8.9 ⁽¹⁴⁾	8.9 ⁽¹⁴⁾	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3		
Cobalt (Co)	µg/L	<0.5	--	--	--	0.9	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	0.8	<0.5		
Copper (Cu)	µg/L	<2	--	--	2 ⁽¹⁵⁾	5 ⁽¹⁶⁾	4	4	5	16	3	<2	3	4	<2	3	8	3	7		
Iron (Fe)	µg/L	<10	--	--	300	300	57	28	<10	58	<10	<10	25	<10	105	<10	38	<10	135		
Lead (Pb)	µg/L	<1	10 ⁽¹⁷⁾	--	1 ⁽¹⁸⁾	3 ⁽¹⁹⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Manganese (Mn)	µg/L	<2	--	--	--	--	20	5	13	168	38	25	34	94	313	42	39	266	102		
Mercury (Hg)	µg/L	<0.10	1	--	0.026	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.1	<0.1		
Molybdenum (Mo)	µg/L	<2	--	--	73	40	5	5	5	3	<2	<2	<2	127	108	147	<2	48	30		
Nickel (Ni)	µg/L	<3	--	--	25 ⁽²⁰⁾	25	<3	<3	<3	<3	<3	<3	7	<3	3	<3	<3	9	5		
Selenium (Se)	µg/L	<4	10	--	1	100	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4		
Silver (Ag)	µg/L	<0.1	--	--	0.1	0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Strontium (Sr)	µg/L	<5	--	--	--	--	28	18	29	51	29	32	16	54	63	56	42	88	82		
Thallium (Tl)	µg/L	<0.3, <4	--	--	0.8	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3		
Titanium (Ti)	µg/L	<0.1, <2	--	--	--	--	2	<2	<2	2	<2	<2	<2	<2	<2	<2	<2	<2	<2		
Tungsten (W)	µg/L	<0.1, <10	--	--	--	30	<10	<10	<10	212	55	23	232	14	<10	21	21	91	54		
Uranium (U)	µg/L	<2, <4	20	--	15	5	<2	<2	<2	<2	<2	8	<2	13	7	14	<2	2	<2		
Vanadium (V)	µg/L	<0.1, <2	--	--	--	6	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	2	<2		
Zinc (Zn)	µg/L	<4, <5	--	--	30	20	145	<5	41	20	22	10	9	9	8	<5	385	385	61		
Zirconium (Zr)	µg/L	<0.1, <4	--	--	--	4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4		
NUTRIENTS																					
Nitrate (NO ₃)	µg/L as N	<50	10000	--	13000 ⁽²¹⁾	--	<50	<50	<50	<50	<50	120	140	130	<50	<50	120	--	170		
Nitrite (NO ₂)	µg/L as N	<50	1000	--	60 ⁽²²⁾	--	<50	--	<50	<50	--	<50	<50	<50	--	<50	<50	--	<50		
Total Ammonia (NH ₃ + NH ₄)	µg/L as N	<20	--	--	6980	--	<20	30	<20	40	<20	<20	150	<20	40	<20	<20	<20	40		
Un-ionized Ammonia	µg/L as N	<20	--	--	19 ⁽²³⁾	20 ⁽²³⁾	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20		
NUTRIENTS																					
Free Cyanide	µg/L	<2	200	--	5	5	<2	<2	<2	<2	<2	<2	<2	5	<2	<2	<2	<2	<2		
Sulphur (S)	µg/L	<50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1860	--	--		

2012 Groundwater Quality Results

Parameter ⁽¹⁾	Unit	Method Detection Limit	Ontario Drinking Water Standards ⁽¹⁾⁽²⁾		Canadian Water Quality Guidelines ⁽⁴⁾	Provincial Water Quality Objective ⁽⁵⁾	Open Pit Footprint			Tailings Management Facility Footprint and Adjacent Areas									
			MAC	IMAC			DH12-PO-14B			DH12-TMF-05A			DH12-TMF-05B			DH12-TMF-12			
							28-May-12	15-Aug-12	5-Dec-12	6-Jun-12	14-Aug-01	29-Nov-12	6-Jun-12	14-Aug-12	29-Nov-12	13-Jun-12	14-Aug-12	29-Nov-12	
FIELD PARAMETERS																			
pH	pH units	--	--	--	6.5-9	6.5-8.5	7.93	6.94	8.33	7.76	6.54	7.91	7.09	6.54	6.96	6.18	7.6	7.51	
Conductivity	µs/cm	--	--	--	--	--	192	203	213	592	415	382	552	783	761	670	787	727	
Temperature	degrees Celsius	--	--	--	--	--	8.2	10.8	4.5	9.2	11.1	--	14.9	15.5	--	9.8	9.6	--	
GENERAL PARAMETERS																			
pH	pH units	--	--	--	6.5-9	6.5-8.5	7.83	8.04	7.99	7.81	8.01	7.89	7.89	7.97	7.91	7.75	7.94	7.81	
Alkalinity	µg/L as CaCO3	<5000	--	--	--	-25%	91000	95000	106000	125000	136000	136000	232000	342000	328000	86000	87000	87000	
Acidity	µg/L as CaCO3	<5000	--	--	--	--	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	
Electrical Conductivity (EC)	µS/cm	<2	--	--	--	--	189	208	225	589	385	429	486	706	764	766	748	741	
Total Suspended Solids (TSS)	µg/L	<10000	--	--	+5000-25000 ⁽⁶⁾	--	16000000	5560000	5970000	2640000	491000	524000	5680000	344000	25800000	326000	2350000	805000	
Total Dissolved Solids (TDS)	µg/L	<20000	--	--	--	--	184000	134000	144000	378000	272000	398000	360000	554000	564000	574000	558000	468000	
Total Hardness	µg/L as CaCO3	<500	--	--	--	--	81300	113000	105000	129000	141000	143000	200000	187000	231000	340000	343000	322000	
MAJOR IONS																			
Calcium (Ca)	µg/L	<50	--	--	--	--	24800	33200	31700	39000	40200	40900	53400	52100	61900	84600	86100	82300	
Chloride (Cl)	µg/L	<100	--	--	--	--	2440	3480	4160	15100	6670	9090	7850	13300	16300	18300	17100	17500	
Sodium (Na)	µg/L	<50	--	--	--	--	8550	7160	4070	77400	29100	39800	36300	108000	96100	36300	36500	39100	
Fluoride (F)	µg/L	<50, <100, <50000	1500 ⁽⁷⁾	--	--	--	140	90	<50	280	760	640	<50	<50	<50	<50	<50	<50	
Magnesium (Mg)	µg/L	<50	--	--	--	--	4710	7310	6330	7590	9890	9940	16300	13800	18600	31200	31200	28300	
Potassium (K)	µg/L	<50	--	--	--	--	590	1310	920	4760	3820	2810	2640	3470	3050	2190	2340	2080	
Sulphate (SO ₄)	µg/L	<100	--	--	--	--	8270	9840	9560	152000	53500	75900	26500	32900	78700	300000	310000	278000	
METALS																			
Aluminum (Al)	µg/L	<4	--	--	100 ⁽⁸⁾	75 ⁽⁹⁾	94	15	25	146	116	42	123	134	142	9	5	12	
Antimony (Sb)	µg/L	<6	--	6	--	20	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	
Arsenic (As)	µg/L	<3	--	25	5	5	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	
Barium (Ba)	µg/L	<2	1000	--	--	--	15	13	18	59	42	36	39	63	45	22	30	25	
Beryllium (Be)	µg/L	<1	--	--	--	11 ⁽¹⁰⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Boron (B)	µg/L	<10	--	5000	1500 ⁽¹¹⁾	200	<10	<10	<10	31	34	32	<10	20	12	40	47	48	
Cadmium (Cd)	µg/L	<0.1	--	5	0.058 ⁽¹²⁾	0.1 ⁽¹³⁾	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Chromium (Cr)	µg/L	<3	50	--	8.9 ⁽¹⁴⁾	8.9 ⁽¹⁴⁾	<3	<3	<3	<3	<3	<3	4	8	9	<3	<3	<3	
Cobalt (Co)	µg/L	<0.5	--	--	--	0.9	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	3.9	2.7	2.9	<0.5	<0.5	<0.5	
Copper (Cu)	µg/L	<2	--	--	2 ⁽¹⁵⁾	5 ⁽¹⁶⁾	<2	<2	<2	2	2	<2	<2	<2	<2	<2	<2	<2	
Iron (Fe)	µg/L	<10	--	--	300	300	32	73	89	184	<10	23	7230	12200	13800	28	164	223	
Lead (Pb)	µg/L	<1	10 ⁽¹⁷⁾	--	1 ⁽¹⁸⁾	3 ⁽¹⁹⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Manganese (Mn)	µg/L	<2	--	--	--	--	56	64	62	320	201	151	553	609	731	832	832	864	
Mercury (Hg)	µg/L	<0.10	1	--	0.026	0.2	<0.1	<0.1	<0.1	<0.10	<0.1	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	
Molybdenum (Mo)	µg/L	<2	--	--	73	40	5	5	6	179	49	16	3	5	2	4	4	5	
Nickel (Ni)	µg/L	<3	--	--	25 ⁽²⁰⁾	25	<3	<3	<3	5	6	<3	5	5	<3	<3	3	<3	
Selenium (Se)	µg/L	<4	10	--	1	100	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	
Silver (Ag)	µg/L	<0.1	--	--	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Strontium (Sr)	µg/L	<5	--	--	--	69	65	79	292	314	319	167	224	183	523	590	578		
Thallium (Tl)	µg/L	<0.3, <4	--	--	0.8	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	
Titanium (Ti)	µg/L	<0.1, <2	--	--	--	--	<2	<2	<2	5	2	<2	8	14	12	5	6	5	
Tungsten (W)	µg/L	<0.1, <10	--	--	--	30	92	28	43	15	10	<10	<10	<10	<10	<10	<10	<10	
Uranium (U)	µg/L	<2, <4	20	--	15	5	<2	<2	<2	5	7	5	<2	<2	<2	3	3	4	
Vanadium (V)	µg/L	<0.1, <2	--	--	6	--	<2	<2	<2	<2	<2	<2	6	6	6	<2	<2	<2	
Zinc (Zn)	µg/L	<4, <5	--	--	30	20	153	<5	23	96	35	59	1250	11	<5	16	<5	8	
Zirconium (Zr)	µg/L	<0.1, <4	--	--	--	4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	
NUTRIENTS																			
Nitrate (NO ₃ -)	µg/L as N	<50	10000	--	13000 ⁽²¹⁾	--	<50	--	<50	<50	--	120	<50	--	<50	<50	--	<50	
Nitrite (NO ₂ -)	µg/L as N	<50	1000	--	60 ⁽²²⁾	--	<50	--	<50	<50	--	<50	<50	--	<50	<50	--	<50	
Total Ammonia (NH ₃ + NH ₄)	µg/L as N	<20	--	--	6980	--	270	100	130	<20	<20	70	200	350	270	<20	20	<20	
Un-ionized Ammonia	µg/L as N	<20	--	--	19 ⁽²³⁾	20 ⁽²³⁾	<20	<20	<20	<20	<20	--	<20	<20	--	<20	<20	--	
NUTRIENTS																			
Free Cyanide	µg/L	<2	200	--	5	5	<2	<2	<2	<2	<2	4	<2	<2	<2	<2	<2	<2	
Sulphur (S)	µg/L	<50	--	--	--	--	--	--	--	50400	--	--	--	--	--	--	--	--	

2012 Groundwater Quality Results

Parameter ⁽¹⁾	Unit	Method Detection Limit	Ontario Drinking Water Standards ⁽¹⁾⁽²⁾		Canadian Water Quality Guidelines ⁽⁴⁾	Provincial Water Quality Objective ⁽⁵⁾	Tailings Management Facility Footprint and Adjacent Areas																
			MAC	IMAC			DH12-TMF-16				DH12-TMF-27A				DH12-TMF-27B			DH12-TMF-28			DH12-TMF-31A		
							6-Jun-12	29-May-12	15-Aug-12	29-Nov-12	29-May-12	15-Aug-12	29-Nov-12	13-Jun-12	16-Aug-12	29-Nov-12	5-Jun-12	16-Aug-12	29-Nov-12				
FIELD PARAMETERS																							
pH	pH units	--	--	--	6.5-9	6.5-8.5	8.16	7.74	7.49	7	7.97	7.1	7.07	6.31	7.53	7.55	7.93	7.37	7.74				
Conductivity	µS/cm	--	--	--	--	--	126	57	94	80	62	88	99	319	469	350	229	226	226				
Temperature	degrees Celsius	--	--	--	--	--	10	6.9	9.7	--	8.7	10.3	--	8.4	13.4	5	6.7	8.6	4.6				
GENERAL PARAMETERS																							
pH	pH units	--	--	--	6.5-9	6.5-8.5	7.58	7.29	7.72	7.43	7.16	7.5	7.49	7.8	7.93	7.82	7.86	8.03	7.98				
Alkalinity	µg/L as CaCO3	<5000	--	--	--	<25%	64000	41000	55000	43000	33000	40000	41000	99000	94000	99000	123000	116000	117000				
Acidity	µg/L as CaCO3	<5000	--	--	--	--	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000				
Electrical Conductivity (EC)	µS/cm	<2	--	--	--	--	136	149	138	101	91	94	93	346	401	358	241	233	240				
Total Suspended Solids (TSS)	µg/L	<10000	--	--	+5000-25000 ⁽⁶⁾	--	1250000	2900000	3810000	5980000	7420000	11000000	2330000	5480000	3040000	1380000	5780000	6480000	7970000				
Total Dissolved Solids (TDS)	µg/L	<20000	--	--	--	--	86000	66000	80000	74000	70000	102000	66000	308000	222000	308000	222000	134000	146000				
Total Hardness	µg/L as CaCO3	<500	--	--	--	--	62800	40300	58400	46200	32200	43300	40800	145000	169000	153000	121000	124000	127000				
MAJOR IONS																							
Calcium (Ca)	µg/L	<50	--	--	--	--	17400	9750	14300	11000	6120	7850	7850	39300	45300	41200	43000	43800	45500				
Chloride (Cl)	µg/L	<100	--	--	--	--	420	350	480	600	440	440	350	5370	7110	5410	510	500	550				
Sodium (Na)	µg/L	<50	--	--	--	--	2040	1640	3190	2250	2090	2700	2260	19100	23300	16000	1390	1410	1410				
Fluoride (F)	µg/L	<50, <100, <50000	1500 ⁽⁷⁾	--	--	--	70	90	120	70	80	<50	580	970	830	<50	<50	<50	<50				
Magnesium (Mg)	µg/L	<50	--	--	--	--	4690	3870	5520	4540	4100	5750	5150	11500	13500	12100	3430	3660	3210				
Potassium (K)	µg/L	<50	--	--	--	--	430	410	730	470	450	600	400	1210	1670	1120	470	640	300				
Sulphate (SO ₄)	µg/L	<100	--	--	--	--	5910	4460	5750	6840	4630	5150	5230	70100	102000	75800	8320	8650	8880				
METALS																							
Aluminum (Al)	µg/L	<4	--	--	100 ⁽⁸⁾	75 ⁽⁹⁾	184	14	10	52	39	20	25	17	45	9	27	38	13				
Antimony (Sb)	µg/L	<6	--	6	--	20	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6				
Arsenic (As)	µg/L	<3	--	25	5	5	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3				
Barium (Ba)	µg/L	<2	1000	--	--	--	6	<2	5	6	2	2	2	29	57	37	7	5	5				
Beryllium (Be)	µg/L	<1	--	--	--	11 ⁽¹⁰⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1				
Boron (B)	µg/L	<10	--	5000	1500 ⁽¹¹⁾	200	<10	<10	<10	<10	<10	<10	<10	18	19	12	<10	<10	<10				
Cadmium (Cd)	µg/L	<0.1	--	5	0.058 ⁽¹²⁾	0.1 ⁽¹³⁾	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Chromium (Cr)	µg/L	<3	50	--	8.9 ⁽¹⁴⁾	8.9 ⁽¹⁴⁾	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3				
Cobalt (Co)	µg/L	<0.5	--	--	--	0.9	<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				
Copper (Cu)	µg/L	<2	--	--	2 ⁽¹⁵⁾	5 ⁽¹⁶⁾	6	<2	2	3	<2	<2	<2	<2	<2	<2	<2	<2	<2				
Iron (Fe)	µg/L	<10	--	--	300	300	20	<10	<10	15	<10	<10	<10	297	168	256	<10	<10	<10				
Lead (Pb)	µg/L	<1	10 ⁽¹⁷⁾	--	1 ⁽¹⁸⁾	3 ⁽¹⁹⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1				
Manganese (Mn)	µg/L	<2	--	--	--	17	<2	12	27	31	7	2	<2	284	462	433	8	6	4				
Mercury (Hg)	µg/L	<0.10	1	--	0.026	0.2	<0.10	<0.10	<0.1	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10	<0.1	<0.1				
Molybdenum (Mo)	µg/L	<2	--	--	73	40	<2	<2	<2	<2	<2	<2	<2	9	6	3	<2	<2	<2				
Nickel (Ni)	µg/L	<3	--	--	25 ⁽²⁰⁾	25	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3				
Selenium (Se)	µg/L	<4	10	--	1	100	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4				
Silver (Ag)	µg/L	<0.1	--	--	0.1	0.1	0.2	0.2	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1				
Strontium (Sr)	µg/L	<5	--	--	34	14	25	14	25	27	16	19	22	81	112	85	29	38	33				
Thallium (Tl)	µg/L	<0.3, <4	--	--	0.8	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3				
Titanium (Ti)	µg/L	<0.1, <2	--	--	--	--	<2	<2	<2	3	<2	<2	<2	3	<2	<2	<2	<2	<2				
Tungsten (W)	µg/L	<0.1, <10	--	--	--	30	74	38	42	13	<10	<10	<10	27	20	<10	22	12	<10				
Uranium (U)	µg/L	<2, <4	20	--	15	5	<2	<2	<2	<2	<2	<2	<2	3	5	5	<2	<2	<2				
Vanadium (V)	µg/L	<0.1, <2	--	--	--	6	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2				
Zinc (Zn)	µg/L	<4, <5	--	--	30	20	353	<5	<5	<5	22	<5	8	69	<5	10	53	20	20				
Zirconium (Zr)	µg/L	<0.1, <4	--	--	--	4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4				
NUTRIENTS																							
Nitrate (NO ₃ ⁻)	µg/L as N	<50	10000	--	13000 ⁽²¹⁾	--	410	<50	--	<50	<50	--	70	<50	--	<50	<50	--	210				
Nitrite (NO ₂ ⁻)	µg/L as N	<50	1000	--	60 ⁽²²⁾	--	<50	<50	--	<50	<50	--	<50	<50	--	<50	<50	--	<50				
Total Ammonia (NH ₃ + NH ₄)	µg/L as N	<20	--	--	6980	--	<20	<20	60	30	<20	60	30	<20	<20	<20	<20	<20	<20				
Un-ionized Ammonia	µg/L as N	<20	--	--	19 ⁽²³⁾	20 ⁽²³⁾	<20	<20	<20	--	<20	<20	--	<20	<20	<20	<20	<20	<20				
NUTRIENTS																							
Free Cyanide	µg/L	<2	200	--	5	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	5	<2	<2				
Sulphur (S)	µg/L	<50	--	--	--	--	2040	1520	--	--	1580	--	--	--	--	--	2830	--	--				

2012 Groundwater Quality Results

Parameter ⁽¹⁾	Unit	Method Detection Limit	Ontario Drinking Water Standards ⁽¹⁾⁽²⁾		Canadian Water Quality Guidelines ⁽⁴⁾	Provincial Water Quality Objective ⁽⁵⁾	Tailings Management Facility Footprint and Adjacent Areas									North of Tailings Management Facility				
							DH12-TMF-31B			DH12-TMF-32A		DH12-TMF-32B			DH12-TMF-23A		DH12-TMF-23B			
			MAC	IMAC			5-Jun-12	16-Aug-12	29-Nov-12	15-Aug-12	29-Nov-12	28-May-12	15-Aug-12	29-Nov-12	5-Jun-12	15-Aug-12	5-Jun-12	15-Aug-12	29-Nov-12	
FIELD PARAMETERS																				
pH	pH units	--	--	--	6.5-9	6.5-8.5	8.02	--	7.44	7.53	8.01	8.5	6.9	7.06	7.99	6.97	8.3	6.75	7.14	
Conductivity	µS/cm	--	--	--	--	--	133	--	95	302	303	122	120	132	157	172	107	99	88	
Temperature	degrees Celsius	--	--	--	--	--	6.7	--	4.6	13.8	5	8.06	13.5	5.7	8.3	10.6	6.4	10	6.5	
GENERAL PARAMETERS																				
pH	pH units	--	--	--	6.5-9	6.5-8.5	7.65	7.83	7.58	7.95	8.05	7.22	7.58	7.47	7.78	7.85	7.58	7.78	7.54	
Alkalinity	µg/L as CaCO3	<5000	--	--	--	-25%	74000	83000	46000	132000	136000	55000	52000	65000	102000	73000	58000	53000	52000	
Acidity	µg/L as CaCO3	<5000	--	--	--	--	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	
Electrical Conductivity (EC)	µS/cm	<2	--	--	--	--	160	183	115	295	304	126	126	146	260	175	121	117	113	
Total Suspended Solids (TSS)	µg/L	<10000	--	--	+5000-25000 ⁽⁶⁾	--	22800000	12900000	2830000	1140000	953000	1380000	4500000	785000	286000	418000	6820000	1140000	1550000	
Total Dissolved Solids (TDS)	µg/L	<20000	--	--	--	--	116000	138000	214000	208000	168000	74000	92000	86000	110000	124000	114000	88000	68000	
Total Hardness	µg/L as CaCO3	<500	--	--	--	--	76400	95000	51500	129000	142000	55500	60500	70900	76600	76400	50000	58400	52700	
MAJOR IONS																				
Calcium (Ca)	µg/L	<50	--	--	--	--	29000	35000	19100	41500	46100	20600	22300	26300	22600	22300	16000	18800	17100	
Chloride (Cl)	µg/L	<100	--	--	--	--	520	530	1170	1270	1190	530	540	530	3590	2730	390	470	460	
Sodium (Na)	µg/L	<50	--	--	--	--	1150	1560	1270	13700	11600	1330	1570	1310	6370	7700	4890	2700	2220	
Fluoride (F)	µg/L	<50, <100, <50000	1500 ⁽⁷⁾	--	--	--	<50	<50	<50	392	380	<50	<50	<50	160	160	120	<50	<50	
Magnesium (Mg)	µg/L	<50	--	--	--	--	980	1840	920	6140	6440	990	1170	1260	4890	5040	2450	2780	2440	
Potassium (K)	µg/L	<50	--	--	--	--	340	1590	80	1770	1610	430	460	240	1340	1280	300	660	170	
Sulphate (SO ₄)	µg/L	<100	--	--	--	--	7540	8990	8070	22100	24200	5930	6690	7470	7450	11800	4220	5200	3580	
METALS																				
Aluminum (Al)	µg/L	<4	--	--	100 ⁽⁸⁾	75 ⁽⁹⁾	38	43	68	35	37	180	31	6	21	29	68	25	12	
Antimony (Sb)	µg/L	<6	--	6	--	20	<6	<6	<6	<6	6	<6	<6	<6	<6	<6	<6	<6	<6	
Arsenic (As)	µg/L	<3	--	25	5	5	<3	<3	<3	16	179	<3	<3	<3	<3	<3	<3	<3	<3	
Barium (Ba)	µg/L	<2	1000	--	--	--	5	3	2	20	34	5	3	3	8	27	5	4	3	
Beryllium (Be)	µg/L	<1	--	--	--	11 ⁽¹⁰⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Boron (B)	µg/L	<10	--	5000	1500 ⁽¹¹⁾	200	<10	<10	<10	119	149	<10	<10	<10	12	14	<10	<10	<10	
Cadmium (Cd)	µg/L	<0.1	--	5	0.058 ⁽¹²⁾	0.1 ⁽¹³⁾	<0.1	<0.1	<0.1	<0.1	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Chromium (Cr)	µg/L	<3	50	--	8.9 ⁽¹⁴⁾	8.9 ⁽¹⁴⁾	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	
Cobalt (Co)	µg/L	<0.5	--	--	--	0.9	<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	
Copper (Cu)	µg/L	<2	--	--	2 ⁽¹⁵⁾	5 ⁽¹⁶⁾	<2	<2	<2	<2	15	<2	<2	<2	<2	<2	<2	<2	<2	
Iron (Fe)	µg/L	<10	--	--	300	300	<10	40	51	<10	<10	18	<10	<10	<10	140	13	<10	<10	
Lead (Pb)	µg/L	<1	10 ⁽¹⁷⁾	--	1 ⁽¹⁸⁾	3 ⁽¹⁹⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Manganese (Mn)	µg/L	<2	--	--	--	--	39	66	14	130	15	116	76	8	92	155	25	15	5	
Mercury (Hg)	µg/L	<0.10	1	--	0.026	0.2	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.1	<0.10	<0.1	<0.1	
Molybdenum (Mo)	µg/L	<2	--	--	73	40	<2	<2	<2	12	15	<2	<2	<2	2	<2	<2	<2	<2	
Nickel (Ni)	µg/L	<3	--	--	25 ⁽²⁰⁾	25	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	
Selenium (Se)	µg/L	<4	10	--	1	100	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	
Silver (Ag)	µg/L	<0.1	--	--	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Strontium (Sr)	µg/L	<5	--	--	--	--	36	47	27	115	134	36	31	32	109	134	26	24	21	
Thallium (Tl)	µg/L	<0.3 <4	--	--	0.8	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	
Titanium (Ti)	µg/L	<0.1, <2	--	--	--	--	<2	3	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	
Tungsten (W)	µg/L	<0.1, <10	--	--	--	30	<10	<10	<10	31	<10	<10	<10	<10	<10	15	<10	<10	<10	
Uranium (U)	µg/L	<2, <4	20	--	15	5	<2	<2	<2	<2	<2	<2	<2	<2	21	19	<2	<2	<2	
Vanadium (V)	µg/L	<0.1, <2	--	--	--	6	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	
Zinc (Zn)	µg/L	<4, <5	--	--	30	20	<5	5	<5	<5	12	316	48	<5	36	<5	109	38	<5	
Zirconium (Zr)	µg/L	<0.1, <4	--	--	--	4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	
NUTRIENTS																				
Nitrate (NO ₃ ⁻)	µg/L as N	<50	10000	--	13000 ⁽²¹⁾	--	<50	--	80	190	200	610	--	450	80	--	<50	--	<50	
Nitrite (NO ₂ ⁻)	µg/L as N	<50	1000	--	60 ⁽²²⁾	--	<50	--	<50	<50	<50	<50	--	<50	<50	--	<50	--	<50	
Total Ammonia (NH ₃ + NH ₄)	µg/L as N	<20	--	--	6990	--	<20	<20	40	40	60	<20	30	20	<20	<20	<20	<20	<20	
Un-ionized Ammonia	µg/L as N	<20	--	--	19 ⁽²³⁾	20 ⁽²³⁾	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
NUTRIENTS																				
Free Cyanide	µg/L	<2	200	--	5	5	<2	<2	<2	<2	7	<2	<2	<2	<2	<2	3	<2	<2	
Sulphur (S)	µg/L	<50	--	--	--	--	2650	--	--	--	--	2070	--	--	2610	--	1510	--	--	

2012 Groundwater Quality Results

Parameter ⁽¹⁾	Unit	Method Detection Limit	Ontario Drinking Water Standards ⁽¹⁾⁽²⁾		Canadian Water Quality Guidelines ⁽⁴⁾	Provincial Water Quality Objective ⁽⁵⁾	North of Tailings Management Facility						North of Open Pit			Adjacent to Mine Rock Area	
							DH12-TMF-24A			DH12-TMF-24B			DH12-WD-01			DH12-WD-12A	
			MAC	IMAC			6-Jun-12	14-Aug-12	29-Nov-12	6-Jun-12	14-Aug-12	29-Nov-12	7-Jun-12	15-Aug-12	5-Dec-12	4-Jun-12	16-Aug-12
FIELD PARAMETERS																	
pH	pH units	--	--	--	6.5-9	6.5-8.5	6.48	6.87	7.51	6.95	6.16	6.11	7.64	5.5	7.78	6.14	7.14
Conductivity	µs/cm	--	--	--	--	--	527	568	787	69	63	68	--	135	76	470	810
Temperature	degrees Celsius	--	--	--	--	--	8.4	12.1	5.2	8.1	10.1	5	8.1	14.6	6.2	5.3	10.5
GENERAL PARAMETERS																	
pH	pH units	--	--	--	6.5-9	6.5-8.5	7.33	7.88	7.68	6.7	6.96	6.77	7.4	7.42	6.94	7.95	8
Alkalinity	µg/L as CaCO ₃	<5000	--	--	--	-25%	128000	200000	208000	17000	21000	21000	74000	65000	30000	133000	136000
Acidity	µg/L as CaCO ₃	<5000	--	--	--	--	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000
Electrical Conductivity (EC)	µS/cm	<2	--	--	--	--	524	700	724	58	51	54	163	145	87	379	507
Total Suspended Solids (TSS)	µg/L	<10000	--	--	+5000-25000 ⁽⁶⁾	--	1760000	950000	1470000	2620000	4470000	6440000	1350000	160000	38000	175000	82000
Total Dissolved Solids (TDS)	µg/L	<20000	--	--	--	--	374000	454000	562000	162000	158000	76000	104000	104000	52000	380000	722000
Total Hardness	µg/L as CaCO ₃	<500	--	--	--	--	180000	267000	175000	16100	20300	20300	70700	64400	36500	131000	148000
MAJOR IONS																	
Calcium (Ca)	µg/L	<50	--	--	--	--	61500	91800	61400	4340	5500	5540	23000	22100	12400	41700	46900
Chloride (Cl)	µg/L	<100	--	--	--	--	58600	75300	59600	900	460	830	820	600	710	3900	5390
Sodium (Na)	µg/L	<50	--	--	--	--	36100	38300	85500	1940	1930	1880	3630	4900	2170	27200	55200
Fluoride (F)	µg/L	<50, <100, <50000	1500 ⁽⁷⁾	--	--	--	<50	<50	<50	<50	<50	<50	150	<50	<50	<50	<50
Magnesium (Mg)	µg/L	<50	--	--	--	--	6390	9110	5210	1290	1590	1560	3220	2240	1940	6540	7420
Potassium (K)	µg/L	<50	--	--	--	--	3440	2940	2860	580	600	740	870	780	4500	1420	1580
Sulphate (SO ₄)	µg/L	<100	--	--	--	--	26900	17600	55800	2710	2540	3130	9290	10400	11000	60400	121000
METALS																	
Aluminum (Al)	µg/L	<4	--	--	100 ⁽⁸⁾	75 ⁽⁹⁾	106	40	47	159	154	133	122	37	47	13	5
Antimony (Sb)	µg/L	<6	--	6	--	20	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
Arsenic (As)	µg/L	<3	--	25	5	5	<3	<3	4	<3	<3	<3	<3	<3	<3	<3	<3
Barium (Ba)	µg/L	<2	1000	--	--	--	137	78	63	8	9	9	23	7	6	11	10
Beryllium (Be)	µg/L	<1	--	--	--	11 ⁽¹⁰⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Boron (B)	µg/L	<10	--	5000	1500 ⁽¹¹⁾	200	219	69	78	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium (Cd)	µg/L	<0.1	--	5	0.058 ⁽¹²⁾	0.1 ⁽¹³⁾	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1
Chromium (Cr)	µg/L	<3	50	--	8.9 ⁽¹⁴⁾	8.9 ⁽¹⁴⁾	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Cobalt (Co)	µg/L	<0.5	--	--	--	0.9	2.6	0.8	<0.5	0.7	0.5	0.6	0.8	1.5	0.8	<0.5	<0.5
Copper (Cu)	µg/L	<2	--	--	2 ⁽¹⁵⁾	5 ⁽¹⁶⁾	<2	<2	<2	<2	<2	<2	7	3	9	<2	<2
Iron (Fe)	µg/L	<10	--	--	300	300	1950	549	816	7790	5580	7730	45	836	24	11	<10
Lead (Pb)	µg/L	<1	10 ⁽¹⁷⁾	--	1 ⁽¹⁸⁾	3 ⁽¹⁹⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese (Mn)	µg/L	<2	--	--	--	--	485	385	295	146	125	132	161	300	54	16	17
Mercury (Hg)	µg/L	<0.10	1	--	0.028	0.2	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.1	<0.1	<0.10	<0.1
Molybdenum (Mo)	µg/L	<2	--	--	73	40	3	3	<2	<2	<2	<2	33	<2	<2	<2	<2
Nickel (Ni)	µg/L	<3	--	--	25 ⁽²⁰⁾	25	11	5	<3	<3	<3	<3	5	<3	<3	<3	<3
Selenium (Se)	µg/L	<4	10	--	1	100	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Silver (Ag)	µg/L	<0.1	--	--	0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium (Sr)	µg/L	<5	--	--	--	--	886	998	886	38	35	36	80	48	25	65	71
Thallium (Tl)	µg/L	<0.3, <4	--	--	0.8	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Titanium (Ti)	µg/L	<0.1, <2	--	--	--	--	<2	<2	<2	4	9	4	<2	<2	<2	<2	<2
Tungsten (W)	µg/L	<0.1, <10	--	--	--	30	<10	<10	13	<10	<10	<10	107	25	<10	26	10
Uranium (U)	µg/L	<2, <4	20	--	15	5	<2	<2	5	<2	<2	<2	<2	<2	<2	2	2
Vanadium (V)	µg/L	<0.1, <2	--	--	--	6	<2	2	<2	16	6	18	2	<2	<2	<2	<2
Zinc (Zn)	µg/L	<4, <5	--	--	30	20	447	<5	<5	81	5	14	864	<5	9	39	6
Zirconium (Zr)	µg/L	<0.1, <4	--	--	--	4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
NUTRIENTS																	
Nitrate (NO ₃ -)	µg/L as N	<50	10000	--	13000 ⁽²¹⁾	--	<50	--	<50	100	--	<50	60	--	<50	<50	--
Nitrite (NO ₂ -)	µg/L as N	<50	1000	--	60 ⁽²²⁾	--	<50	--	<50	--	--	<50	<50	--	<50	<50	--
Total Ammonia (NH ₃ + NH ₄)	µg/L as N	<20	--	--	6980	--	<20	30	40	60	30	50	<20	<20	<20	<20	<20
Un-Ionized Ammonia	µg/L as N	<20	--	--	19 ⁽²³⁾	20 ⁽²³⁾	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
NUTRIENTS																	
Free Cyanide	µg/L	<2	200	--	5	5	<2	<2	<2	<2	<2	<2	6	<2	<2	<2	<2
Sulphur (S)	µg/L	<50	--	--	--	--	9370	--	--	900	--	--	3220	--	--	19200	--

2012 Groundwater Quality Results

Parameter ⁽¹⁾	Unit	Method Detection Limit	Ontario Drinking Water Standards ⁽¹⁾⁽²⁾		Canadian Water Quality Guidelines ⁽⁴⁾	Provincial Water Quality Objective ⁽⁵⁾	Adjacent to Mine Rock Area									West of Open Pit		
			MAC	IMAC			DH12-WD-12B		DH12-WD-14			DH12-WD-17A			DH12-WD-19			
							4-Jun-12	16-Aug-12	4-Jun-12	14-Aug-12	5-Dec-12	5-Jun-12	15-Aug-12	5-Dec-12	4-Jun-12	15-Aug-12	5-Dec-12	
FIELD PARAMETERS																		
pH	pH units	--	--	--	6.5-9	6.5-8.5	7.09	7.08	7.85	7.12	8.05	8.44	6.04	8.02	7.65	7.22	7.63	
Conductivity	µs/cm	--	--	--	--	--	227	229	228	206	206	312	351	405	373	441		
Temperature	degrees Celsius	--	--	--	--	--	4.9	10	10.1	11.2	7.4	10.1	9	--	9.7	13.2	6.6	
GENERAL PARAMETERS																		
pH	pH units	--	--	--	6.5-9	6.5-8.5	7.84	8.08	7.76	7.99	7.85	7.73	7.95	8.02	7.89	8.01	8.06	
Alkalinity	µg/L as CaCO3	<5000	--	--	--	<25%	119000	120000	111000	103000	101000	109000	114000	133000	213000	198000	209000	
Acidity	µg/L as CaCO3	<5000	--	--	--	--	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	
Electrical Conductivity (EC)	µS/cm	<2	--	--	--	--	240	249	227	215	215	308	303	362	410	378	430	
Total Suspended Solids (TSS)	µg/L	<10000	--	--	+5000-25000 ⁽⁶⁾	--	40000	100000	223000	256000	112000	38000	592000	102000	266000	187000	793000	
Total Dissolved Solids (TDS)	µg/L	<20000	--	--	--	--	146000	172000	130000	138000	116000	146000	240000	208000	236000	244000	542000	
Total Hardness	µg/L as CaCO3	<500	--	--	--	--	104000	129000	98600	104000	98900	93200	104000	107000	206000	205000	189000	
MAJOR IONS																		
Calcium (Ca)	µg/L	<50	--	--	--	--	32400	40100	31900	33800	32100	29300	32200	32600	66100	66300	62300	
Chloride (Cl)	µg/L	<100	--	--	--	--	900	870	1040	940	1060	10800	13000	21300	1890	960	3260	
Sodium (Na)	µg/L	<50	--	--	--	--	4640	4630	6500	6290	6010	26900	24800	35700	4660	3850	24600	
Fluoride (F)	µg/L	<50, <100, <50000	1500 ⁽⁷⁾	--	--	--	<50	<50	140	<50	100	<50	<50	<50	<50	<50	<50	
Magnesium (Mg)	µg/L	<50	--	--	--	--	5550	6940	4590	4810	4550	4860	5660	6330	10000	9700	8240	
Potassium (K)	µg/L	<50	--	--	--	--	1520	1700	1220	1190	1060	1020	1370	1170	1650	1720	1770	
Sulphate (SO ₄)	µg/L	<100	--	--	--	--	10200	13600	9890	10900	10700	32700	24200	26600	12400	11100	29000	
METALS																		
Aluminum (Al)	µg/L	<4	--	--	100 ⁽⁸⁾	75 ⁽⁹⁾	21	8	13	7	10	63	25	13	18	13	14	
Antimony (Sb)	µg/L	<6	--	--	6	20	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	
Arsenic (As)	µg/L	<3	--	25	5	5	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	
Barium (Ba)	µg/L	<2	1000	--	--	--	14	13	22	10	17	35	77	50	23	29	41	
Beryllium (Be)	µg/L	<1	--	--	--	11 ⁽¹⁰⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Boron (B)	µg/L	<10	--	5000	1500 ⁽¹¹⁾	200	<10	<10	16	20	22	11	14	27	<10	<10	12	
Cadmium (Cd)	µg/L	<0.1	--	5	0.058 ⁽¹²⁾	0.1 ⁽¹³⁾	<0.1	<0.1	0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Chromium (Cr)	µg/L	<3	50	--	8.9 ⁽¹⁴⁾	8.9 ⁽¹⁴⁾	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	
Cobalt (Co)	µg/L	<0.5	--	--	--	0.9	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	
Copper (Cu)	µg/L	<2	--	--	2 ⁽¹⁵⁾	5 ⁽¹⁶⁾	<2	<2	<2	<2	<2	2	4	3	<2	<2	<2	
Iron (Fe)	µg/L	<10	--	--	300	300	79	32	<10	<10	57	39	<10	16	<10	<10	52	
Lead (Pb)	µg/L	<1	10 ⁽¹⁷⁾	--	1 ⁽¹⁸⁾	3 ⁽¹⁹⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Manganese (Mn)	µg/L	<2	--	--	--	--	61	58	46	17	59	85	98	113	96	101	181	
Mercury (Hg)	µg/L	<0.10	1	--	0.026	0.2	<0.10	<0.1	<0.10	<0.1	<0.1	<0.10	<0.1	<0.1	<0.10	<0.1	<0.1	
Molybdenum (Mo)	µg/L	<2	--	--	73	40	3	2	7	8	13	11	7	<2	<2	<2	<2	
Nickel (Ni)	µg/L	<3	--	--	25 ⁽²⁰⁾	25	<3	<3	<3	<3	<3	<3	7	13	<3	3	<3	
Selenium (Se)	µg/L	<4	10	--	1	100	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	
Silver (Ag)	µg/L	<0.1	--	--	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Strontium (Sr)	µg/L	<5	--	--	--	--	47	50	57	58	65	51	54	89	142	149	151	
Thallium (Tl)	µg/L	<0.3, <4	--	--	0.8	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	
Titanium (Ti)	µg/L	<0.1, <2	--	--	--	--	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	
Tungsten (W)	µg/L	<0.1, <10	--	--	--	30	426	259	28	12	34	677	647	42	<10	<10	20	
Uranium (U)	µg/L	<2, <4	20	--	15	5	3	4	4	4	3	<2	<2	2	<2	<2	4	
Vanadium (V)	µg/L	<0.1, <2	--	--	--	6	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	
Zinc (Zn)	µg/L	<4, <5	--	--	30	20	27	8	32	12	<5	262	142	17	19	<5	8	
Zirconium (Zr)	µg/L	<0.1, <4	--	--	--	4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	
NUTRIENTS																		
Nitrate (NO ₃ -)	µg/L as N	<50	10000	--	13000 ⁽²¹⁾	--	<50	--	<50	--	<50	190	--	<50	<50	--	<50	
Nitrite (NO ₂ -)	µg/L as N	<50	1000	--	60 ⁽²²⁾	--	<50	--	<50	--	<50	<50	--	<50	<50	--	<50	
Total Ammonia (NH ₃ + NH ₄)	µg/L as N	<20	--	--	6980	--	<20	<20	<20	<20	40	<20	20	50	<20	<20	50	
Un-ionized Ammonia	µg/L as N	<20	--	--	19 ⁽²³⁾	20 ⁽²³⁾	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
NUTRIENTS																		
Free Cyanide	µg/L	<2	200	--	5	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	
Sulphur (S)	µg/L	<50	--	--	--	--	3200	<50	--	3280	--	--	10700	--	--	4190	--	

2012 Groundwater Quality Results

Parameter ⁽¹⁾	Unit	Method Detection Limit	Ontario Drinking Water Standards ⁽¹⁾⁽²⁾		Canadian Water Quality Guidelines ⁽⁴⁾	Provincial Water Quality Objective ⁽⁵⁾	Adjacent to Mine Rock Area			North of Open Pit								
			MAC	IMAC			DH12-WD-23			DH12-WD-01			DH12-WD-25A			DH12-WD-25B		
							5-Jun-12	15-Aug-12	5-Dec-12	7-Jun-12	15-Aug-12	5-Dec-12	13-Jun-12	16-Aug-12	5-Dec-12	13-Jun-12	16-Aug-12	5-Dec-12
FIELD PARAMETERS																		
pH	pH units	--	--	--	6.5-9	6.5-8.5	7.65	5.87	6.97	7.64	5.5	7.78	6.88	6.05	7.42	6.4	5.8	7.3
Conductivity	µS/cm	--	--	--	--	--	339	308	330	--	135	76	163	167	152	214	254	266
Temperature	degrees Celsius	--	--	--	--	--	1.6	11.6	6	8.1	14.6	6.2	8.3	10.1	4.8	8.4	10.8	5
GENERAL PARAMETERS																		
pH	pH units	--	--	--	6.5-9	6.5-8.5	7.93	8.05	7.96	7.4	7.42	6.94	7.53	7.64	7.31	7.7	7.79	7.68
Alkalinity	µg/L as CaCO ₃	<5000	--	--	--	<25%	181000	188000	167000	74000	65000	30000	81000	70000	70000	118000	135000	132000
Acidity	µg/L as CaCO ₃	<5000	--	--	--	--	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000
Electrical Conductivity (EC)	µS/cm	<2	--	--	--	--	331	305	313	163	145	87	180	154	150	226	256	253
Total Suspended Solids (TSS)	µg/L	<10000	--	--	+5000-25000 ⁽⁶⁾	--	1910000	2140000	15000000	13500000	1600000	38000	624000	736000	211000	19500000	4660000	5770000
Total Dissolved Solids (TDS)	µg/L	<20000	--	--	--	--	206000	202000	208000	104000	104000	52000	114000	98000	102000	154000	<20000	178000
Total Hardness	µg/L as CaCO ₃	<500	--	--	--	--	185000	183000	173000	70700	64400	36500	81900	81900	74100	123000	135000	128000
MAJOR IONS																		
Calcium (Ca)	µg/L	<50	--	--	--	--	59900	58400	56100	23000	22100	12400	25300	25000	23000	41100	44800	42800
Chloride (Cl)	µg/L	<100	--	--	--	--	670	520	810	820	600	710	590	550	760	690	670	810
Sodium (Na)	µg/L	<50	--	--	--	--	2170	2400	2040	3630	4900	2170	1680	1590	1490	4520	6610	4790
Fluoride (F)	µg/L	<50, <100, <50000	1500 ⁽⁷⁾	--	--	--	<50	<50	<50	150	<50	<50	<50	<50	<50	<50	<50	<50
Magnesium (Mg)	µg/L	<50	--	--	--	--	8560	8960	7930	3220	2240	1340	4550	4730	4050	4900	5700	5010
Potassium (K)	µg/L	<50	--	--	--	--	1910	2160	2010	870	780	450	860	940	470	770	640	590
Sulphate (SO ₄)	µg/L	<100	--	--	--	--	100	100	100	9290	10400	11000	8410	8170	6730	5210	770	1570
METALS																		
Aluminum (Al)	µg/L	<4	--	--	100 ⁽⁸⁾	75 ⁽⁹⁾	23	9	20	122	37	47	31	24	31	209	43	20
Antimony (Sb)	µg/L	<6	--	6	--	20	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
Arsenic (As)	µg/L	<3	--	25	5	5	<3	<3	<3	<3	<3	<3	8	14	11	6	4	4
Barium (Ba)	µg/L	<2	1000	--	--	--	27	27	30	23	7	6	5	7	7	17	26	23
Beryllium (Be)	µg/L	<1	--	--	--	11 ⁽¹⁰⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Boron (B)	µg/L	<10	--	5000	1500 ⁽¹¹⁾	200	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cadmium (Cd)	µg/L	<0.1	--	5	0.058 ⁽¹²⁾	0.1 ⁽¹³⁾	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (Cr)	µg/L	<3	50	--	8.9 ⁽¹⁴⁾	8.9 ⁽¹⁴⁾	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Cobalt (Co)	µg/L	<0.5	--	--	--	0.9	<0.5	<0.5	<0.5	0.8	1.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Copper (Cu)	µg/L	<2	--	--	2 ⁽¹⁵⁾	5 ⁽¹⁶⁾	<2	<2	<2	7	3	9	4	4	4	<2	<2	<2
Iron (Fe)	µg/L	<10	--	--	300	300	1430	1510	1900	45	836	24	4400	4200	4360	3440	3210	4540
Lead (Pb)	µg/L	<1	10 ⁽¹⁷⁾	--	1 ⁽¹⁸⁾	3 ⁽¹⁹⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese (Mn)	µg/L	<2	--	--	--	--	166	156	191	161	300	54	268	300	287	390	366	431
Mercury (Hg)	µg/L	<0.10	1	--	0.026	0.2	<0.10	<0.1	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum (Mo)	µg/L	<2	--	--	73	40	8	2	4	33	<2	<2	<2	<2	<2	<2	<2	<2
Nickel (Ni)	µg/L	<3	--	--	25 ⁽²⁰⁾	25	<3	<3	<3	5	<3	<3	<3	<3	<3	<3	<3	<3
Selenium (Se)	µg/L	<4	10	--	1	100	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
Silver (Ag)	µg/L	<0.1	--	--	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium (Sr)	µg/L	<5	--	--	--	--	58	56	60	80	48	25	46	48	49	60	70	74
Thallium (Tl)	µg/L	<0.3, <4	--	--	0.8	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Titanium (Ti)	µg/L	<0.1, <2	--	--	--	--	<2	<2	<2	<2	<2	<2	<2	<2	11	<2	<2	<2
Tungsten (W)	µg/L	<0.1, <10	--	--	--	30	21	<10	<10	107	25	<10	<10	<10	<10	<10	<10	<10
Uranium (U)	µg/L	<2, <4	20	--	15	5	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Vanadium (V)	µg/L	<0.1, <2	--	--	--	6	<2	<2	<2	2	<2	<2	<2	<2	<2	<2	<2	<2
Zinc (Zn)	µg/L	<4, <5	--	--	30	20	37	<5	<5	864	<5	9	10	11	<5	16	24	<5
Zirconium (Zr)	µg/L	<0.1, <4	--	--	--	4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
NUTRIENTS																		
Nitrate (NO ₃ ⁻)	µg/L as N	<50	10000	--	13000 ⁽²¹⁾	--	<50	--	<50	60	--	<50	<50	--	<50	<50	--	<50
Nitrite (NO ₂ ⁻)	µg/L as N	<50	1000	--	60 ⁽²²⁾	--	<50	--	<50	<50	--	<50	<50	--	<50	<50	--	<50
Total Ammonia (NH ₃ + NH ₄)	µg/L as N	<20	--	--	6980	--	80	70	280	<20	<20	<20	<20	40	60	170	360	200
Un-ionized Ammonia	µg/L as N	<20	--	--	19 ⁽²³⁾	20 ⁽²³⁾	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
NUTRIENTS																		
Free Cyanide	µg/L	<2	200	--	5	5	<2	<2	<2	6	<2	<2	<2	2	<2	<2	2	<2
Sulphur (S)	µg/L	<50	--	--	--	--	140	--	--	3220	--	--	--	--	--	--	--	--

2012 Groundwater Quality Results

Parameter ⁽¹⁾	Unit	Method Detection Limit	Ontario Drinking Water Standards ⁽¹⁾⁽²⁾		Canadian Water Quality Guidelines ⁽⁴⁾	Provincial Water Quality Objective ⁽⁶⁾	North of Open Pit			West of Open Pit					
			MAC	IMAC			DH12-WD-26			DH12-WD-27A			DH12-WD-27B		
							13-Jun-12	15-Aug-12	5-Dec-12	4-Jun-12	15-Aug-12	5-Dec-12	4-Jun-12	15-Aug-12	5-Dec-12
FIELD PARAMETERS															
pH	pH units	--	--	--	6.5-9	6.5-8.5	7.43	7.1	7.58	7.61	6.61	8.08	7.43	6.97	7.97
Conductivity	µs/cm	--	--	--	--	--	389	315	299	289	252	237	239	273	272
Temperature	degrees Celsius	--	--	--	--	--	8.9	13.6	6.3	9	9.5	4.8	8.2	8.7	4.8
GENERAL PARAMETERS															
pH	pH units	--	--	--	6.5-9	6.5-8.5	7.83	7.78	7.84	7.87	8.08	7.94	7.85	8.13	8.01
Alkalinity	µg/L as CaCO3	<5000	--	--	--	-25%	135000	145000	150000	152000	122000	120000	125000	136000	134000
Acidity	µg/L as CaCO3	<5000	--	--	--	--	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000	<5000
Electrical Conductivity (EC)	µS/cm	<2	--	--	--	--	372	331	306	294	248	246	259	271	272
Total Suspended Solids (TSS)	µg/L	<10000	--	--	+5000-25000 ⁽⁵⁾	--	602000	104000	41000	2700000	1210000	312000	6100000	3960000	2180000
Total Dissolved Solids (TDS)	µg/L	<20000	--	--	--	--	270000	216000	208000	170000	160000	148000	152000	176000	608000
Total Hardness	µg/L as CaCO3	<500	--	--	--	--	112000	121000	94900	146000	136000	117000	114000	157000	136000
MAJOR IONS															
Calcium (Ca)	µg/L	<50	--	--	--	--	37700	40100	32100	42200	39000	33700	33100	45200	39400
Chloride (Cl)	µg/L	<100	--	--	--	--	3420	2850	2740	800	690	710	800	710	860
Sodium (Na)	µg/L	<50	--	--	--	--	46100	30000	29600	2930	4660	4250	8120	3110	2600
Fluoride (F)	µg/L	<50, <100, <50000	1500 ⁽⁷⁾	--	--	--	300	290	250	<50	100	110	170	<50	<50
Magnesium (Mg)	µg/L	<50	--	--	--	--	4340	5030	3590	9850	9490	7980	7630	10700	9080
Potassium (K)	µg/L	<50	--	--	--	--	990	1220	820	1130	1230	910	1070	1230	960
Sulphate (SO ₄)	µg/L	<100	--	--	--	--	59200	24400	9910	12100	12800	12600	14200	12700	12200
METALS															
Aluminum (Al)	µg/L	<4	--	--	100 ⁽⁸⁾	75 ⁽⁹⁾	9	9	15	15	21	7	154	102	8
Antimony (Sb)	µg/L	<6	--	6	--	20	<6	<6	<6	<6	<6	<6	<6	<6	<6
Arsenic (As)	µg/L	<3	--	25	5	5	<3	4	<3	<3	<3	<3	<3	<3	<3
Barium (Ba)	µg/L	<2	1000	--	--	--	14	15	17	15	16	21	17	16	14
Beryllium (Be)	µg/L	<1	--	--	--	11 ⁽¹⁰⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1
Boron (B)	µg/L	<10	--	5000	1500 ⁽¹¹⁾	200	13	12	17	<10	<10	10	<10	<10	<10
Cadmium (Cd)	µg/L	<0.1	--	5	0.058 ⁽¹²⁾	0.1 ⁽¹³⁾	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (Cr)	µg/L	<3	50	--	8.9 ⁽¹⁴⁾	8.9 ⁽¹⁴⁾	<3	<3	<3	<3	<3	<3	<3	<3	<3
Cobalt (Co)	µg/L	<0.5	--	--	--	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Copper (Cu)	µg/L	<2	--	--	2 ⁽¹⁵⁾	5 ⁽¹⁶⁾	<2	<2	<2	<2	<2	<2	5	<2	<2
Iron (Fe)	µg/L	<10	--	--	300	300	1280	1440	1340	89	<10	<10	154	61	28
Lead (Pb)	µg/L	<1	10 ⁽¹⁷⁾	--	1 ⁽¹⁸⁾	3 ⁽¹⁹⁾	<1	<1	<1	<1	<1	<1	<1	<1	<1
Manganese (Mn)	µg/L	<2	--	--	--	263	279	257	47	57	53	63	36	16	16
Mercury (Hg)	µg/L	<0.10	1	--	0.026	0.2	<0.1	<0.1	<0.1	<0.10	<0.1	<0.1	<0.10	<0.1	<0.1
Molybdenum (Mo)	µg/L	<2	--	--	73	40	12	6	8	<2	<2	<2	<2	<2	<2
Nickel (Ni)	µg/L	<3	--	--	25 ⁽²⁰⁾	25	<3	<3	<3	<3	<3	<3	<3	<3	<3
Selenium (Se)	µg/L	<4	10	--	1	100	<4	<4	<4	<4	<4	<4	<4	<4	<4
Silver (Ag)	µg/L	<0.1	--	--	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Strontium (Sr)	µg/L	<5	--	--	--	73	83	66	52	87	144	75	60	54	54
Thallium (Tl)	µg/L	<0.3, <4	--	--	0.8	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Titanium (Ti)	µg/L	<0.1, <2	--	--	--	2	<2	<2	<2	<2	<2	<2	5	<2	<2
Tungsten (W)	µg/L	<0.1, <10	--	--	--	30	29	14	11	<10	<10	<10	<10	<10	<10
Uranium (U)	µg/L	<2, <4	20	--	15	5	<2	<2	<2	<2	<2	<2	<2	3	2
Vanadium (V)	µg/L	<0.1, <2	--	--	--	6	3	3	3	<2	<2	<2	<2	<2	<2
Zinc (Zn)	µg/L	<4, <5	--	--	30	20	227	3	<5	6	28	<5	21	166	<5
Zirconium (Zr)	µg/L	<0.1, <4	--	--	--	4	<4	<4	<4	<4	<4	<4	<4	<4	<4
NUTRIENTS															
Nitrate (NO ₃ ⁻)	µg/L as N	<50	10000	--	13000 ⁽²¹⁾	--	<50	--	<50	<50	--	<50	<50	--	<50
Nitrite (NO ₂ ⁻)	µg/L as N	<50	1000	--	60 ⁽²²⁾	--	<50	--	<50	<50	--	<50	<50	--	<50
Total Ammonia (NH ₃ + NH ₄ ⁺)	µg/L as N	<20	--	--	6980	--	80	20	110	<20	60	110	120	20	40
Un-ionized Ammonia	µg/L as N	<20	--	--	19 ⁽²³⁾	20 ⁽²³⁾	<20	<20	<20	<20	<20	<20	<20	<20	<20
NUTRIENTS															
Free Cyanide	µg/L	<2	200	--	5	5	<2	2	<2	<2	<2	<2	<2	<2	<2
Sulphur (S)	µg/L	<50	--	--	--	--	--	--	--	4080	--	--	4820	--	--

Table Notes for Groundwater Quality Results

NOTES ON COMPARISONS TO WATER QUALITY STANDARDS AND GUIDELINES:

Values in GREY exceed the ODWSs MACs or IMACs

Values in **bold italics** exceed the CCME CWQGs

Values underlined exceed the PWQOs

-- indicates no value available

NOTES ON WATER QUALITY STANDARDS AND GUIDELINES:

(1) Total concentrations are assumed, unless stated otherwise.

(2) Ontario Regulation (O.Reg.) 169/03: Ontario Drinking Water Standards (ODWS). Last amendment: O.Reg. 327/08.

http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_030169_e.htm.

(3) MAC: Maximum Acceptable Concentration; IMAC: Interim Maximum Acceptable Concentration

(4) Canadian Council of Ministers of the Environment (CCME), Canadian Water Quality Guidelines (CWQGs) for the Protection of Aquatic Life, Update 7.1 (December 2007).

(5) Provincial Water Quality Objectives, Ministry of Environment and Energy (1994, Revised 1999).

(6) TSS (CWQG) Under clear flow: + 25 mg/L from background levels for any short-term exposure (e.g., 24-h period).
average + 5 mg/L from background levels for longer term exposures (24 h < discharge < 30 d).
TSS (CWQG) Under high flow: + 25 mg/L from background levels at any time when background levels between 25 and 250 mg/L.
+ 10% of background levels when background is >250 mg/L.

(7) Where fluoride is added to drinking water, it is recommended that the concentration be adjusted to 0.5-0.8 mg/L the optimum level for control of tooth decay. Where supplies contain naturally occurring fluoride at levels higher than 1.5 mg/L but less than 2.4 mg/L the Ministry of Health and Long Term Care recommends an approach through local boards of health to raise public and professional awareness to control excessive exposure to fluoride from other sources.

(8) Aluminium guideline (CWQG) is calculated assuming a pH of 7.0.

(9) Aluminium guideline (PWQO) is calculated assuming a pH of 7.0.

(10) Beryllium guideline (PWQO) is calculated assuming a hardness of 30 mg/L as CaCO₃.

(11) Boron guideline (CWQG) is based on long-term exposure.

(12) Cadmium guideline (CWQG) is based on the Draft Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Cadmium, October 2012, and calculated using an assumed hardness of 30 mg/L as CaCO₃.

(13) Cadmium guideline (PWQO) is calculated assuming a hardness of 30 mg/L as CaCO₃.

(14) No guidelines for total chromium. Guidelines for trivalent chromium used: CWQG and PWQO guidelines for Cr(III) are both 8.9 µg/L.

(15) Copper guideline (CWQG) is calculated assuming a hardness of 30 mg/L as CaCO₃.

(16) Copper guideline (PWQO) is calculated assuming a hardness of 30 mg/L as CaCO₃.

(17) This standard applies to water at the point of consumption. Since lead is a component in some plumbing systems, first flush water may contain higher concentrations of lead than water that has been flushed for five minutes.

(18) Lead guideline (CWQG) is calculated assuming a hardness of 30 mg/L as CaCO₃.

(19) Lead guideline (PWQO) is calculated assuming a hardness of 30 mg/L as CaCO₃.

(20) Nickel guideline (CCME) is calculated assuming a hardness of 30 mg/L as CaCO₃.

(21) For protection from direct toxic effects, the guidelines do not consider indirect effects due to eutrophication.

(22) Guideline is expressed as µg nitrite-nitrogen/L. This value is equivalent to 197 µg nitrite/L.

(23) Un-ionized ammonia is calculated using the equation: $f = 1/(10^{pKa-pH} + 1)$, where f is the fraction of NH₃; $pKa = 0.09018 + 2729.92/T$; T = ambient water temperature in Kelvin ($K = °C + 273.16$) (Emerson et al., 1975)

2014 Statistical Summary of Updated Baseline Groundwater Quality Dataset

Parameter	Unit	DH12-WD-278 (n=5)							
		Minimum	Maximum	Average	Standard Deviation	25th percentile	Median	75 th percentile	95 th percentile
GENERAL PARAMETERS									
pH	pH units	6.09	8.13	7.46	0.8	7.22	7.85	8.01	8.11
Alkalinity	mg/L as CaCO ₃	21	136	88.2	53	25	125	134	136
Electrical Conductivity (EC)	µS/cm	59	272	186	100	69	259	271	272
Total Dissolved Solids (TDS)	mg/L	2180	6100	3936	1476	2490	3960	4950	5870
Total Suspended Solids (TSS)	mg/L as CaCO ₃	58	608	221	198	110	152	176	522
Total Hardness	mg/L as CaCO ₃	23	157	91	56	26.2	114	136	153
MAJOR IONS									
Calcium (Ca)	mg/L	4.8	45	26	17	5.7	33	39	44
Magnesium (Mg)	mg/L	0.61	0.9	0.78	0.10	0.71	0.8	0.86	0.89
Potassium (K)	mg/L	1.4	8.1	3.4	2.4	2.0	2.6	3.1	7.1
Sodium (Na)	mg/L	0.025	0.17	0.05	0.06	0.025	0.025	0.025	0.14
Chloride (Cl)	mg/L	2.6	11	6.6	3.3	2.9	7.6	9.1	10
Fluoride (F)	mg/L	0.38	1.2	0.88	0.29	0.77	0.96	1.1	1.2
Sulphate (SO ₄)	mg/L	4.3	14	9.7	4.1	5.2	12	13	14
METALS									
Aluminum (Al)	mg/L	0.008	0.15	0.066	0.054	0.028	0.04	0.10	0.14
Antimony (Sb)	mg/L	<0.006	<0.006	<0.006	-	<0.006	<0.006	<0.006	<0.006
Arsenic (As)	mg/L	0.0015	0.05	0.011	0.019	0.0015	0.0015	0.0015	0.040
Barium (Ba)	mg/L	0.001	0.017	0.0098	0.0072	0.001	0.014	0.016	0.017
Beryllium (Be)	mg/L	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001
Boron (B)	mg/L	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01
Cadmium (Cd)	mg/L	0.00001	0.00005	0.000042	0.000016	0.00005	0.00005	0.00005	0.00005
Chromium (Cr)	mg/L	<0.003	<0.003	<0.003	-	<0.003	<0.003	<0.003	<0.003
Cobalt (Co)	mg/L	<0.0005	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	<0.0005
Copper (Cu)	mg/L	0.0004	0.005	0.0017	0.0017	0.001	0.001	0.001	0.0042
Iron (Fe)	mg/L	0.005	0.15	0.05	0.056	0.005	0.028	0.061	0.14
Lead (Pb)	mg/L	0.0001	0.0005	0.00042	0.00016	0.0005	0.0005	0.0005	0.0005
Manganese (Mn)	mg/L	0.001	0.063	0.0234	0.024	0.001	0.016	0.036	0.058
Mercury (Hg)	mg/L	0.00000125	0.00005	0.000040	0.000020	0.00005	0.00005	0.00005	0.00005
Molybdenum (Mo)	mg/L	<0.002	<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002
Nickel (Ni)	mg/L	0.0015	0.004	0.002	0.001	0.0015	0.0015	0.0015	0.0035
Selenium (Se)	mg/L	0.002	0.05	0.0116	0.0192	0.002	0.002	0.002	0.0404
Silver (Ag)	mg/L	0.00005	0.0001	0.00006	0.00002	0.00005	0.00005	0.00005	0.00009
Strontium (Sr)	mg/L	0.014	0.075	0.044	0.025	0.015	0.054	0.06	0.072
Thallium (Tl)	mg/L	0.000005	0.00015	0.00012	0.000058	0.00015	0.00015	0.00015	0.00015
Titanium (Ti)	mg/L	0.001	0.005	0.0018	0.0016	0.001	0.001	0.001	0.0042
Tungsten (W)	mg/L	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01
Uranium (U)	mg/L	0.001	0.003	0.0016	0.0008	0.001	0.001	0.002	0.0028
Vanadium (V)	mg/L	<0.002	<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002
Zinc (Zn)	mg/L	0.0025	0.166	0.0389	0.063952639	0.0025	0.0025	0.021	0.137
Zirconium (Zr)	mg/L	<0.004	<0.004	<0.004	-	<0.004	<0.004	<0.004	<0.004
OTHER PARAMETERS									
Total Cyanide	mg/L	<0.002	<0.002	<0.002	-	<0.002	<0.002	<0.002	<0.002
Total Ammonia (NH ₃ + NH ₄)	mg/L as N	0.01	0.12	0.042	0.04	0.02	0.02	0.04	0.10

Notes:

Values with the less than sign ("<") indicate concentrations below the laboratory method detection limit.

For the purposes of statistical calculations, values less than the laboratory detection limit were assumed to be equal to one-half the detection limit

Dashes ("-") indicate the statistic was not calculated.