

Table 2-1. Low, Average, and High Flows in the Embarrass River at PM-12 and PM-13

Flow ¹ (cfs)	Location in Embarrass River	
	PM-12	PM-13
Low	0.86	5.07
Average	13.80	81.53
High	144.35	853.08

¹ Flows include surface runoff and groundwater not originating in Tailings Basin

Table 2-2. Groundwater Chemistry at the Tailings Basin Prior to PolyMet Operations

Parameter	Units	Median Groundwater Concentration at Taililngs Basin
Ag	mg/L	0.0001
Al	mg/L	1.5788
As	mg/L	0.002905
B	mg/L	0.33
Ba	mg/L	0.09298
Be	mg/L	0.00075
Ca	mg/L	59.78
Cd	mg/L	0.000188
Cl	mg/L	21.54
Co	mg/L	0.001556
Cu	mg/L	0.004555
F	mg/L	1.55
Fe	mg/L	4.594
Hardness	mg/L	436.6
K	mg/L	7.77
Mg	mg/L	69.97
Mn	mg/L	1.183
Na	mg/L	44.31
Ni	mg/L	0.00688
Pb	mg/L	0.0012
Sb	mg/L	0.00025
Se	mg/L	0.00109
SO ₄	mg/L	152.4
Tl	mg/L	0.0002
Zn	mg/L	0.01435

Table 2-3. Initial Estimate of Water Quality for Babbitt WWTP - Selected Parameters

Parameter	Units	Concentration in WWTP Effluent
Copper	mg/L	0.019
Nickel	mg/L	0.0033
Zinc	mg/L	0.062

Table 3-1. Minnesota Surface Water Quality Standards for the Embarrass River

Water Body		Embarrass River			
Water Use Classification		2B - Statewide Waters	2B - Lake Superior Basin Waters	3C - Statewide Waters	4A - Statewide Waters
Parameter	Units				
Ag	mg/L	0.001			
Al	mg/L	0.125			
As	mg/L	0.053	0.053		
B	mg/L				0.5
Ba	mg/L				
Be	mg/L				
Ca	mg/L				
Cd	mg/L	0.0011 +	0.0025 *		
Cl	mg/L	230		250	
Co	mg/L	0.005			
Cu	mg/L	0.0098 +	0.0093 *		
F	mg/L				
Fe	mg/L				
Hardness	mg/L			500	
K	mg/L				
Mg	mg/L				
Mn	mg/L				
Na	mg/L				
Ni	mg/L	0.158 +	0.052 *		
Pb	mg/L	0.0032 +			
Sb	mg/L	0.031			
Se	mg/L	0.005	0.005		
SO ₄	mg/L				
Tl	mg/L	0.00056			
Zn	mg/L	0.106 +	0.12 *		

Standards in bold are the most stringent and are used to evaluate the water quality modeling results of the NorthMet Project.

Minnesota Class 4B, 5 and 6 Surface Water Quality are applicable for the Embarrass River and do not have standards related to the parameters listed above.

+ Standards assume a total hardness of 100 mg/L for Class 2B under Minnesota Rules Chapter 7050 for statewide water bodies. Actual equations are:

$$\text{Cd standard} = \exp(0.7852 * \ln(\text{total hardness}) - 3.490) / 1000$$

$$\text{Cu standard} = \exp(0.62 * \ln(\text{total hardness}) - 0.57) / 1000$$

$$\text{Ni standard} = \exp(0.846 * \ln(\text{total hardness}) + 1.1645) / 1000$$

$$\text{Pb standard} = \exp(1.273 * \ln(\text{total hardness}) - 4.705) / 1000$$

$$\text{Zn standard} = \exp(0.8473 * \ln(\text{total hardness}) + 0.7615) / 1000$$

* Standards assume a total hardness of 100 mg/L for Class 2B under Minnesota Rules Chapter 7052 for Lake Superior Basin water bodies. Actual equations are:

$$\text{Cd standard} = \exp(0.7852 * \ln(\text{total hardness}) - 2.715) / 1000$$

$$\text{Cu standard} = \exp(0.8545 * \ln(\text{total hardness}) - 1.702) / 1000$$

$$\text{Ni standard} = \exp(0.846 * \ln(\text{total hardness}) + 0.0584) / 1000$$

$$\text{Zn standard} = \exp(0.8473 * \ln(\text{total hardness}) + 0.884) / 1000$$

Table 3-2. Minnesota Groundwater Quality Standards for the Plant Site

		GW Standards		EPA
		EPA	MDH	
		MCL	HRL	sMCL
Antimony	ug/L	6	6	--
Arsenic	ug/L	10	--	--
Barium	ug/L	2,000	2,000	--
Beryllium	ug/L	4	0.08	--
Boron	ug/L	--	600	--
Cadmium	ug/L	5	4	--
Calcium		--	--	--
Chromium, total	ug/L	100	--	--
Chromium Hexavalent	ug/L	--	100	--
Chromium Trivalent	ug/L	--	20,000	--
Cobalt	ug/L	--	--	--
Copper	ug/L	1,300	--	1,000
Iron	ug/L	--	--	300
Lead (TT)	ug/L	15	--	--
Magnesium		--	--	--
Manganese	ug/L	--	100*	50
Mercury	ug/L	2	--	--
Nickel	ug/L	--	100	--
Selenium	ug/L	50	30	--
Silver	ug/L	--	30	100
Thallium	ug/L	2	0.6	--
Tin	ug/L	--	4,000	--
Vanadium	ug/L	--	50	--
Zinc	ug/L	--	2,000	5,000
Other parameters				
Sulfate	ug/L	--	--	250,000
Alkalinity		--	--	--
Chloride	ug/L	--	--	250,000
Fluoride	ug/L	4,000	--	2,000
Hardness		--	--	--
Potassium		--	--	--
Sodium		--	--	--
Nitrogen as nitrate	ug/L	10,000	10,000	--
Nitrogen as ammonia		--	--	--
Aluminum	ug/L		--	50 to 200
Molybdenum	ug/L	--	--	--

Groundwater Criteria:

sMCL - Secondary MCLs (40 CFR 143) based on aesthetics.

MCL - Maximum Contaminant Levels (40 CFR 141)

HRLs - Health Risk Limits - (MN Rules 4717.7500)

* While a HRL was promulgated for this chemical, due to research that has become available since the HRLs were promulgated, the MDH no longer recommends the HRL value.

Table 4-1. Unrecoverable Seepage Flows from the Tailings Basin During Operation and Closure under Tailings Basin - Proposed Action

	Unrecoverable Seepage to Embarrass River Watershed by Source (gpm)		
	Hydrometallurgical Residue Cells	Cells 1E & 2E	Cell 2W
Prior to PolyMet Operations	--	900	4123
Year 1	0.468	1430	3573
Year 5	6.732	1841	3573
Year 8	5.043	2150	3573
Year 9	5.956	2360	3573
Year 15	7.833	2535	3573
Year 20	8.664	2680	3573
Closure	0.744	1100	1510
Post-Closure	0.744	1100	610

Table 4-2. Water Chemistry of Cells 1E and 2E Seepage to Groundwater under Tailings Basin - Proposed Action

Parameter	Units	Cell 1E and Cell 2E Percolate to Groundwater under Proposed Action							
		Year 1	Year 5	Year 8	Year 9	Year 15	Year 20	Closure	Post-Closure
Ag	mg/L	0.0010	0.0009	0.0009	0.0009	0.0012	0.0012	0.0010	0.0010
Al	mg/L	0.0100	0.0961	0.1005	0.1068	0.4434	0.3735	0.6373	0.6373
As	mg/L	0.0059	0.0068	0.0070	0.0076	0.0155	0.0144	0.0124	0.0124
B	mg/L	0.1390	0.1354	0.1409	0.1451	0.1732	0.1741	0.1988	0.1988
Ba	mg/L	0.0529	0.0503	0.0504	0.0505	0.0635	0.0660	0.0481	0.0481
Be	mg/L	0.0003	0.0005	0.0005	0.0006	0.0014	0.0013	0.0008	0.0008
Ca	mg/L	45.8	55.6	72.5	75.5	95.4	76.4	59.9	59.9
Cd	mg/L	0.0001	0.0002	0.0004	0.0004	0.0007	0.0005	0.0002	0.0002
Cl	mg/L	18.9	10.7	6.1	5.9	7.6	7.7	6.3	6.3
Co	mg/L	0.0012	0.0020	0.0023	0.0025	0.0087	0.0079	0.0014	0.0014
Cu	mg/L	0.0059	0.0078	0.0085	0.0086	0.0208	0.0202	0.0182	0.0182
F	mg/L	4.5714	2.2470	0.7888	0.6911	0.8265	0.7704	0.0182	0.0182
Fe	mg/L	0.0040	0.0596	0.0580	0.0591	0.0982	0.0872	0.6747	0.6747
Hardness	mg/L	315.0	261.3	252.5	255.7	319.8	270.8	227.4	227.4
K	mg/L	9.2	7.7	6.7	7.0	14.6	13.4	13.4	13.4
Mg	mg/L	48.7	29.8	17.3	16.3	19.8	19.4	18.9	18.9
Mn	mg/L	0.2895	0.3101	0.2972	0.2887	0.4324	0.4504	0.2764	0.2764
Na	mg/L	66.1	34.8	18.9	22.1	22.5	19.4	12.2	12.2
Ni	mg/L	0.0095	0.0298	0.0386	0.0412	0.1537	0.1418	0.0151	0.0151
Pb	mg/L	0.0006	0.0008	0.0012	0.0017	0.0024	0.0018	0.0011	0.0011
Sb	mg/L	0.0048	0.0065	0.0083	0.0088	0.0113	0.0102	0.0054	0.0054
Se	mg/L	0.0010	0.0012	0.0013	0.0014	0.0025	0.0023	0.0015	0.0015
SO ₄	mg/L	142.8	140.4	153.3	166.6	241.9	212.0	110.3	110.3
Tl	mg/L	0.0010	0.0009	0.0009	0.0010	0.0012	0.0011	0.0009	0.0009
Zn	mg/L	0.0098	0.0176	0.0291	0.0397	0.0812	0.0611	0.0202	0.0202

Table 4-3. Water Chemistry of Hydrometallurgical Residue Cells Liner Leakage

Parameter	Units	Water Quality of Hydrometallurgical Residue Cells Liner Leakage - All Years
Ag	mg/L	0.000125
Al	mg/L	0.18
As	mg/L	0.004
B	mg/L	0.1
Ba ¹	mg/L	0.005
Be	mg/L	0
Ca	mg/L	416
Cd	mg/L	0.0004
Cl ¹	mg/L	1760
Co	mg/L	0.005
Cu	mg/L	0.0015
F ¹	mg/L	2.85
Fe	mg/L	0.4
Hardness ¹	mg/L	8610
K	mg/L	1.8
Mg	mg/L	213
Mn	mg/L	0.0023
Na	mg/L	255
Ni	mg/L	0.098
Pb	mg/L	0.0005
Sb	mg/L	0.004
Se	mg/L	0.054
SO ₄	mg/L	7347
Tl	mg/L	0.0002
Zn	mg/L	0.01

¹ Predictions of the Hydrometallurgical Residue Cells seepage water quality is not available for Ba, Cl, F and Hardness. It was assumed to be the maximum value observed in the humidity cells.

Table 4-4. Unrecoverable Seepage Flows from the Tailings Basin During Operation and Closure for Tailings Basin - Geotechnical Mitigation

	Unrecoverable Seepage to Embarrass River Watershed by Source for Geotechnical Mitigation (gpm)		
	Hydrometallurgical Residue Cells ¹	Cells 1E & 2E	Cell 2W
Prior to PolyMet Operations	--	900	4123
Year 1	0.468	1600	3573
Year 5	6.732	2260	3573
Year 10	7.712	2490	3573
Year 15	7.833	2700	3573
Year 20	8.664	2900	3573
Closure	0.744	777	1510
Post-Closure	0.744	777	610

¹Seepage from Hydrometallurgical Residue Cells is the same for Tailings Basin-Proposed Action and Tailings Basin-Geotechnical Mitigation.

Table 4-5. Water Chemistry of Cells 1E and 2E Seepage to Groundwater for Tailings Basin - Geotechnical Mitigation

Parameter	Units	Cells 1E and 2E Percolate to Groundwater under Geotechnical Mitigation						
		Year 1	Year 5	Year 10	Year 15	Year 20	Closure	Post-Closure
Ag	mg/L	0.0009	0.0009	0.0008	0.0009	0.0009	0.0012	0.0012
Al	mg/L	0.0100	0.0100	0.1251	0.0874	0.0688	0.6149	0.6149
As	mg/L	0.0068	0.0068	0.0094	0.0078	0.0075	0.0279	0.0279
B	mg/L	0.1378	0.1378	0.1500	0.1535	0.1587	0.1506	0.1506
Ba	mg/L	0.0505	0.0505	0.0492	0.0500	0.0540	0.0195	0.0195
Be	mg/L	0.0004	0.0004	0.0006	0.0005	0.0005	0.0013	0.0013
Ca	mg/L	77.3	77.3	107.3	81.6	65.2	68.7	68.7
Cd	mg/L	0.0003	0.0003	0.0006	0.0006	0.0005	0.0012	0.0012
Cl	mg/L	15.2	15.2	5.1	5.7	5.9	4.0	4.0
Co	mg/L	0.0015	0.0015	0.0016	0.0019	0.0022	0.0027	0.0027
Cu	mg/L	0.0068	0.0068	0.0070	0.0091	0.0114	0.0141	0.0141
F	mg/L	2.9034	2.9034	0.5070	0.5631	0.5994	1.1369	1.1369
Fe	mg/L	0.0040	0.0040	0.0397	0.0386	0.0217	0.0994	0.0994
Hardness	mg/L	374.3	374.3	310.8	254.7	218.2	402.1	402.1
K	mg/L	9.3	9.3	8.0	6.7	6.2	21.3	21.3
Mg	mg/L	44.0	44.0	10.4	12.4	13.4	56.0	56.0
Mn	mg/L	0.2403	0.2403	0.1585	0.1938	0.2308	0.1435	0.1435
Na	mg/L	52.9	52.9	31.4	26.0	22.2	26.6	26.6
Ni	mg/L	0.0191	0.0191	0.0248	0.0222	0.0236	0.0055	0.0055
Pb	mg/L	0.0009	0.0009	0.0030	0.0027	0.0023	0.0010	0.0010
Sb	mg/L	0.0080	0.0080	0.0117	0.0093	0.0088	0.0012	0.0012
Se	mg/L	0.0011	0.0011	0.0016	0.0015	0.0014	0.0033	0.0033
SO ₄	mg/L	190.0	190.0	223.1	183.9	163.3	176.5	176.5
Tl	mg/L	0.0009	0.0009	0.0010	0.0010	0.0010	0.0001	0.0001
Zn	mg/L	0.0182	0.0182	0.0636	0.0666	0.0587	0.0128	0.0128

Table 5-1. Variables Included in Embarrass River Model

Variable Type	Variable Label	Variable Description
FLOW VARIABLES	Q_{r12}	Total flow in Embarrass River at PM-12
	Q_{r13}	Total flow in Embarrass River at PM-13
	Q_{s12}	Surface runoff entering Embarrass River upstream of PM-12
	Q_{s13}	Surface runoff entering Embarrass River between PM-12 and PM-13
	Q_{sBab}	Discharge from Babbitt Wastewater Treatment Plant
	Q_{sPit}	Discharge from Area 5 Pit NW
	Q_{fs}	Groundwater seepage from Tailings Basin Cells 1E and 2E
	Q_{rrs}	Liner leakage from Tailings Basin Hydrometallurgical Residue Cells to groundwater
	Q_{s2W}	Groundwater seepage from Tailings Basin Cell 2W
	Q_{g12}	Groundwater entering river upstream of PM-12
	Q_{g13}	Groundwater entering river between PM-12 and PM-13
CONCENTRATION VARIABLES	C_{r12}	Parameter concentration in Embarrass River at PM-12
	C_{r13}	Parameter concentration in Embarrass River at PM-13
	C_{s12}	Parameter concentration in surface runoff entering Embarrass River upstream of PM-12
	C_{s13}	Parameter concentration in surface runoff entering Embarrass River between PM-12 and PM-13
	C_{sBab}	Parameter concentration in Babbitt Wastewater Treatment Plant discharge
	C_{sPit}	Parameter concentration in Area 5 Pit NW discharge
	C_{fs}	Parameter concentration in seepage from Tailings Basin Cells 1E and 2E
	C_{rrs}	Parameter concentration in Tailings Basin Hydrometallurgical Residue Cells liner leakage
	C_{s2W}	Parameter concentration in groundwater seepage from Tailings Basin Cell 2W
	C_{g12}	Parameter concentration in groundwater entering river upstream of PM-12
	C_{g13}	Parameter concentration in groundwater entering river between PM-12 and PM-13

Table 5-2. Input Concentrations Used in the Embarrass River Mass-Balance Model

Parameter	Units	Surface Runoff Concentration	Median Groundwater Concentration	Pre-PolyMet Seepage from Cell 2W	Area 5 Pit NW Discharge
Ag	mg/L	0.00011	0.000008	0.0001	0.00016
Al	mg/L	0.1	0.025	1.5788	0.0133
As	mg/L	0.00075	0.00273	0.002905	0.0013
B	mg/L	0.012	0.0212	0.33	0.132
Ba	mg/L	0.011	0.0681	0.09298	0.0044
Be	mg/L	0.0001	0.000023	0.00075	0.0001
Ca	mg/L	13	19	59.78	95.4
Cd	mg/L	0.00008	0.0003	0.000188	0.0001
Cl	mg/L	10	1.8	21.54	5.95
Co	mg/L	0.0006	0.0011	0.001556	0.00055
Cu	mg/L	0.0015	0.004	0.004555	0.0035
F	mg/L	0.1	0.385	1.55	0.125
Fe	mg/L	2.9	0.035	4.594	0.038
Hardness	mg/L	70	87.5	436.6	943
K	mg/L	3.7	1.6	7.77	53.8
Mg	mg/L	6	10.65	69.97	271
Mn	mg/L	0.3	0.188	1.183	0.485
Na	mg/L	3.5	4.9	44.31	120
Ni	mg/L	0.0012	0.007	0.00688	0.0052
Pb	mg/L	0	0.0012	0.0012	0.0003
Sb ¹	mg/L	0.00002	0.0015	0.00025	0.00025
Se	mg/L	0.0003	0.00295	0.00109	0.0016
SO ₄	mg/L	4	8.5	152.4	1046
Tl	mg/L	0.0002	0.000004	0.0002	0.0006
Zn	mg/L	0.016	0.0115	0.01435	0.003

¹ Antimony was not measured in the MPCA or the Copper Nickel Study, therefore the groundwater value from the Partridge River watershed was used for the median groundwater concentration.

Table 5-3. Average Baseline Concentrations Observed in the Embarrass River

Parameter	Units	PM-12	PM-13
Ag	mg/L	0.00012	0.00012
Al	mg/L	0.0983	0.1916
As	mg/L	0.001	0.001
B	mg/L	0.0175	0.0443
Ba	mg/L	0.0155	0.0278
Be	mg/L	0.0001	0.0001
Ca	mg/L	13.4	19.9
Cd	mg/L	0.0001	0.0001
Cl	mg/L	4.49	6.98
Co	mg/L	0.0006	0.0005
Cu	mg/L	0.00153	0.002
F	mg/L	0.1	0.39
Fe	mg/L	1.72	1.29
Hardness	mg/L	61.7	143.5
K	mg/L	0.8	2.3
Mg	mg/L	6.2	15.9
Mn	mg/L	0.16	0.11
Na	mg/L	3	12.7
Ni	mg/L	0.00194	0.00207
Pb	mg/L	0.00015	0.00027
Sb	mg/L	0.0015	0.0015
Se	mg/L	0.0005	0.0005
SO ₄	mg/L	4.64	36.13
Tl	mg/L	0.0002	0.0002
Zn	mg/L	0.0183	0.0123

Table 5-4.

Deterministic water quality predictions at surface water monitoring station PM-12 (mg/L)

Embarrass River PM-12

Tailings Basin - Proposed Action

Low flow conditions

Parameter	Average Measured Conditions	Year 01	Year 05	Year 08	Year 09	Year 15	Year 20	Closure	Post-Closure	Hardness Independent Standard
Ag	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.001
Al	0.0983	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.125
As	0.0010	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.053
B	0.0175	0.0212	0.0212	0.0212	0.0212	0.0212	0.0212	0.0212	0.0212	0.5
Ba	0.0155	0.0681	0.0681	0.0681	0.0681	0.0681	0.0681	0.0681	0.0681	
Be	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Ca	13.4	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	
Cd	0.0001	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	
Cd-Std	0.0008	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	
Cl	4.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	230
Co	0.0006	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.005
Cu	0.0015	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	
Cu-Std	0.0062	0.0083	0.0083	0.0083	0.0083	0.0083	0.0083	0.0083	0.0083	
F	0.1000	0.3850	0.3850	0.3850	0.3850	0.3850	0.3850	0.3850	0.3850	
Fe	1.7200	0.0350	0.0350	0.0350	0.0350	0.0350	0.0350	0.0350	0.0350	
Hard	61.7	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	
K	0.8	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	
Mg	6.2	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	
Mn	0.1600	0.1880	0.1880	0.1880	0.1880	0.1880	0.1880	0.1880	0.1880	
Na	3.0	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	
Ni	0.0019	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	
Ni-Std	0.0346	0.0466	0.0466	0.0466	0.0466	0.0466	0.0466	0.0466	0.0466	
Pb	0.0002	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	
Pb-Std	0.0017	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	
Sb	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.031
Se	0.0005	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.005
SO ₄	4.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	
Tl	0.0002	0.000004	0.000004	0.000004	0.000004	0.000004	0.000004	0.000004	0.000004	0.00056
Zn	0.0183	0.0115	0.0115	0.0115	0.0115	0.0115	0.0115	0.0115	0.0115	
Zn-Std	0.0704	0.0947	0.0947	0.0947	0.0947	0.0947	0.0947	0.0947	0.0947	

Notes

- 1) The hardness dependent standards for Cd, Cu, Ni, Pb and Zn are listed below the deterministic water quality predictions for each parameter.
- 2) Deterministic water quality predictions at PM-12 does not change during mine operation and closure because it is upstream of the tailings basin.
- 3) Predictions for low flow conditions correspond to surface runoff equal to zero, and groundwater recharge as the only natural flow contribution.

Table 5-5. Deterministic water quality predictions at surface water monitoring station PM-12 (mg/L)

Embarrass River PM-12

Tailings Basin - Proposed Action

Average flow conditions

Parameter	Average Measured Conditions	Year 01	Year 05	Year 08	Year 09	Year 15	Year 20	Closure	Post-Closure	Hardness Independent Standard
Ag	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.001
Al	0.0983	0.0953	0.0953	0.0953	0.0953	0.0953	0.0953	0.0953	0.0953	0.125
As	0.0010	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.053
B	0.0175	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	0.5
Ba	0.0155	0.0146	0.0146	0.0146	0.0146	0.0146	0.0146	0.0146	0.0146	
Be	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Ca	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	
Cd	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Cd-Std	0.0008	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	
Cl	4.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	230
Co	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.005
Cu	0.0015	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	
Cu-Std	0.0062	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	
F	0.1000	0.1178	0.1178	0.1178	0.1178	0.1178	0.1178	0.1178	0.1178	
Fe	1.7200	2.7215	2.7215	2.7215	2.7215	2.7215	2.7215	2.7215	2.7215	
Hard	61.7	71.1	71.1	71.1	71.1	71.1	71.1	71.1	71.1	
K	0.8	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Mg	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	
Mn	0.1600	0.2930	0.2930	0.2930	0.2930	0.2930	0.2930	0.2930	0.2930	
Na	3.0	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	
Ni	0.0019	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	
Ni-Std	0.0346	0.0391	0.0391	0.0391	0.0391	0.0391	0.0391	0.0391	0.0391	
Pb	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Pb-Std	0.0017	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	
Sb	0.0015	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.031
Se	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.005
SO ₄	4.6	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	
Tl	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.00056
Zn	0.0183	0.0157	0.0157	0.0157	0.0157	0.0157	0.0157	0.0157	0.0157	
Zn-Std	0.0704	0.0794	0.0794	0.0794	0.0794	0.0794	0.0794	0.0794	0.0794	

Notes

- 1) The hardness dependent standards for Cd, Cu, Ni, Pb and Zn are listed below the deterministic water quality predictions for each parameter.
- 2) Deterministic water quality predictions at PM-12 does not change during mine operation and closure because it is upstream of the tailings basin.

Table 5-6. Deterministic water quality predictions at surface water monitoring station PM-12 (mg/L)

Embarrass River PM-12

Tailings Basin - Proposed Action

High flow conditions

Parameter	Average Measured Conditions	Year 01	Year 05	Year 08	Year 09	Year 15	Year 20	Closure	Post-Closure	Hardness Independent Standard
Ag	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.001
Al	0.0983	0.0996	0.0996	0.0996	0.0996	0.0996	0.0996	0.0996	0.0996	0.125
As	0.0010	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.053
B	0.0175	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121	0.5
Ba	0.0155	0.0113	0.0113	0.0113	0.0113	0.0113	0.0113	0.0113	0.0113	
Be	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Ca	13.4	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	
Cd	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Cd-Std	0.0008	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	
Cl	4.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	230
Co	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.005
Cu	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	
Cu-Std	0.0062	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	
F	0.1000	0.1017	0.1017	0.1017	0.1017	0.1017	0.1017	0.1017	0.1017	
Fe	1.7200	2.8829	2.8829	2.8829	2.8829	2.8829	2.8829	2.8829	2.8829	
Hard	61.7	70.1	70.1	70.1	70.1	70.1	70.1	70.1	70.1	
K	0.8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
Mg	6.2	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Mn	0.1600	0.2993	0.2993	0.2993	0.2993	0.2993	0.2993	0.2993	0.2993	
Na	3.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Ni	0.0019	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	
Ni-Std	0.0346	0.0386	0.0386	0.0386	0.0386	0.0386	0.0386	0.0386	0.0386	
Pb	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Pb-Std	0.0017	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	
Sb	0.0015	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.031
Se	0.0005	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.005
SO ₄	4.6	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Tl	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.00056
Zn	0.0183	0.0160	0.0160	0.0160	0.0160	0.0160	0.0160	0.0160	0.0160	
Zn-Std	0.0704	0.0785	0.0785	0.0785	0.0785	0.0785	0.0785	0.0785	0.0785	

Notes

- 1) The hardness dependent standards for Cd, Cu, Ni, Pb and Zn are listed below the deterministic water quality predictions for each parameter.
- 2) Deterministic water quality predictions at PM-12 does not change during mine operation and closure because it is upstream of the tailings basin.

Table 5-7.

Deterministic water quality predictions at surface water monitoring station PM-13 (mg/L)

Embarrass River PM-13

Tailings Basin - Proposed Action

Low flow conditions

Parameter	Average Measured Conditions	Year 01	Year 05	Year 08	Year 09	Year 15	Year 20	Closure	Post-Closure	Hardness Independent Standard
Ag	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.001
Al	0.1916	0.2365	0.2258	0.2160	0.2102	0.2153	0.2234	0.2465	0.2062	0.125
As	0.0010	0.0029	0.0030	0.0031	0.0031	0.0019	0.0037	0.0035	0.0039	0.053
B	0.0443	0.0699	0.0677	0.0668	0.0663	0.0538	0.0676	0.0697	0.0641	0.5
Ba	0.0278	0.0707	0.0699	0.0697	0.0695	0.0247	0.0704	0.0692	0.0673	
Be	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	
Ca	19.9	26.1	27.5	28.4	28.8	18.0	29.4	26.9	26.9	
Cd	0.0001	0.0003	0.0003	0.0003	0.0003	0.0001	0.0003	0.0003	0.0003	
Cd-Std	0.0015	0.0016	0.0017	0.0016	0.0016	0.0012	0.0017	0.0015	0.0014	
Cl	7.0	5.7	9.1	7.6	8.1	8.1	9.8	4.8	4.2	230
Co	0.0005	0.0012	0.0012	0.0012	0.0013	0.0010	0.0017	0.0012	0.0012	0.005
Cu	0.0020	0.0042	0.0043	0.0044	0.0044	0.0027	0.0054	0.0052	0.0058	
Cu-Std	0.0123	0.0126	0.0133	0.0130	0.0131	0.0101	0.0135	0.0121	0.0116	
F	0.3900	0.7736	0.6586	0.5573	0.5474	0.2991	0.5511	0.4852	0.4196	
Fe	1.2900	0.6564	0.6119	0.5811	0.5619	0.5266	0.5374	0.5917	0.4239	
Hard	143.5	149.1	163.1	156.2	158.4	109.9	166.7	139.7	130.7	
K	2.3	2.9	2.8	2.7	2.7	2.2	3.2	3.2	3.5	
Mg	15.9	20.9	19.8	18.6	18.3	11.4	18.5	17.9	15.7	
Mn	0.1100	0.3295	0.3208	0.3142	0.3097	0.1921	0.3174	0.3053	0.2665	
Na	12.7	13.7	12.4	11.1	11.3	8.1	11.1	9.9	8.5	
Ni	0.0021	0.0071	0.0087	0.0094	0.0098	0.0142	0.0183	0.0077	0.0080	
Ni-Std	0.0708	0.0731	0.0789	0.0761	0.0770	0.0565	0.0804	0.0692	0.0654	
Pb	0.0003	0.0012	0.0012	0.0012	0.0012	0.0005	0.0013	0.0012	0.0012	
Pb-Std	0.0050	0.0053	0.0059	0.0056	0.0057	0.0036	0.0061	0.0049	0.0045	
Sb	0.0015	0.0015	0.0017	0.0018	0.0019	0.0011	0.0021	0.0017	0.0019	0.031
Se	0.0005	0.0026	0.0027	0.0027	0.0027	0.0009	0.0029	0.0026	0.0027	0.005
SO ₄	36.1	36.7	52.7	49.2	52.6	57.7	63.4	34.6	32.8	
Tl	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00056
Zn	0.0123	0.0118	0.0123	0.0131	0.0140	0.0096	0.0159	0.0125	0.0128	
Zn-Std	0.1440	0.1487	0.1605	0.1547	0.1565	0.1149	0.1634	0.1407	0.1330	

Notes

- 1) The hardness dependent standards for Cd, Cu, Ni, Pb and Zn are listed below the deterministic water quality predictions for each parameter.
- 2) Predictions for low flow conditions correspond to surface runoff equal to zero, and groundwater recharge as the only natural flow contribution.

Table 5-8. Deterministic water quality predictions at surface water monitoring station PM-13 (mg/L)

Embarrass River PM-13

Tailings Basin - Proposed Action

Average flow conditions

Parameter	Average Measured Conditions	Year 01	Year 05	Year 08	Year 09	Year 15	Year 20	Closure	Post-Closure	Hardness Independent Standard
Ag	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001	0.0001	0.001
Al	0.1916	0.2180	0.2197	0.2190	0.2188	0.2372	0.2346	0.1658	0.1323	0.125
As	0.0010	0.0012	0.0013	0.0014	0.0014	0.0018	0.0019	0.0013	0.0012	0.053
B	0.0443	0.0467	0.0475	0.0484	0.0491	0.0502	0.0516	0.0328	0.0257	0.5
Ba	0.0278	0.0225	0.0226	0.0229	0.0230	0.0209	0.0242	0.0184	0.0166	
Be	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	
Ca	19.9	20.2	21.0	22.1	22.5	23.1	23.0	18.4	17.4	
Cd	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Cd-Std	0.0015	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0012	0.0012	
Cl	7.0	10.8	10.8	10.5	10.5	10.5	10.6	9.8	9.5	230
Co	0.0005	0.0007	0.0008	0.0008	0.0008	0.0011	0.0012	0.0007	0.0007	0.005
Cu	0.0020	0.0021	0.0022	0.0023	0.0023	0.0029	0.0031	0.0023	0.0022	
Cu-Std	0.0123	0.0115	0.0116	0.0116	0.0116	0.0117	0.0118	0.0101	0.0095	
F	0.3900	0.3944	0.3338	0.2736	0.2708	0.2636	0.2790	0.1708	0.1382	
Fe	1.2900	2.7277	2.7031	2.6839	2.6709	2.6609	2.6530	2.6714	2.6259	
Hard	143.5	129.7	130.4	130.6	131.6	132.4	134.0	109.6	101.9	
K	2.3	5.2	5.2	5.1	5.2	5.6	5.6	5.1	5.1	
Mg	15.9	18.9	18.4	17.8	17.8	17.5	18.0	15.1	13.8	
Mn	0.1100	0.3733	0.3733	0.3722	0.3714	0.3713	0.3809	0.3311	0.3109	
Na	12.7	11.7	10.9	10.3	10.5	10.4	10.4	8.0	7.2	
Ni	0.0021	0.0024	0.0034	0.0040	0.0043	0.0108	0.0109	0.0022	0.0021	
Ni-Std	0.0708	0.0650	0.0653	0.0654	0.0658	0.0661	0.0668	0.0564	0.0530	
Pb	0.0003	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0002	0.0001	
Pb-Std	0.0050	0.0044	0.0045	0.0045	0.0045	0.0045	0.0046	0.0036	0.0033	
Sb	0.0015	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0003	0.0003	0.031
Se	0.0005	0.0006	0.0006	0.0006	0.0006	0.0005	0.0007	0.0005	0.0005	0.005
SO ₄	36.1	44.2	46.2	47.2	48.6	53.5	52.8	36.9	34.1	
Tl	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0002	0.0002	0.00056
Zn	0.0123	0.0151	0.0154	0.0160	0.0167	0.0187	0.0182	0.0155	0.0155	
Zn-Std	0.1440	0.1321	0.1328	0.1329	0.1337	0.1344	0.1358	0.1146	0.1077	

Notes

- 1) The hardness dependent standards for Cd, Cu, Ni, Pb and Zn are listed below the deterministic water quality predictions for each parameter.

Table 5-9. Deterministic water quality predictions at surface water monitoring station PM-13 (mg/L)

Embarrass River PM-13

Tailings Basin - Proposed Action

High flow conditions

Parameter	Average Measured Conditions	Year 01	Year 05	Year 08	Year 09	Year 15	Year 20	Closure	Post-Closure	Hardness Independent Standard
Ag	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.001
Al	0.1916	0.1126	0.1129	0.1130	0.1130	0.1151	0.1148	0.1067	0.1032	0.125
As	0.0010	0.0008	0.0008	0.0008	0.0008	0.0009	0.0009	0.0008	0.0008	0.053
B	0.0443	0.0157	0.0158	0.0160	0.0161	0.0162	0.0164	0.0141	0.0134	0.5
Ba	0.0278	0.0122	0.0123	0.0123	0.0123	0.0121	0.0125	0.0117	0.0116	
Be	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Ca	19.9	13.2	13.3	13.4	13.5	13.6	13.6	13.3	13.3	
Cd	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Cd-Std	0.0015	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	
Cl	7.0	10.1	10.1	10.0	10.1	10.1	10.1	10.0	10.0	230
Co	0.0005	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	0.0006	0.0006	0.005
Cu	0.0020	0.0016	0.0016	0.0016	0.0016	0.0017	0.0017	0.0016	0.0016	
Cu-Std	0.0123	0.0074	0.0074	0.0074	0.0074	0.0074	0.0075	0.0072	0.0071	
F	0.3900	0.1316	0.1253	0.1189	0.1187	0.1180	0.1197	0.1072	0.1038	
Fe	1.2900	2.8815	2.8787	2.8765	2.8749	2.8738	2.8728	2.8767	2.8727	
Hard	143.5	76.4	76.5	76.6	76.7	76.8	77.0	74.0	73.2	
K	2.3	3.9	3.9	3.9	3.9	3.9	3.9	3.8	3.8	
Mg	15.9	7.4	7.3	7.3	7.3	7.3	7.3	6.9	6.8	
Mn	0.1100	0.3079	0.3079	0.3079	0.3078	0.3078	0.3089	0.3032	0.3011	
Na	12.7	4.4	4.3	4.2	4.3	4.3	4.3	4.0	3.9	
Ni	0.0021	0.0013	0.0014	0.0015	0.0015	0.0023	0.0023	0.0013	0.0013	
Ni-Std	0.0708	0.0415	0.0416	0.0416	0.0417	0.0417	0.0418	0.0404	0.0401	
Pb	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Pb-Std	0.0050	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0022	0.0021	
Sb	0.0015	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.031
Se	0.0005	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.005
SO ₄	36.1	8.3	8.6	8.7	8.9	9.4	9.4	7.3	7.0	
Tl	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.00056
Zn	0.0123	0.0159	0.0159	0.0160	0.0161	0.0163	0.0162	0.0159	0.0160	
Zn-Std	0.1440	0.0844	0.0845	0.0846	0.0847	0.0848	0.0850	0.0822	0.0814	

Notes

- 1) The hardness dependent standards for Cd, Cu, Ni, Pb and Zn are listed below the deterministic water quality predictions for each parameter.

Table 5-10. Multiplying Factors for Concentrations of Leachate from PolyMet Tailings Basin (Cell 1E & 2E) and Hydrometallurgical Residue Cells That Would Cause the Embarrass River Water Chemistry Predictions to Exceed the Minnesota Surface Water Quality Standards

Embarrass River

Proposed Action

Parameter	Low Flow					Average Flow					High Flow				
	Standard (mg/L) ¹	Factor	Year	Location	Corresponding SO ₄ concentration (mg/L)	Standard (mg/L) ¹	Factor	Year	Location	Corresponding SO ₄ concentration (mg/L)	Standard (mg/L) ¹	Factor	Year	Location	Corresponding SO ₄ concentration (mg/L)
As	0.0530	34.0	Post-Closure	PM-13	545.7	0.0530	57.0	Year 15	PM-13	933.4	0.0530	517.0	Year 15	PM-13	899.1
Co	0.0050	5.7	Year 15	PM-13	249.3	0.0050	8.5	Year 15	PM-13	171.7	0.0050	78.0	Year 15	PM-13	142.2
Cu	0.0116	3.6	Post-Closure	PM-13	73.2	0.0118	7.9	Year 20	PM-13	154.5	0.0075	43.0	Year 20	PM-13	77.6
Ni	0.0811	6.1	Year 15	PM-13	265.2	0.0678	7.2	Year 15	PM-13	151.3	0.0419	41.0	Year 15	PM-13	78.4
Sb	0.0310	33.0	Year 15	PM-13	1,329.2	0.0310	45.9	Year 15	PM-13	759.0	0.0310	419.0	Year 15	PM-13	730.2

Geotechnical Mitigation

Parameter	Low Flow					Average Flow					High Flow				
	Standard (mg/L) ¹	Factor	Year	Location	Corresponding SO ₄ concentration (mg/L)	Standard (mg/L) ¹	Factor	Year	Location	Corresponding SO ₄ concentration (mg/L)	Standard (mg/L) ¹	Factor	Year	Location	Corresponding SO ₄ concentration (mg/L)
As	0.0530	16.9	Post-Closure	PM-13	373.1	0.0530	91.3	Post-Closure	PM-13	376.5	0.0530	864.0	Year 10	PM-13	1,367.7
Co	0.0050	13.7	Post-Closure	PM-13	306.2	0.0050	29.3	Year 20	PM-13	403.4	0.0050	268.0	Year 20	PM-13	377.6
Cu	0.0128	6.1	Post-Closure	PM-13	147.2	0.0116	12.8	Year 20	PM-13	197.6	0.0074	70.0	Year 20	PM-13	104.3
Ni	0.0783	31.1	Year 20	PM-13	1158.4	0.0656	40.0	Year 20	PM-13	536.8	0.0417	228.0	Year 20	PM-13	322.4
Sb	0.0310	32.0	Year 10	PM-13	1226.2	0.0310	45.1	Year 10	PM-13	685.4	0.0310	412.0	Year 10	PM-13	656.2

¹ As, Co and Sb standards are hardness independent. Cu and Ni standards are hardness dependent and assume that the hardness and standards do not change from Tables 5-7 to 5-9.

Table 5-11. Comparison of concentrations of leachate from PolyMet Tailings Basin (Cell 1E & 2E) and Hydrometallurgical Residue Cells (all occurring concurrently) that would cause Embarrass River water chemistry predictions to exceed the Minnesota surface water quality standards and the "Base Case" concentrations of these mine site features. "Base Case" concentrations are those presented in Tables 5-7 to 5-9.

Embarrass River <i>Proposed Action</i>																														
Flow/Yield Condition	As						Co						Cu						Ni						Sb					
	Low Flow		Average Flow		High Flow		Low Flow		Average Flow		High Flow		Low Flow		Average Flow		High Flow		Low Flow		Average Flow		High Flow		Low Flow		Average Flow		High Flow	
	Post-Closure		Year 15		Year 15		Year 15		Year 15		Year 15		Post-Closure		Year 20		Year 20		Year 15		Year 15		Year 15		Year 15		Year 15		Year 15	
Feature	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)		
PolyMet Tailings Basin	0.0124	0.420	0.0155	0.884	0.0155	8.021	0.0087	0.049	0.0087	0.074	0.0087	0.676	0.0182	0.0657	0.0202	0.160	0.0202	0.869	0.1537	0.937	0.1537	1.106	0.1537	6.300	0.0113	0.374	0.0113	0.521	0.0113	4.753
Hydrometal-lurgical Residue Cells	0.0040	0.136	0.0040	0.2280	0.0040	2.0680	0.0050	0.029	0.0050	0.0425	0.0050	0.3900	0.0015	0.0054	0.0015	0.0119	0.0015	0.0645	0.0980	0.598	0.0980	0.7056	0.0980	4.0180	0.0040	0.132	0.0040	0.1836	0.0040	1.6760
Factor to Exceed Standard		34.0		57.0		517.0		5.7		8.5		78.0		3.6		7.9		43.0		6.1		7.2		41.0		33.0		45.9		419.0

Embarrass River Geotechnical Mitigation																														
Flow/Yield Condition	As						Co						Cu						Ni						Sb					
	Low Flow		Average Flow		High Flow		Low Flow		Average Flow		High Flow		Low Flow		Average Flow		High Flow		Low Flow		Average Flow		High Flow		Low Flow		Average Flow		High Flow	
	Post-Closure		Post-Closure		Year 10		Post-Closure		Year 20		Year 20		Post-Closure		Year 20		Year 20		Year 20		Year 20		Year 20		Year 10		Year 10		Year 10	
Feature	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)	"Base Case" Concentration (mg/L)	Concentration causing exceedance (mg/L)		
PolyMet Tailings Basin	0.0279	0.949	0.0279	1.591	0.0094	4.877	0.0027	0.015	0.0022	0.019	0.0022	0.170	0.0141	0.051	0.0114	0.090	0.0114	0.491	0.0236	0.144	0.0236	0.170	0.0236	0.966	0.0117	0.387	0.0117	0.538	0.0117	4.91
Hydrometal-lurgical Residue Cells	0.0040	0.1360	0.0040	0.2280	0.0040	2.0680	0.0050	0.0285	0.0050	0.0425	0.0050	0.3900	0.0015	0.0054	0.0015	0.0119	0.0015	0.0645	0.0980	0.5978	0.0980	0.7056	0.0980	4.0180	0.0040	0.1320	0.0040	0.1836	0.0040	1.6760
Factor to Exceed Standard		16.9		91.3		864.0		13.7		29.3		268.0		6.1		12.8		70.0		31.1		40.0		228.0		32.0		45.1		412.0

Table 6-1. Source Term Flows, Cell 2E Tailings Basin - Proposed Action

	Embankmnt		Coarse Beach		Fine Beach		Pond Recharge	
	Infiltration	Flow	Infiltration	Flow	Infiltration	Flow	Infiltration	Flow
Year	inches	m3/year	inches	m3/year	inches	m3/year	inches	m3/year
1	8.00	8132	37.8	273830	17	92363	105	3143518
2	8.00	16729	37.8	273830	17	123151	103	3289518
3	5.52	17575	37.8	273830	17	123151	98	3427386
4	4.21	18018	37.8	273830	17	123151	95	3528290
5	3.45	18760	37.8	273830	17	123151	94	3673443
6	3.08	20855	37.8	273830	17	123151	92	3673000
7	3.04	25870	37.8	273830	17	123151	88	3672258
8	2.34	21762	37.8	273830	17	123151	88	3883421
9	0.88	8180	19	137640	11.4	82584	82	3787909
10	0.88	8180	19	137640	11.4	82584	82	3791883
11	1.68	17620	19	137640	11.4	82584	83	3840341
12	1.11	11577	19	137640	11.4	82584	84	3875657
13	1.11	11577	19	137640	11.4	82584	85	3901839
14	1.82	21272	19	137640	11.4	82584	85	3907685
15	1.04	12104	19	137640	11.4	82584	86	4108158
16	1.04	12104	19	137640	11.4	82584	86	4135180
17	1.31	15994	19	137640	11.4	82584	87	4181218
18	0.54	6578	19	137640	11.4	82584	61	2953056
19	0.23	2799	19	137640	11.4	82584	62	2999962
Closure	0.23	2799	0.23	1666	8	139021	62	240479

Table 6-2. Embankment Loads, Cell 2E Tailings Basin - Proposed Action

	SO ₄	F	Cl	Al	Sb	As	Ba	Be	B	Cd	Ca	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	K	Se	Ag	Na	Tl	Zn
	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	
1	6.22E+00	2.20E-02	1.38E-01	2.82E-02	2.23E-04	6.45E-04	9.96E-04	6.45E-05	2.25E-03	1.72E-05	2.13E+00	4.27E-04	7.62E-04	8.30E-03	2.62E-05	6.34E-01	1.41E-02	1.91E-05	8.22E-03	6.27E-01	8.42E-05	2.31E-05	2.85E-01	1.49E-05	1.83E-03
2	1.02E+01	3.75E-02	2.42E-01	4.48E-02	3.76E-04	1.02E-03	1.76E-03	1.01E-04	4.09E-03	2.78E-05	3.51E+00	6.66E-04	1.21E-03	1.53E-02	4.60E-05	1.04E+00	2.29E-02	2.94E-05	1.28E-02	9.90E-01	1.35E-04	3.96E-05	5.24E-01	2.72E-05	2.94E-03
3	1.07E+01	3.95E-02	2.54E-01	4.70E-02	3.95E-04	1.07E-03	1.85E-03	1.06E-04	4.30E-03	2.92E-05	3.69E+00	7.00E-04	1.27E-03	1.61E-02	4.83E-05	1.10E+00	2.41E-02	3.09E-05	1.34E-02	1.04E+00	1.42E-04	4.16E-05	5.50E-01	2.86E-05	3.09E-03
4	1.11E+01	4.09E-02	2.63E-01	4.90E-02	4.10E-04	1.11E-03	1.92E-03	1.11E-04	4.44E-03	3.04E-05	3.84E+00	7.30E-04	1.32E-03	1.66E-02	5.00E-05	1.14E+00	2.50E-02	3.22E-05	1.40E-02	1.08E+00	1.48E-04	4.31E-05	5.68E-01	2.95E-05	3.21E-03
5	1.19E+01	4.37E-02	2.79E-01	5.28E-02	4.38E-04	1.20E-03	2.03E-03	1.20E-04	4.70E-03	3.27E-05	4.11E+00	7.89E-04	1.43E-03	1.75E-02	5.31E-05	1.22E+00	2.69E-02	3.49E-05	1.52E-02	1.17E+00	1.59E-04	4.59E-05	6.00E-01	3.12E-05	3.46E-03
6	1.37E+01	4.98E-02	3.17E-01	6.08E-02	5.00E-04	1.39E-03	2.31E-03	1.38E-04	5.30E-03	3.75E-05	4.71E+00	9.10E-04	1.64E-03	1.97E-02	6.03E-05	1.40E+00	3.09E-02	4.03E-05	1.75E-02	1.35E+00	1.83E-04	5.23E-05	6.76E-01	3.52E-05	3.97E-03
7	1.74E+01	6.29E-02	3.99E-01	7.74E-02	6.32E-04	1.76E-03	2.90E-03	1.76E-04	6.66E-03	4.77E-05	5.96E+00	1.16E-03	2.09E-03	2.47E-02	7.59E-05	1.77E+00	3.92E-02	5.14E-05	2.23E-02	1.72E+00	2.32E-04	6.60E-05	8.48E-01	4.42E-05	5.05E-03
8	1.34E+01	4.94E-02	3.17E-01	5.92E-02	4.95E-04	1.35E-03	2.31E-03	1.34E-04	5.36E-03	3.67E-05	4.63E+00	8.81E-04	1.60E-03	2.00E-02	6.03E-05	1.37E+00	3.02E-02	3.89E-05	1.69E-02	1.31E+00	1.78E-04	5.20E-05	6.86E-01	3.56E-05	3.88E-03
9	5.87E+00	2.10E-02	1.32E-01	2.64E-02	2.12E-04	6.03E-04	9.59E-04	6.02E-05	2.18E-03	1.62E-05	2.01E+00	3.98E-04	7.13E-04	8.08E-03	2.52E-05	5.99E-01	1.33E-02	1.77E-05	7.65E-03	5.86E-01	7.90E-05	2.20E-05	2.77E-01	1.45E-05	1.71E-03
10	4.48E+00	1.69E-02	1.10E-01	1.94E-02	1.68E-04	4.39E-04	8.07E-04	4.35E-05	1.90E-03	1.21E-05	1.56E+00	2.85E-04	5.22E-04	7.14E-03	2.10E-05	4.60E-01	1.00E-02	1.25E-05	5.46E-03	4.27E-01	5.87E-05	1.78E-05	2.44E-01	1.26E-05	1.28E-03
11	1.20E+01	4.34E-02	2.75E-01	5.37E-02	4.37E-04	1.22E-03	2.00E-03	1.22E-04	4.58E-03	3.31E-05	4.13E+00	8.07E-04	1.45E-03	1.70E-02	5.23E-05	1.23E+00	2.71E-02	3.58E-05	1.55E-02	1.19E+00	1.61E-04	4.56E-05	5.82E-01	3.04E-05	3.50E-03
12	8.24E+00	2.96E-02	1.86E-01	3.70E-02	2.98E-04	8.46E-04	1.35E-03	8.44E-05	3.08E-03	2.27E-05	2.82E+00	5.58E-04	1.00E-03	1.14E-02	3.54E-05	8.41E-01	1.86E-02	2.48E-05	1.07E-02	8.22E-01	1.11E-04	3.10E-05	3.91E-01	2.04E-05	2.41E-03
13	5.60E+00	2.16E-02	1.44E-01	2.36E-02	2.13E-04	5.32E-04	1.06E-03	5.25E-05	2.53E-03	1.50E-05	1.95E+00	3.43E-04	6.37E-04	9.59E-03	2.74E-05	5.76E-01	1.25E-02	1.49E-05	6.55E-03	5.17E-01	7.20E-05	2.30E-05	3.28E-01	1.69E-05	1.58E-03
14	1.32E+01	4.83E-02	3.10E-01	5.79E-02	4.84E-04	1.32E-03	2.26E-03	1.31E-04	5.24E-03	3.59E-05	4.53E+00	8.63E-04	1.56E-03	1.96E-02	5.90E-05	1.35E+00	2.96E-02	3.81E-05	1.66E-02	1.28E+00	1.74E-04	5.09E-05	6.71E-01	3.48E-05	3.80E-03
15	8.89E+00	3.17E-02	1.99E-01	4.01E-02	3.20E-04	9.16E-04	1.44E-03	9.15E-05	3.27E-03	2.46E-05	3.04E+00	6.05E-04	1.08E-03	1.21E-02	3.78E-05	9.06E-01	2.01E-02	2.69E-05	1.16E-02	8.90E-01	1.20E-04	3.32E-05	4.15E-01	2.17E-05	2.60E-03
16	6.16E+00	2.36E-02	1.56E-01	2.62E-02	2.33E-04	5.93E-04	1.14E-03	5.86E-05	2.71E-03	1.66E-05	2.15E+00	3.84E-04	7.08E-04	1.02E-02	2.96E-05	6.33E-01	1.38E-02	1.67E-05	7.34E-03	5.77E-01	7.99E-05	2.50E-05	3.50E-01	1.81E-05	1.75E-03
17	9.28E+00	3.45E-02	2.24E-01	4.04E-02	3.44E-04	9.18E-04	1.63E-03	9.11E-05	3.82E-03	2.52E-05	3.21E+00	5.99E-04	1.09E-03	1.43E-02	4.25E-05	9.51E-01	2.08E-02	2.63E-05	1.15E-02	8.93E-01	1.22E-04	3.64E-05	4.90E-01	2.54E-05	2.67E-03
18	6.84E+00	2.32E-02	1.40E-01	3.20E-02	2.39E-04	7.36E-04	1.00E-03	7.40E-05	2.19E-03	1.93E-05	2.32E+00	4.93E-04	8.65E-04	7.95E-03	2.66E-05	6.94E-01	1.56E-02	2.22E-05	9.51E-03	7.16E-01	9.47E-05	2.41E-05	2.73E-01	1.45E-05	2.04E-03
19	5.22E+00	1.68E-02	9.65E-02	2.54E-02	1.76E-04	5.87E-04	6.81E-04	5.93E-05	1.41E-03	1.50E-05	1.74E+00	3.98E-04	6.85E-04	4.96E-03	1.83E-05	5.27E-01	1.20E-02	1.81E-05	7.69E-03	5.71E-01	7.42E-05	1.72E-05	1.71E-01	9.22E-06	1.59E-03
20	5.28E+00	1.70E-02	9.74E-02	2.57E-02	1.77E-04	5.94E-04	6.87E-04	6.00E-05	1.42E-03	1.52E-05	1.76E+00	4.02E-04	6.92E-04	5.00E-03	1.85E-05	5.32E-01	1.22E-02	1.83E-05	7.78E-03	5.77E-01	7.51E-05	1.74E-05	1.73E-01	9.30E-06	1.61E-03
Closure	5.36E+00	1.72E-02	9.87E-02	2.61E-02	1.80E-04	6.03E-04	6.96E-04	6.10E-05	1.44E-03	1.54E-05	1.79E+00	4.09E-04	7.03E-04	5.05E-03	1.87E-05	5.40E-01	1.24E-02	1.86E-05	7.91E-03	5.86E-01	7.62E-05	1.76E-05	1.75E-01	9.41E-06	1.63E-03

Table 6-3. Fine Beach Loads, Cell 2E Tailings Basin - Proposed Action

	SO ₄	F	Cl	Al	Sb	As	Ba	Be	B	Cd	Ca	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	K	Se	Ag	Na	Tl	Zn
	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr
1	2.79E+00	1.42E-02	6.79E-02	4.07E-02	2.54E-04	1.34E-03	3.61E-04	5.52E-05	1.42E-03	1.21E-05	5.53E-01	2.76E-05	7.58E-04	1.38E-02	1.77E-05	5.17E-01	1.54E-03	5.99E-05	2.01E-04	5.79E-01	6.18E-05	1.38E-05	2.04E-01	5.52E-06	4.51E-04
2	3.48E+00	1.77E-02	8.48E-02	5.07E-02	3.17E-04	1.67E-03	4.50E-04	6.89E-05	1.77E-03	1.51E-05	6.90E-01	3.44E-05	9.46E-04	1.73E-02	2.21E-05	6.45E-01	1.92E-03	7.47E-05	2.50E-04	7.23E-01	7.71E-05	1.72E-05	2.54E-01	6.89E-06	5.62E-04
3	3.82E+00	1.94E-02	9.28E-02	5.55E-02	3.47E-04	1.82E-03	4.93E-04	7.54E-05	1.94E-03	1.65E-05	7.55E-01	3.77E-05	1.04E-03	1.89E-02	2.42E-05	7.06E-01	2.11E-03	8.18E-05	2.74E-04	7.91E-01	8.45E-05	1.89E-05	2.78E-01	7.54E-06	6.16E-04
4	2.68E+00	1.36E-02	6.51E-02	3.90E-02	2.44E-04	1.28E-03	3.46E-04	5.29E-05	1.36E-03	1.16E-05	5.30E-01	2.65E-05	7.27E-04	1.33E-02	1.69E-05	4.95E-01	1.48E-03	5.74E-05	1.92E-04	5.55E-01	5.92E-05	1.32E-05	1.95E-01	5.29E-06	4.32E-04
5	2.79E+00	1.42E-02	6.79E-02	4.07E-02	2.54E-04	1.34E-03	3.61E-04	5.52E-05	1.42E-03	1.21E-05	5.53E-01	2.76E-05	7.58E-04	1.38E-02	1.77E-05	5.17E-01	1.54E-03	5.99E-05	2.01E-04	5.79E-01	6.18E-05	1.38E-05	2.04E-01	5.52E-06	4.51E-04
6	3.48E+00	1.77E-02	8.48E-02	5.07E-02	3.17E-04	1.67E-03	4.50E-04	6.89E-05	1.77E-03	1.51E-05	6.90E-01	3.44E-05	9.46E-04	1.73E-02	2.21E-05	6.45E-01	1.92E-03	7.47E-05	2.50E-04	7.23E-01	7.71E-05	1.72E-05	2.54E-01	6.89E-06	5.62E-04
7	3.82E+00	1.94E-02	9.28E-02	5.55E-02	3.47E-04	1.82E-03	4.93E-04	7.54E-05	1.94E-03	1.65E-05	7.55E-01	3.77E-05	1.04E-03	1.89E-02	2.42E-05	7.06E-01	2.11E-03	8.18E-05	2.74E-04	7.91E-01	8.45E-05	1.89E-05	2.78E-01	7.54E-06	6.16E-04
8	2.68E+00	1.36E-02	6.51E-02	3.90E-02	2.44E-04	1.28E-03	3.46E-04	5.29E-05	1.36E-03	1.16E-05	5.30E-01	2.65E-05	7.27E-04	1.33E-02	1.69E-05	4.95E-01	1.48E-03	5.74E-05	1.92E-04	5.55E-01	5.92E-05	1.32E-05	1.95E-01	5.29E-06	4.32E-04
9	1.79E+01	1.05E-01	8.14E-01	7.26E-02	1.05E-03	1.92E-03	6.13E-03	9.95E-05	1.73E-02	4.27E-05	6.58E+00	2.19E-04	1.62E-03	7.73E-02	1.60E-04	2.17E+00	3.13E-02	5.99E-05	2.97E-03	1.15E+00	1.90E-04	1.16E-04	2.35E+00	1.13E-04	3.63E-03
10	1.86E+01	1.08E-01	8.31E-01	8.27E-02	1.11E-03	2.25E-03	6.21E-03	1.13E-04	1.76E-02	4.57E-05	6.72E+00	2.26E-04	1.81E-03	8.07E-02	1.65E-04	2.30E+00	3.17E-02	7.47E-05	3.02E-03	1.29E+00	2.05E-04	1.19E-04	2.40E+00	1.14E-04	3.75E-03
11	1.90E+01	1.10E-01	8.39E-01	8.75E-02	1.14E-03	2.41E-03	6.26E-03	1.20E-04	1.78E-02	4.71E-05	6.78E+00	2.29E-04	1.90E-03	8.23E-02	1.67E-04	2.36E+00	3.18E-02	8.18E-05	3.05E-03	1.36E+00	2.13E-04	1.21E-04	2.43E+00	1.15E-04	3.80E-03
12	1.78E+01	1.04E-01	8.11E-01	7.09E-02	1.04E-03	1.86E-03	6.11E-03	9.72E-05	1.72E-02	4.22E-05	6.56E+00	2.18E-04	1.59E-03	7.67E-02	1.59E-04	2.15E+00	3.12E-02	5.74E-05	2.96E-03	1.12E+00	1.87E-04	1.15E-04	2.35E+00	1.12E-04	3.61E-03
13	1.79E+01	1.05E-01	8.14E-01	7.26E-02	1.05E-03	1.92E-03	6.13E-03	9.95E-05	1.73E-02	4.27E-05	6.58E+00	2.19E-04	1.62E-03	7.73E-02	1.60E-04	2.17E+00	3.13E-02	5.99E-05	2.97E-03	1.15E+00	1.90E-04	1.16E-04	2.35E+00	1.13E-04	3.63E-03
14	1.86E+01	1.08E-01	8.31E-01	8.27E-02	1.11E-03	2.25E-03	6.21E-03	1.13E-04	1.76E-02	4.57E-05	6.72E+00	2.26E-04	1.81E-03	8.07E-02	1.65E-04	2.30E+00	3.17E-02	7.47E-05	3.02E-03	1.29E+00	2.05E-04	1.19E-04	2.40E+00	1.14E-04	3.75E-03
15	1.90E+01	1.10E-01	8.39E-01	8.75E-02	1.14E-03	2.41E-03	6.26E-03	1.20E-04	1.78E-02	4.71E-05	6.78E+00	2.29E-04	1.90E-03	8.23E-02	1.67E-04	2.36E+00	3.18E-02	8.18E-05	3.05E-03	1.36E+00	2.13E-04	1.21E-04	2.43E+00	1.15E-04	3.80E-03
16	1.78E+01	1.04E-01	8.11E-01	7.09E-02	1.04E-03	1.86E-03	6.11E-03	9.72E-05	1.72E-02	4.22E-05	6.56E+00	2.18E-04	1.59E-03	7.67E-02	1.59E-04	2.15E+00	3.12E-02	5.74E-05	2.96E-03	1.12E+00	1.87E-04	1.15E-04	2.35E+00	1.12E-04	3.61E-03
17	1.79E+01	1.05E-01	8.14E-01	7.26E-02	1.05E-03	1.92E-03	6.13E-03	9.95E-05	1.73E-02	4.27E-05	6.58E+00	2.19E-04	1.62E-03	7.73E-02	1.60E-04	2.17E+00	3.13E-02	5.99E-05	2.97E-03	1.15E+00	1.90E-04	1.16E-04	2.35E+00	1.13E-04	3.63E-03
18	1.86E+01	1.08E-01	8.31E-01	8.27E-02	1.11E-03	2.25E-03	6.21E-03	1.13E-04	1.76E-02	4.57E-05	6.72E+00	2.26E-04	1.81E-03	8.07E-02	1.65E-04	2.30E+00	3.17E-02	7.47E-05	3.02E-03	1.29E+00	2.05E-04	1.19E-04	2.40E+00	1.14E-04	3.75E-03
19	1.90E+01	1.10E-01	8.39E-01	8.75E-02	1.14E-03	2.41E-03	6.26E-03	1.20E-04	1.78E-02	4.71E-05	6.78E+00	2.29E-04	1.90E-03	8.23E-02	1.67E-04	2.36E+00	3.18E-02	8.18E-05	3.05E-03	1.36E+00	2.13E-04	1.21E-04	2.43E+00	1.15E-04	3.80E-03
20	1.34E+01	7.77E-02	5.91E-01	6.31E-02	8.13E-04	1.74E-03	4.41E-03	8.63E-05	1.25E-02	3.36E-05	4.78E+00	1.62E-04	1.36E-03	5.84E-02	1.18E-04	1.68E+00	2.24E-02	5.99E-05	2.15E-03	9.77E-01	1.52E-04	8.54E-05	1.71E+00	8.07E-05	2.68E-03
Closure	1.39E+01	7.06E-02	3.38E-01	2.02E-01	1.26E-03	6.64E-03	1.79E-03	2.74E-04	7.06E-03	6.01E-05	2.75E+00	1.37E-04	3.77E-03	6.88E-02	8.79E-05	2.57E+00	7.67E-03	2.98E-04	9.97E-04	2.88E+00	3.07E-04	6.86E-05	1.01E+00	2.74E-05	2.24E-03

Table 6-4. Coarse Beach Loads, Cell 2E Tailings Basin - Proposed Action

	SO ₄	F	Cl	Al	Sb	As	Ba	Be	B	Cd	Ca	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	K	Se	Ag	Na	Tl	Zn
	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr
1	7.50E+01	3.40E-01	2.49E+00	2.66E-01	3.21E-03	5.77E-03	1.88E-02	5.49E-04	4.81E-02	1.85E-04	2.74E+01	3.43E-03	7.18E-03	1.88E-01	4.75E-04	7.87E+00	1.61E-01	1.36E-04	6.42E-02	5.62E+00	8.60E-04	3.71E-04	6.39E+00	3.23E-04	1.95E-02
2	7.50E+01	3.40E-01	2.49E+00	2.66E-01	3.21E-03	5.77E-03	1.88E-02	5.49E-04	4.81E-02	1.85E-04	2.74E+01	3.43E-03	7.18E-03	1.88E-01	4.75E-04	7.87E+00	1.61E-01	1.36E-04	6.42E-02	5.62E+00	8.60E-04	3.71E-04	6.39E+00	3.23E-04	1.95E-02
3	7.50E+01	3.40E-01	2.49E+00	2.66E-01	3.21E-03	5.77E-03	1.88E-02	5.49E-04	4.81E-02	1.85E-04	2.74E+01	3.43E-03	7.18E-03	1.88E-01	4.75E-04	7.87E+00	1.61E-01	1.36E-04	6.42E-02	5.62E+00	8.60E-04	3.71E-04	6.39E+00	3.23E-04	1.95E-02
4	7.51E+01	3.41E-01	2.49E+00	2.66E-01	3.21E-03	5.79E-03	1.88E-02	5.51E-04	4.81E-02	1.85E-04	2.74E+01	3.44E-03	7.19E-03	1.88E-01	4.75E-04	7.88E+00	1.61E-01	1.36E-04	6.44E-02	5.63E+00	8.62E-04	3.71E-04	6.39E+00	3.23E-04	1.95E-02
5	7.56E+01	3.42E-01	2.50E+00	2.69E-01	3.22E-03	5.85E-03	1.88E-02	5.57E-04	4.82E-02	1.87E-04	2.76E+01	3.48E-03	7.26E-03	1.88E-01	4.77E-04	7.93E+00	1.62E-01	1.38E-04	6.51E-02	5.69E+00	8.69E-04	3.73E-04	6.40E+00	3.24E-04	1.96E-02
6	7.71E+01	3.47E-01	2.53E+00	2.76E-01	3.27E-03	6.02E-03	1.90E-02	5.74E-04	4.85E-02	1.91E-04	2.80E+01	3.60E-03	7.46E-03	1.89E-01	4.81E-04	8.08E+00	1.66E-01	1.44E-04	6.75E-02	5.86E+00	8.91E-04	3.77E-04	6.44E+00	3.26E-04	2.01E-02
7	8.08E+01	3.58E-01	2.58E+00	2.95E-01	3.39E-03	6.46E-03	1.94E-02	6.19E-04	4.93E-02	2.02E-04	2.93E+01	3.90E-03	7.97E-03	1.92E-01	4.92E-04	8.45E+00	1.74E-01	1.57E-04	7.33E-02	6.28E+00	9.45E-04	3.88E-04	6.52E+00	3.31E-04	2.13E-02
8	8.95E+01	3.84E-01	2.72E+00	3.40E-01	3.67E-03	7.49E-03	2.04E-02	7.24E-04	5.11E-02	2.28E-04	3.21E+01	4.61E-03	9.17E-03	1.97E-01	5.19E-04	9.32E+00	1.95E-01	1.90E-04	8.71E-02	7.29E+00	1.07E-03	4.15E-04	6.73E+00	3.42E-04	2.40E-02
9	9.18E+01	3.33E-01	2.12E+00	4.09E-01	3.35E-03	9.32E-03	1.54E-02	9.29E-04	3.53E-02	2.52E-04	3.15E+01	6.13E-03	1.10E-02	1.31E-01	4.02E-04	9.38E+00	2.07E-01	2.72E-04	1.18E-01	9.06E+00	1.23E-03	3.50E-04	4.50E+00	2.34E-04	2.67E-02
10	1.35E+02	4.63E-01	2.81E+00	6.30E-01	4.74E-03	1.45E-02	2.01E-02	1.45E-03	4.42E-02	3.80E-04	4.58E+01	9.66E-03	1.70E-02	1.61E-01	5.33E-04	1.37E+01	3.09E-01	4.35E-04	1.86E-01	1.41E+01	1.87E-03	4.81E-04	5.53E+00	2.92E-04	4.02E-02
11	2.34E+02	7.56E-01	4.38E+00	1.13E+00	7.90E-03	2.61E-02	3.10E-02	2.64E-03	6.45E-02	6.70E-04	7.82E+01	1.77E-02	3.05E-02	2.28E-01	8.31E-04	2.36E+01	5.38E-01	8.05E-04	3.42E-01	2.54E+01	3.31E-03	7.77E-04	7.88E+00	4.23E-04	7.10E-02
12	3.22E+02	1.02E+00	5.79E+00	1.58E+00	1.07E-02	3.67E-02	4.07E-02	3.71E-03	8.27E-02	9.31E-04	1.07E+02	2.49E-02	4.27E-02	2.89E-01	1.10E-03	3.25E+01	7.46E-01	1.14E-03	4.82E-01	3.56E+01	4.62E-03	1.05E-03	9.99E+00	5.41E-04	9.87E-02
13	3.43E+02	1.08E+00	6.13E+00	1.69E+00	1.14E-02	3.92E-02	4.30E-02	3.96E-03	8.71E-02	9.93E-04	1.14E+02	2.66E-02	4.56E-02	3.03E-01	1.16E-03	3.46E+01	7.95E-01	1.22E-03	5.15E-01	3.81E+01	4.93E-03	1.11E-03	1.05E+01	5.69E-04	1.05E-01
14	3.51E+02	1.11E+00	6.25E+00	1.73E+00	1.17E-02	4.01E-02	4.39E-02	4.06E-03	8.87E-02	1.02E-03	1.17E+02	2.72E-02	4.66E-02	3.08E-01	1.19E-03	3.54E+01	8.13E-01	1.25E-03	5.28E-01	3.90E+01	5.04E-03	1.13E-03	1.07E+01	5.79E-04	1.08E-01
15	3.51E+02	1.11E+00	6.25E+00	1.73E+00	1.17E-02	4.01E-02	4.39E-02	4.06E-03	8.86E-02	1.02E-03	1.17E+02	2.72E-02	4.66E-02	3.08E-01	1.19E-03	3.54E+01	8.13E-01	1.25E-03	5.27E-01	3.89E+01	5.04E-03	1.13E-03	1.07E+01	5.79E-04	1.08E-01
16	3.44E+02	1.09E+00	6.14E+00	1.69E+00	1.14E-02	3.92E-02	4.31E-02	3.97E-03	8.72E-02	9.94E-04	1.14E+02	2.67E-02	4.57E-02	3.03E-01	1.16E-03	3.47E+01	7.96E-01	1.22E-03	5.16E-01	3.81E+01	4.93E-03	1.11E-03	1.05E+01	5.70E-04	1.05E-01
17	3.28E+02	1.04E+00	5.88E+00	1.61E+00	1.09E-02	3.73E-02	4.13E-02	3.78E-03	8.39E-02	9.47E-04	1.09E+02	2.54E-02	4.35E-02	2.92E-01	1.12E-03	3.30E+01	7.59E-01	1.16E-03	4.91E-01	3.63E+01	4.70E-03	1.06E-03	1.01E+01	5.48E-04	1.00E-01
18	3.03E+02	9.64E-01	5.49E+00	1.48E+00	1.01E-02	3.44E-02	3.86E-02	3.48E-03	7.88E-02	8.74E-04	1.01E+02	2.33E-02	4.01E-02	2.75E-01	1.04E-03	3.06E+01	7.01E-01	1.07E-03	4.52E-01	3.34E+01	4.33E-03	9.87E-04	9.53E+00	5.16E-04	9.27E-02
19	2.65E+02	8.50E-01	4.87E+00	1.29E+00	8.90E-03	2.98E-02	3.44E-02	3.01E-03	7.09E-02	7.61E-04	8.84E+01	2.02E-02	3.48E-02	2.49E-01	9.25E-04	2.67E+01	6.11E-01	9.22E-04	3.91E-01	2.90E+01	3.77E-03	8.71E-04	8.62E+00	4.64E-04	8.07E-02
20	2.06E+02	6.75E-01	3.94E+00	9.91E-01	7.02E-03	2.29E-02	2.79E-02	2.31E-03	5.88E-02	5.89E-04	6.92E+01	1.54E-02	2.67E-02	2.09E-01	7.48E-04	2.08E+01	4.74E-01	7.02E-04	2.99E-01	2.22E+01	2.91E-03	6.95E-04	7.22E+00	3.86E-04	6.24E-02
Closure	9.27E+00	2.84E-02	1.56E-01	4.65E-02	3.02E-04	1.08E-03	1.08E-03	1.10E-04	2.11E-03	2.71E-05	3.07E+00	7.39E-04	1.25E-03	7.16E-03	2.95E-05	9.31E-01	2.16E-02	3.40E-05	1.43E-02	1.05E+00	1.35E-04	2.88E-05	2.49E-01	1.37E-05	2.87E-03

Table 6-5. Pond Loads Tailings Basin - Proposed Action

	SO ₄ , dissolved	Sb, dissolved	As, dissolved	Cu, dissolved	Ni, dissolved	Zn, dissolved	Co, dissolved	Ca, dissolved	Mg, dissolved	Na, dissolved	K, dissolved	Ag, dissolved	B, dissolved	Be, dissolved	Cd, dissolved	Pb, dissolved	Se, dissolved	Tl, dissolved	Fe, dissolved	Mn, dissolved	Cl, dissolved	F, dissolved	Al, dissolved	Ba, dissolved
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1	142.792	0.005	0.006	0.006	0.010	0.010	0.001	45.787	48.718	66.126	9.155	0.001	0.139	0.000	0.000	0.001	0.001	0.001	0.004	0.289	18.862	4.571	0.010	0.053
2	133.405	0.006	0.005	0.006	0.014	0.014	0.001	53.712	30.747	36.993	6.649	0.001	0.136	0.000	0.000	0.001	0.001	0.001	0.004	0.298	11.230	2.409	0.010	0.051
3	134.750	0.007	0.005	0.007	0.018	0.017	0.001	61.328	23.473	25.014	5.823	0.001	0.137	0.000	0.000	0.001	0.001	0.001	0.004	0.300	8.091	1.472	0.010	0.050
4	136.317	0.008	0.005	0.007	0.019	0.018	0.001	66.303	18.689	18.970	5.377	0.001	0.141	0.000	0.000	0.001	0.001	0.001	0.004	0.292	6.723	0.983	0.010	0.051
5	145.726	0.008	0.005	0.007	0.021	0.026	0.001	71.895	16.613	19.096	5.418	0.001	0.142	0.000	0.000	0.001	0.001	0.001	0.004	0.279	5.978	0.768	0.010	0.050
6	159.380	0.009	0.006	0.007	0.022	0.037	0.001	74.852	15.320	22.599	5.619	0.001	0.146	0.000	0.000	0.002	0.001	0.001	0.004	0.266	5.753	0.655	0.010	0.050
7	163.188	0.009	0.006	0.007	0.022	0.042	0.002	74.773	14.611	23.925	5.627	0.001	0.148	0.000	0.000	0.002	0.001	0.001	0.004	0.262	5.647	0.594	0.010	0.050
8	164.840	0.009	0.006	0.007	0.022	0.044	0.002	74.531	14.221	24.455	5.619	0.001	0.152	0.000	0.000	0.002	0.001	0.001	0.004	0.265	5.786	0.566	0.010	0.052
9	169.611	0.009	0.006	0.006	0.021	0.051	0.001	79.704	12.539	27.107	5.687	0.001	0.150	0.000	0.000	0.002	0.001	0.001	0.004	0.235	5.668	0.530	0.010	0.050
10	171.004	0.009	0.006	0.008	0.024	0.057	0.002	77.799	11.607	25.398	5.545	0.001	0.151	0.000	0.000	0.002	0.001	0.001	0.004	0.223	5.819	0.551	0.010	0.051
11	170.203	0.009	0.006	0.009	0.027	0.063	0.002	75.720	11.270	23.209	5.395	0.001	0.154	0.000	0.001	0.002	0.001	0.001	0.004	0.225	6.026	0.578	0.010	0.052
12	161.763	0.009	0.006	0.010	0.028	0.058	0.002	69.408	11.382	20.474	5.211	0.001	0.156	0.000	0.000	0.002	0.001	0.001	0.004	0.242	6.233	0.564	0.010	0.054
13	157.631	0.009	0.006	0.010	0.030	0.055	0.002	66.149	11.458	18.982	5.235	0.001	0.155	0.000	0.000	0.002	0.001	0.001	0.004	0.249	6.242	0.556	0.010	0.054
14	163.939	0.009	0.006	0.011	0.035	0.060	0.003	69.071	11.633	19.440	5.576	0.001	0.158	0.000	0.000	0.002	0.001	0.001	0.004	0.254	6.377	0.577	0.010	0.056
15	158.372	0.009	0.006	0.011	0.037	0.055	0.003	64.526	11.824	18.926	5.674	0.001	0.158	0.000	0.000	0.002	0.001	0.001	0.004	0.265	6.364	0.569	0.010	0.056
16	149.491	0.008	0.006	0.011	0.038	0.046	0.003	57.816	12.188	18.075	5.673	0.001	0.159	0.001	0.000	0.002	0.001	0.001	0.004	0.283	6.436	0.557	0.010	0.058
17	144.656	0.008	0.006	0.011	0.038	0.041	0.003	54.116	12.449	17.486	5.678	0.001	0.160	0.001	0.000	0.002	0.001	0.001	0.004	0.295	6.524	0.549	0.010	0.059
18	143.365	0.008	0.006	0.011	0.039	0.040	0.003	52.737	12.531	17.899	5.722	0.001	0.161	0.001	0.000	0.002	0.001	0.001	0.004	0.299	6.538	0.554	0.010	0.059
19	141.156	0.008	0.006	0.011	0.038	0.038	0.003	51.349	12.559	17.692	5.679	0.001	0.161	0.001	0.000	0.002	0.001	0.001	0.004	0.302	6.560	0.550	0.010	0.059
20	135.578	0.008	0.006	0.011	0.037	0.033	0.002	49.052	12.372	16.222	5.466	0.001	0.157	0.000	0.000	0.001	0.001	0.001	0.004	0.300	6.458	0.528	0.010	0.058

**Table 6-6. Source Years Data used in Deterministic Water Quality Predictions
for Cell 2E - Tailings Basin - Proposed Action**

Prediction Year	Coarse Beach Source Year (yr)	Fine Beach Source Year (yr)	Embankment Source Year (yr)	Pond Source Year (yr)
1	0	0	0	1
2	0	0	0	1
3	1	1	0	1
4	2	2	0	1
5	3	3	0	2
6	4	4	1	3
7	5	5	2	4
8	6	6	3	5
9	7	7	4	6
10	8	8	5	7
11	9	9	6	8
12	10	10	7	9
13	11	11	8	10
14	12	12	9	11
15	13	13	10	12
16	14	14	11	13
17	15	15	12	14
18	16	16	13	15
19	17	17	14	16
20	18	18	15	17

Table 6-7. Predicted groundwater flow out of the Tailings Basin to the north of Cell 2E - Tailings Basin - Proposed Action

Year	gpm
1	1560
2	1630
3	1710
4	1780
5	1850
6	1930
7	1980
8	2050
9	2050
10	2050
11	2070
12	2090
13	2090
14	2110
15	2130
16	2150
17	2150
18	2160
19	2180
20	2200

Table 6-8. Predicted Total Concentrations Cell 2E Tailings Basin - Proposed Action

Prediction	SO4	Sb	As	Co	Cu	Ni	Zn	F	Cl	Al	Ba	Be	B	Cd	Ca	Fe	Pb	Mg	Mn	K	Se	Ag	Na	Tl	Hardness
Year	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
GW Standard	250	0.006	0.01	--	1	0.1	2	2	250	0.05	2	8.00E-05	0.6	0.004	--	0.3	0.015	--	0.05	--	0.03	0.03	--	6.00E-04	--
SW Standard	--	0.031	0.053	0.005	0.023	0.127	0.295	--	230	0.125	--	--	--	0.006	--	--	0.012	--	--	--	0.005	0.001	--	5.60E-04	--
1	143	0.00483	0.00595	0.00117	0.00589	0.00951	0.00984	4.57138	18.86156	0.01000	0.05289	0.00027	0.13898	0.00012	45.78662	0.00400	0.00059	48.71810	0.28948	9.15487	0.00097	0.00096	66.12629	0.00097	315
2	143	0.00483	0.00595	0.00117	0.00589	0.00951	0.00984	4.57138	18.86156	0.01000	0.05289	0.00027	0.13898	0.00012	45.78662	0.00400	0.00059	48.71810	0.28948	9.15487	0.00097	0.00096	66.12629	0.00097	315
3	150	0.00533	0.00740	0.00207	0.00759	0.02745	0.01465	4.18270	17.58099	0.09920	0.05282	0.00042	0.13858	0.00016	49.06937	0.06291	0.00067	45.93337	0.30605	9.99307	0.00114	0.00097	60.93384	0.00096	312
4	149	0.00529	0.00738	0.00202	0.00752	0.02665	0.01439	4.15997	17.47453	0.09828	0.05239	0.00042	0.13748	0.00016	48.57448	0.06142	0.00066	45.66067	0.30296	9.91937	0.00112	0.00096	60.58716	0.00095	309
5	140	0.00647	0.00678	0.00201	0.00780	0.02981	0.01765	2.24703	10.72209	0.09610	0.05031	0.00045	0.13536	0.00024	55.55427	0.05959	0.00077	29.76311	0.31005	7.67208	0.00116	0.00090	34.81686	0.00091	261
6	142	0.00726	0.00667	0.00217	0.00818	0.03466	0.02054	1.41449	7.93913	0.09597	0.05003	0.00050	0.13623	0.00030	62.68634	0.05817	0.00086	23.34335	0.31477	6.98518	0.00122	0.00089	24.16195	0.00090	253
7	144	0.00772	0.00668	0.00226	0.00853	0.03717	0.02236	0.97995	6.73054	0.09883	0.05108	0.00053	0.13966	0.00034	67.36720	0.05867	0.00093	19.13579	0.30828	6.65357	0.00128	0.00090	18.78698	0.00093	247
8	153	0.00828	0.00704	0.00232	0.00854	0.03855	0.02907	0.78883	6.07286	0.10052	0.05042	0.00054	0.14090	0.00038	72.53697	0.05799	0.00124	17.33079	0.29718	6.73302	0.00133	0.00089	18.93025	0.00093	252
9	167	0.00883	0.00759	0.00248	0.00863	0.04116	0.03974	0.69109	5.88840	0.10675	0.05049	0.00056	0.14508	0.00041	75.53238	0.05913	0.00175	16.28271	0.28868	7.04443	0.00140	0.00090	22.10773	0.00097	256
10	172	0.00898	0.00783	0.00269	0.00878	0.04504	0.04478	0.64142	5.82319	0.11450	0.05063	0.00058	0.14677	0.00042	76.16315	0.05943	0.00197	15.82552	0.28980	7.25953	0.00145	0.00090	23.33238	0.00098	255
11	185	0.00953	0.00874	0.00320	0.00984	0.05446	0.04995	0.65062	6.23477	0.14089	0.05433	0.00067	0.15709	0.00044	80.55939	0.05910	0.00216	16.53004	0.31474	8.09176	0.00160	0.00098	24.85114	0.00106	269
12	202	0.01010	0.01035	0.00414	0.01112	0.07245	0.06046	0.65454	6.32353	0.20516	0.05404	0.00081	0.15826	0.00052	89.34424	0.06977	0.00252	16.18721	0.31450	9.57167	0.00181	0.00100	27.63130	0.00108	290
13	227	0.01098	0.01312	0.00634	0.01567	0.11229	0.07330	0.74533	6.84176	0.32591	0.05741	0.00111	0.16376	0.00063	95.34233	0.08566	0.00261	17.68596	0.35837	12.17266	0.00217	0.00108	26.59869	0.00112	311
14	246	0.01162	0.01524	0.00829	0.01983	0.14633	0.08545	0.82735	7.34374	0.42213	0.06120	0.00136	0.17039	0.00074	99.96665	0.09555	0.00267	19.29974	0.40671	14.27344	0.00247	0.00117	25.00661	0.00118	329
15	242	0.01134	0.01551	0.00866	0.02077	0.15366	0.08120	0.82648	7.60437	0.44340	0.06345	0.00141	0.17317	0.00071	95.38058	0.09817	0.00241	19.82244	0.43241	14.58140	0.00252	0.00122	22.52414	0.00119	320
16	241	0.01121	0.01591	0.00899	0.02143	0.16017	0.07934	0.82827	7.66116	0.45984	0.06389	0.00146	0.17261	0.00069	93.19365	0.10183	0.00227	20.19778	0.44556	14.94606	0.00256	0.00123	21.19179	0.00119	316
17	246	0.01148	0.01622	0.00922	0.02209	0.16335	0.08389	0.84569	7.77776	0.45684	0.06486	0.00149	0.17550	0.00073	95.73973	0.10086	0.00239	20.29792	0.44868	15.19934	0.00261	0.00125	21.61132	0.00121	323
18	235	0.01106	0.01548	0.00880	0.02144	0.15602	0.07738	0.81833	7.65872	0.42101	0.06469	0.00142	0.17374	0.00067	89.41803	0.09356	0.00223	19.80669	0.44464	14.53550	0.00250	0.00124	20.95145	0.00118	305
19	223	0.01064	0.01514	0.00852	0.02109	0.15217	0.06818	0.79808	7.68163	0.40706	0.06569	0.00139	0.17414	0.00059	82.11150	0.09271	0.00200	19.86911	0.45481	14.20340	0.00243	0.00124	20.08170	0.00116	287
20	212	0.01024	0.01439	0.00794	0.02021	0.14179	0.06112	0.77045	7.65734	0.37354	0.06601	0.00131	0.17412	0.00053	76.37590	0.08724	0.00184	19.44643	0.45043	13.44744	0.00233	0.00124	19.36435	0.00115	271
Closure	110	0.00537	0.01236	0.00136	0.01824	0.01513	0.02023	0.47378	6.28979	0.63731	0.04812	0.00081	0.19883	0.00023	59.94388	0.67473	0.00110	18.86674	0.27639	13.37097	0.00150	0.00097	12.15011	0.00092	227

Table 6-9. Predicted Concentration of Captured Water Cell 2E Tailings Basin - Proposed Action

Prediction	SO4	Sb	As	Co	Cu	Ni	Zn	F	Cl	Al	Ba	Be	B	Cd	Ca	Fe	Pb	Mg	Mn	K	Se	Ag	Na	Tl	Hardness
Year	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/l	mg/l	mg/l	mg/l	mg/l
1	143	0.00483	0.00595	0.00117	0.00589	0.00951	0.00984	4.57138	18.86156	0.01000	0.05289	0.00027	0.13898	0.00012	45.78662	0.00400	0.00059	48.71810	0.28948	9.15487	0.00097	0.00096	66.12629	0.00097	315
2	143	0.00483	0.00595	0.00117	0.00589	0.00951	0.00984	4.57138	18.86156	0.01000	0.05289	0.00027	0.13898	0.00012	45.78662	0.00400	0.00059	48.71810	0.28948	9.15487	0.00097	0.00096	66.12629	0.00097	315
3	181	0.00698	0.01125	0.00483	0.01261	0.08239	0.02955	3.29416	14.88877	0.34157	0.05584	0.00085	0.14549	0.00030	61.65338	0.23209	0.00094	40.32288	0.37431	12.72670	0.00166	0.00105	49.38669	0.00100	320
4	176	0.00679	0.01095	0.00457	0.01214	0.07724	0.02810	3.32179	14.91406	0.32295	0.05496	0.00081	0.14330	0.00029	59.99235	0.21777	0.00091	40.29647	0.36467	12.41827	0.00161	0.00104	49.66607	0.00098	316
5	168	0.00757	0.01025	0.00436	0.01201	0.07574	0.02949	1.96380	10.09295	0.30473	0.05327	0.00081	0.14143	0.00034	64.37779	0.20462	0.00097	28.90489	0.36554	10.56827	0.00160	0.00099	31.34803	0.00095	280
6	174	0.00830	0.01064	0.00489	0.01291	0.08720	0.03314	1.36183	8.11111	0.32463	0.05366	0.00090	0.14321	0.00040	71.43068	0.20316	0.00105	24.64441	0.38127	10.58501	0.00171	0.00099	23.57045	0.00095	280
7	178	0.00872	0.01083	0.00508	0.01340	0.09167	0.03501	1.04187	7.23933	0.33368	0.05472	0.00094	0.14638	0.00043	75.65401	0.20247	0.00111	21.68391	0.38079	10.52830	0.00179	0.00101	19.59535	0.00097	278
8	184	0.00915	0.01107	0.00508	0.01334	0.09167	0.03991	0.89548	6.72893	0.32930	0.05419	0.00095	0.14737	0.00046	79.67712	0.19485	0.00135	20.30184	0.37134	10.53900	0.00182	0.00100	19.71169	0.00098	283
9	199	0.00970	0.01208	0.00558	0.01407	0.10103	0.04950	0.83510	6.66608	0.36202	0.05473	0.00102	0.15141	0.00049	83.24598	0.20523	0.00175	19.95254	0.37536	11.32394	0.00194	0.00102	22.23088	0.00101	290
10	209	0.01001	0.01292	0.00626	0.01500	0.11400	0.05534	0.81486	6.71230	0.39643	0.05553	0.00111	0.15398	0.00052	85.86155	0.20724	0.00194	20.20791	0.39102	12.18010	0.00206	0.00104	23.32251	0.00103	298
11	241	0.01127	0.01571	0.00797	0.01808	0.14681	0.06650	0.86200	7.33228	0.47638	0.06119	0.00138	0.16917	0.00061	97.71242	0.17274	0.00225	22.60604	0.45300	14.82960	0.00246	0.00116	25.79566	0.00114	337
12	286	0.01274	0.02073	0.01125	0.02336	0.21024	0.08505	0.95657	7.89457	0.68762	0.06426	0.00186	0.17640	0.00076	115.25025	0.20430	0.00265	25.34937	0.52339	19.61298	0.00308	0.00127	28.92366	0.00120	392
13	365	0.01536	0.02996	0.01784	0.03521	0.33562	0.11434	1.20508	9.25281	1.08307	0.07348	0.00282	0.19301	0.00103	139.49909	0.25325	0.00290	32.38467	0.69525	28.50171	0.00424	0.00152	29.42938	0.00131	482
14	430	0.01746	0.03738	0.02341	0.04533	0.44026	0.14033	1.41302	10.42743	1.40111	0.08194	0.00360	0.20857	0.00126	159.41559	0.28338	0.00312	38.44369	0.84718	35.77141	0.00520	0.00174	29.19979	0.00142	556
15	435	0.01749	0.03867	0.02446	0.04739	0.46079	0.13933	1.43822	10.80041	1.46477	0.08493	0.00376	0.21288	0.00126	158.23146	0.29092	0.00292	39.79187	0.89076	37.06672	0.00537	0.00181	27.18734	0.00145	559
16	443	0.01765	0.04011	0.02547	0.04920	0.48056	0.14021	1.46919	11.00049	1.52812	0.08630	0.00391	0.21417	0.00127	159.10161	0.30587	0.00281	41.06353	0.92349	38.42807	0.00554	0.00184	26.21785	0.00145	566
17	441	0.01770	0.03961	0.02514	0.04891	0.47300	0.14244	1.46259	10.99300	1.48962	0.08644	0.00386	0.21545	0.00129	159.28926	0.29553	0.00290	40.45851	0.91057	37.89606	0.00549	0.00184	26.42597	0.00147	564
18	424	0.01709	0.03808	0.02420	0.04734	0.45548	0.13441	1.41712	10.77471	1.42094	0.08552	0.00371	0.21241	0.00122	151.32988	0.28414	0.00275	39.30897	0.89078	36.48160	0.00529	0.00181	25.66553	0.00143	540
19	408	0.01653	0.03713	0.02351	0.04627	0.44341	0.12434	1.38550	10.71415	1.38373	0.08579	0.00362	0.21157	0.00113	142.99883	0.28502	0.00251	38.85515	0.88725	35.56068	0.00514	0.00180	24.77651	0.00140	517
20	378	0.01555	0.03414	0.02137	0.04280	0.40281	0.11198	1.29838	10.37055	1.25033	0.08394	0.00331	0.20761	0.00102	131.33756	0.26031	0.00232	36.45881	0.83697	32.60899	0.00476	0.00173	23.63987	0.00137	478

Table 6-10. Predicted Concentration of Uncaptured Water Cell 2E Tailings Basin - Proposed Action

Prediction	SO4	Sb	As	Co	Cu	Ni	Zn	F	Cl	Al	Ba	Be	B	Cd	Ca	Fe	Pb	Mg	Mn	K	Se	Ag	Na	Tl	Hardness
Year	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
GW Standard	250	0.006	0.01	--	1	0.1	2	2	250	0.05	2	8.00E-05	0.6	0.004	--	0.3	0.015	--	0.05	--	0.03	0.03	--	6.00E-04	--
SW Standard	--	0.031	0.053	0.005	0.022	0.120	0.279	--	230	0.125	--	--	--	0.005	--	--	0.011	--	--	--	0.005	0.001	--	5.60E-04	--
1	143	0.00483	0.00595	0.00117	0.00589	0.00951	0.00984	4.57138	18.86156	0.01000	0.05289	0.00027	0.13898	0.00012	45.78662	0.00400	0.00059	48.71810	0.28948	9.15487	0.00097	0.00096	66.12629	0.00097	314.9503
2	143	0.00483	0.00595	0.00117	0.00589	0.00951	0.00984	4.57138	18.86156	0.01000	0.05289	0.00027	0.13898	0.00012	45.78662	0.00400	0.00059	48.71810	0.28948	9.15487	0.00097	0.00096	66.12629	0.00097	314.9503
3	146	0.00510	0.00685	0.00168	0.00688	0.01968	0.01254	4.30839	17.96181	0.06492	0.05240	0.00036	0.13760	0.00014	47.28933	0.03898	0.00063	46.72699	0.29640	9.60639	0.00106	0.00096	62.56722	0.00096	310.5032
4	145	0.00507	0.00686	0.00165	0.00685	0.01924	0.01239	4.28262	17.84918	0.06540	0.05202	0.00036	0.13663	0.00014	46.90380	0.03854	0.00062	46.44557	0.29393	9.55373	0.00105	0.00095	62.18515	0.00095	308.3816
5	136	0.00630	0.00625	0.00165	0.00716	0.02289	0.01586	2.28975	10.81699	0.06463	0.04987	0.00040	0.13444	0.00022	54.22333	0.03771	0.00074	29.89257	0.30168	7.23521	0.00109	0.00089	35.34010	0.00090	258.4932
6	137	0.00710	0.00606	0.00175	0.00744	0.02651	0.01858	1.42266	7.91246	0.06052	0.04947	0.00043	0.13515	0.00029	61.33055	0.03569	0.00083	23.14162	0.30446	6.42704	0.00114	0.00087	24.25367	0.00089	248.4396
7	139	0.00756	0.00602	0.00180	0.00775	0.02841	0.02033	0.97000	6.64879	0.06110	0.05050	0.00046	0.13858	0.00033	66.03567	0.03556	0.00090	18.72635	0.29662	6.03098	0.00120	0.00089	18.65709	0.00092	242.0062
8	148	0.00813	0.00637	0.00187	0.00775	0.02982	0.02729	0.77131	5.96504	0.06292	0.04980	0.00048	0.13983	0.00037	71.36359	0.03550	0.00122	16.84254	0.28500	6.10757	0.00125	0.00087	18.80183	0.00093	247.5524
9	162	0.00869	0.00688	0.00199	0.00777	0.03172	0.03820	0.66837	5.76570	0.06648	0.04982	0.00049	0.14408	0.00039	74.31537	0.03608	0.00175	15.70371	0.27500	6.36923	0.00132	0.00088	22.08829	0.00096	250.2334
10	166	0.00882	0.00702	0.00212	0.00779	0.03399	0.04309	0.61364	5.68079	0.06935	0.04985	0.00050	0.14562	0.00040	74.60993	0.03576	0.00198	15.12368	0.27358	6.47149	0.00135	0.00088	23.33396	0.00098	248.5803
11	176	0.00925	0.00761	0.00244	0.00852	0.03960	0.04729	0.61662	6.05822	0.08692	0.05322	0.00055	0.15515	0.00042	77.80000	0.04082	0.00215	15.55260	0.29249	7.00785	0.00147	0.00095	24.69919	0.00105	258.3122
12	188	0.00966	0.00861	0.00295	0.00907	0.04937	0.05634	0.60394	6.06036	0.12434	0.05233	0.00063	0.15523	0.00048	85.00464	0.04723	0.00250	14.65242	0.27950	7.88962	0.00160	0.00095	27.41482	0.00106	272.5953
13	203	0.01023	0.01026	0.00439	0.01235	0.07434	0.06632	0.66719	6.43196	0.19722	0.05468	0.00082	0.15879	0.00057	87.83703	0.05717	0.00256	15.18763	0.30111	9.39721	0.00182	0.00101	26.11756	0.00109	281.8717
14	214	0.01063	0.01147	0.00571	0.01547	0.09615	0.07608	0.72738	6.81736	0.25502	0.05765	0.00097	0.16388	0.00065	89.81875	0.06348	0.00259	16.03188	0.33152	10.60375	0.00201	0.00107	24.29084	0.00114	290.2967
15	209	0.01029	0.01155	0.00595	0.01620	0.10101	0.07123	0.72163	7.05659	0.26834	0.05977	0.00101	0.16636	0.00061	84.60818	0.06514	0.00232	16.39976	0.35385	10.72750	0.00203	0.00112	21.72488	0.00115	278.8008
16	206	0.01010	0.01175	0.00615	0.01665	0.10504	0.06887	0.71799	7.08657	0.27603	0.06004	0.00104	0.16546	0.00059	81.85305	0.06672	0.00218	16.60747	0.36332	10.90557	0.00205	0.00113	20.32697	0.00114	272.7767
17	212	0.01039	0.01214	0.00644	0.01741	0.10933	0.07368	0.73805	7.21676	0.27664	0.06109	0.00107	0.16853	0.00063	84.65144	0.06690	0.00230	16.78024	0.36809	11.23916	0.00211	0.00115	20.77125	0.00117	280.4757
18	203	0.01006	0.01170	0.00622	0.01710	0.10590	0.06784	0.71811	7.13723	0.25366	0.06120	0.00104	0.16727	0.00058	79.05649	0.06167	0.00215	16.54280	0.36997	10.86261	0.00204	0.00114	20.16251	0.00114	265.5273
19	192	0.00965	0.01145	0.00601	0.01686	0.10325	0.05875	0.69940	7.17225	0.24301	0.06231	0.00102	0.16785	0.00050	71.88404	0.06040	0.00191	16.67995	0.38218	10.61595	0.00198	0.00115	19.29310	0.00112	248.1825
20	184	0.00934	0.01106	0.00568	0.01640	0.09779	0.05255	0.68146	7.19997	0.22574	0.06298	0.00098	0.16848	0.00045	67.11095	0.05806	0.00176	16.57863	0.38527	10.21736	0.00192	0.00115	18.64363	0.00111	235.8468

Table 7-1. Deterministic water quality predictions at surface water monitoring station PM-12 (mg/L)

Embarrass River PM-12

Tailings Basin - Geotechnical Mitigation

Low flow conditions

Parameter	Average Measured Conditions	Year 01	Year 05	Year 10	Year 15	Year 20	Closure	Post-Closure	Hardness Independent Standard
Ag	0.0001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.001
Al	0.0983	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.125
As	0.0010	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.053
B	0.0175	0.0212	0.0212	0.0212	0.0212	0.0212	0.0212	0.0212	0.5
Ba	0.0155	0.0681	0.0681	0.0681	0.0681	0.0681	0.0681	0.0681	
Be	0.0001	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	
Ca	13.4	19.0	19.0	19.0	19.0	19.0	19.0	19.0	
Cd	0.0001	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	
Cd-Std	0.0008	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	
Cl	4.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	230
Co	0.0006	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.005
Cu	0.0015	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	0.0040	
Cu-Std	0.0062	0.0083	0.0083	0.0083	0.0083	0.0083	0.0083	0.0083	
F	0.1000	0.3850	0.3850	0.3850	0.3850	0.3850	0.3850	0.3850	
Fe	1.7200	0.0350	0.0350	0.0350	0.0350	0.0350	0.0350	0.0350	
Hard	61.7	87.5	87.5	87.5	87.5	87.5	87.5	87.5	
K	0.8	1.6	1.6	1.6	1.6	1.6	1.6	1.6	
Mg	6.2	10.7	10.7	10.7	10.7	10.7	10.7	10.7	
Mn	0.1600	0.1880	0.1880	0.1880	0.1880	0.1880	0.1880	0.1880	
Na	3.0	4.9	4.9	4.9	4.9	4.9	4.9	4.9	
Ni	0.0019	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	
Ni-Std	0.0346	0.0466	0.0466	0.0466	0.0466	0.0466	0.0466	0.0466	
Pb	0.0002	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	
Pb-Std	0.0017	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	0.0027	
Sb	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.031
Se	0.0005	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.005
SO ₄	4.6	8.5	8.5	8.5	8.5	8.5	8.5	8.5	
Tl	0.0002	0.000004	0.000004	0.000004	0.000004	0.000004	0.000004	0.000004	0.00056
Zn	0.0183	0.0115	0.0115	0.0115	0.0115	0.0115	0.0115	0.0115	
Zn-Std	0.0704	0.0947	0.0947	0.0947	0.0947	0.0947	0.0947	0.0947	

Notes

- 1) The hardness dependent standards for Cd, Cu, Ni, Pb and Zn are listed below the deterministic water quality predictions for each parameter.
- 2) Deterministic water quality predictions at PM-12 does not change during mine operation and closure because it is upstream of the tailings basin.
- 3) Predictions for low flow conditions correspond to surface runoff equal to zero, and groundwater recharge as the only natural flow contribution.

Table 7-2. Deterministic water quality predictions at surface water monitoring station PM-12 (mg/L)

Embarrass River PM-12

Tailings Basin - Geotechnical Mitigation

Average flow conditions

Parameter	Average Measured Conditions	Year 01	Year 05	Year 10	Year 15	Year 20	Closure	Post-Closure	Hardness Independent Standard
Ag	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.001
Al	0.0983	0.0953	0.0953	0.0953	0.0953	0.0953	0.0953	0.0953	0.125
As	0.0010	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.053
B	0.0175	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	0.0126	0.5
Ba	0.0155	0.0146	0.0146	0.0146	0.0146	0.0146	0.0146	0.0146	
Be	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Ca	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	
Cd	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Cd-Std	0.0008	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	
Cl	4.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	230
Co	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.005
Cu	0.0015	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	0.0017	
Cu-Std	0.0062	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	0.0070	
F	0.1000	0.1178	0.1178	0.1178	0.1178	0.1178	0.1178	0.1178	
Fe	1.7200	2.7215	2.7215	2.7215	2.7215	2.7215	2.7215	2.7215	
Hard	61.7	71.1	71.1	71.1	71.1	71.1	71.1	71.1	
K	0.8	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Mg	6.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	
Mn	0.1600	0.2930	0.2930	0.2930	0.2930	0.2930	0.2930	0.2930	
Na	3.0	3.6	3.6	3.6	3.6	3.6	3.6	3.6	
Ni	0.0019	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	
Ni-Std	0.0346	0.0391	0.0391	0.0391	0.0391	0.0391	0.0391	0.0391	
Pb	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Pb-Std	0.0017	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	
Sb	0.0015	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.031
Se	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.005
SO ₄	4.6	4.3	4.3	4.3	4.3	4.3	4.3	4.3	
Tl	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.00056
Zn	0.0183	0.0157	0.0157	0.0157	0.0157	0.0157	0.0157	0.0157	
Zn-Std	0.0704	0.0794	0.0794	0.0794	0.0794	0.0794	0.0794	0.0794	

Notes

- 1) The hardness dependent standards for Cd, Cu, Ni, Pb and Zn are listed below the deterministic water quality predictions for each parameter.
- 2) Deterministic water quality predictions at PM-12 does not change during mine operation and closure because it is upstream of the tailings ba

Table 7-3. Deterministic water quality predictions at surface water monitoring station PM-12 (mg/L)

Embarrass River PM-12

Tailings Basin - Geotechnical Mitigation

High flow conditions

Parameter	Average Measured Conditions	Year 01	Year 05	Year 10	Year 15	Year 20	Closure	Post-Closure	Hardness Independent Standard
Ag	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.001
Al	0.0983	0.0996	0.0996	0.0996	0.0996	0.0996	0.0996	0.0996	0.125
As	0.0010	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.053
B	0.0175	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121	0.0121	0.5
Ba	0.0155	0.0113	0.0113	0.0113	0.0113	0.0113	0.0113	0.0113	
Be	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Ca	13.4	13.0	13.0	13.0	13.0	13.0	13.0	13.0	
Cd	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Cd-Std	0.0008	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	
Cl	4.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	230
Co	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.005
Cu	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	
Cu-Std	0.0062	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	0.0069	
F	0.1000	0.1017	0.1017	0.1017	0.1017	0.1017	0.1017	0.1017	
Fe	1.7200	2.8829	2.8829	2.8829	2.8829	2.8829	2.8829	2.8829	
Hard	61.7	70.1	70.1	70.1	70.1	70.1	70.1	70.1	
K	0.8	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
Mg	6.2	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Mn	0.1600	0.2993	0.2993	0.2993	0.2993	0.2993	0.2993	0.2993	
Na	3.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
Ni	0.0019	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	0.0012	
Ni-Std	0.0346	0.0386	0.0386	0.0386	0.0386	0.0386	0.0386	0.0386	
Pb	0.0002	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	
Pb-Std	0.0017	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	0.0020	
Sb	0.0015	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.00003	0.031
Se	0.0005	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.005
SO ₄	4.6	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Tl	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.00056
Zn	0.0183	0.0160	0.0160	0.0160	0.0160	0.0160	0.0160	0.0160	
Zn-Std	0.0704	0.0785	0.0785	0.0785	0.0785	0.0785	0.0785	0.0785	

Notes

- 1) The hardness dependent standards for Cd, Cu, Ni, Pb and Zn are listed below the deterministic water quality predictions for each parameter
- 2) Deterministic water quality predictions at PM-12 does not change during mine operation and closure because it is upstream of the tailings ba

Table 7-4. Deterministic water quality predictions at surface water monitoring station PM-13 (mg/L)

Embarrass River PM-13

Tailings Basin - Geotechnical Mitigation

Low flow conditions

Parameter	Average Measured Conditions	Year 01	Year 05	Year 10	Year 15	Year 20	Closure	Post-Closure	Hardness Independent Standard
Ag	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.001
Al	0.1916	0.2295	0.2060	0.2080	0.1995	0.1929	0.2597	0.2187	0.125
As	0.0010	0.0030	0.0031	0.0033	0.0032	0.0032	0.0044	0.0055	0.053
B	0.0443	0.0689	0.0662	0.0663	0.0659	0.0657	0.0687	0.0610	0.5
Ba	0.0278	0.0703	0.0696	0.0692	0.0691	0.0693	0.0681	0.0649	
Be	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	
Ca	19.9	27.9	29.0	31.6	29.7	28.5	27.5	27.9	
Cd	0.0001	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0004	
Cd-Std	0.0015	0.0016	0.0017	0.0017	0.0017	0.0017	0.0016	0.0016	
Cl	7.0	5.5	9.3	9.1	9.1	9.6	4.9	4.2	230
Co	0.0005	0.0012	0.0012	0.0012	0.0012	0.0013	0.0013	0.0013	0.005
Cu	0.0020	0.0042	0.0043	0.0043	0.0045	0.0047	0.0047	0.0051	
Cu-Std	0.0123	0.0127	0.0137	0.0135	0.0133	0.0132	0.0129	0.0128	
F	0.3900	0.6884	0.7134	0.5323	0.5331	0.5336	0.5817	0.5642	
Fe	1.2900	0.6358	0.5668	0.5491	0.5319	0.5151	0.6155	0.4242	
Hard	143.5	152.0	169.9	167.6	162.8	161.6	154.3	152.8	
K	2.3	2.9	2.9	2.8	2.7	2.6	3.7	4.2	
Mg	15.9	20.5	20.5	17.9	17.8	17.8	21.1	20.5	
Mn	0.1100	0.3226	0.3078	0.2971	0.2961	0.2959	0.3108	0.2666	
Na	12.7	13.0	13.7	12.1	11.6	11.3	11.4	10.6	
Ni	0.0021	0.0077	0.0081	0.0086	0.0085	0.0087	0.0069	0.0069	
Ni-Std	0.0708	0.0743	0.0817	0.0807	0.0788	0.0783	0.0753	0.0747	
Pb	0.0003	0.0012	0.0012	0.0013	0.0013	0.0013	0.0012	0.0012	
Pb-Std	0.0050	0.0054	0.0062	0.0061	0.0059	0.0059	0.0055	0.0055	
Sb	0.0015	0.0017	0.0018	0.0022	0.0020	0.0020	0.0013	0.0014	0.031
Se	0.0005	0.0026	0.0027	0.0028	0.0028	0.0028	0.0028	0.0029	0.005
SO ₄	36.1	39.5	56.3	61.6	58.9	59.4	39.5	40.6	
Tl	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.00056
Zn	0.0123	0.0123	0.0123	0.0159	0.0163	0.0158	0.0119	0.0119	
Zn-Std	0.1440	0.1512	0.1661	0.1642	0.1602	0.1592	0.1531	0.1518	

Notes

- 1) The hardness dependent standards for Cd, Cu, Ni, Pb and Zn are listed below the deterministic water quality predictions for each parameter
- 2) Predictions for low flow conditions correspond to surface runoff equal to zero, and groundwater recharge as the only natural flow contribution

Table 7-5. Deterministic water quality predictions at surface water monitoring station PM-13 (mg/L)

Embarrass River PM-13

Tailings Basin - Geotechnical Mitigation

Average flow conditions

Parameter	Average Measured Conditions	Year 01	Year 05	Year 10	Year 15	Year 20	Closure	Post-Closure	Hardness Independent Standard
Ag	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0001	0.0001	0.001
Al	0.1916	0.2171	0.2139	0.2195	0.2167	0.2148	0.1614	0.1276	0.125
As	0.0010	0.0013	0.0014	0.0016	0.0015	0.0015	0.0015	0.0015	0.053
B	0.0443	0.0471	0.0485	0.0497	0.0504	0.0512	0.0304	0.0233	0.5
Ba	0.0278	0.0225	0.0229	0.0230	0.0232	0.0236	0.0175	0.0157	
Be	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	
Ca	19.9	21.6	22.5	24.5	23.3	22.5	18.2	17.2	
Cd	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Cd-Std	0.0015	0.0014	0.0015	0.0014	0.0014	0.0014	0.0012	0.0012	
Cl	7.0	10.7	11.0	10.5	10.5	10.5	9.8	9.5	230
Co	0.0005	0.0007	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007	0.005
Cu	0.0020	0.0021	0.0022	0.0023	0.0024	0.0026	0.0021	0.0020	
Cu-Std	0.0123	0.0117	0.0120	0.0119	0.0117	0.0116	0.0103	0.0097	
F	0.3900	0.3475	0.3876	0.2614	0.2661	0.2700	0.1944	0.1621	
Fe	1.2900	2.7166	2.6741	2.6617	2.6488	2.6355	2.6765	2.6307	
Hard	143.5	132.7	137.7	135.5	132.8	131.1	112.1	104.4	
K	2.3	5.2	5.3	5.2	5.2	5.1	5.2	5.2	
Mg	15.9	18.9	19.3	17.4	17.5	17.6	15.8	14.6	
Mn	0.1100	0.3711	0.3690	0.3635	0.3647	0.3664	0.3289	0.3085	
Na	12.7	11.4	12.1	11.1	10.9	10.7	8.3	7.4	
Ni	0.0021	0.0028	0.0030	0.0035	0.0034	0.0036	0.0019	0.0018	
Ni-Std	0.0708	0.0663	0.0684	0.0675	0.0663	0.0656	0.0575	0.0541	
Pb	0.0003	0.0002	0.0002	0.0003	0.0003	0.0003	0.0001	0.0001	
Pb-Std	0.0050	0.0046	0.0048	0.0047	0.0046	0.0045	0.0037	0.0034	
Sb	0.0015	0.0004	0.0006	0.0008	0.0007	0.0007	0.0001	0.0001	0.031
Se	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.005
SO ₄	36.1	46.4	49.7	52.6	51.0	50.4	37.6	34.8	
Tl	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0002	0.0002	0.00056
Zn	0.0123	0.0154	0.0155	0.0181	0.0185	0.0182	0.0153	0.0153	
Zn-Std	0.1440	0.1347	0.1390	0.1371	0.1348	0.1334	0.1168	0.1099	

Notes

1) The hardness dependent standards for Cd, Cu, Ni, Pb and Zn are listed below the deterministic water quality predictions for each parameter

Table 7-6. Deterministic water quality predictions at surface water monitoring station PM-13 (mg/L)

Embarrass River PM-13

Tailings Basin - Geotechnical Mitigation

High flow conditions

Parameter	Average Measured Conditions	Year 01	Year 05	Year 10	Year 15	Year 20	Closure	Post-Closure	Hardness Independent Standard
Ag	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.001
Al	0.1916	0.1126	0.1124	0.1131	0.1129	0.1127	0.1062	0.1027	0.125
As	0.0010	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.0008	0.053
B	0.0443	0.0158	0.0160	0.0161	0.0162	0.0163	0.0139	0.0131	0.5
Ba	0.0278	0.0122	0.0123	0.0123	0.0123	0.0124	0.0117	0.0115	
Be	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Ca	19.9	13.4	13.5	13.7	13.6	13.5	13.3	13.3	
Cd	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	
Cd-Std	0.0015	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	0.0009	
Cl	7.0	10.1	10.1	10.1	10.1	10.1	10.0	10.0	230
Co	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.005
Cu	0.0020	0.0016	0.0016	0.0016	0.0016	0.0016	0.0016	0.0015	
Cu-Std	0.0123	0.0074	0.0075	0.0075	0.0075	0.0074	0.0072	0.0072	
F	0.3900	0.1266	0.1314	0.1177	0.1183	0.1188	0.1095	0.1061	
Fe	1.2900	2.8803	2.8753	2.8739	2.8723	2.8707	2.8774	2.8734	
Hard	143.5	76.8	77.4	77.2	76.9	76.8	74.3	73.4	
K	2.3	3.9	3.9	3.9	3.9	3.9	3.9	3.8	
Mg	15.9	7.4	7.4	7.3	7.3	7.3	7.0	6.8	
Mn	0.1100	0.3077	0.3075	0.3070	0.3071	0.3073	0.3029	0.3008	
Na	12.7	4.4	4.4	4.3	4.3	4.3	4.0	3.9	
Ni	0.0021	0.0014	0.0014	0.0014	0.0014	0.0015	0.0013	0.0013	
Ni-Std	0.0708	0.0417	0.0420	0.0419	0.0418	0.0417	0.0405	0.0402	
Pb	0.0003	0.00002	0.00002	0.00004	0.00004	0.00004	0.00001	0.00001	
Pb-Std	0.0050	0.0023	0.0023	0.0023	0.0023	0.0023	0.0022	0.0021	
Sb	0.0015	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.031
Se	0.0005	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.005
SO ₄	36.1	8.6	9.0	9.3	9.2	9.1	7.4	7.0	
Tl	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.00056
Zn	0.0123	0.0159	0.0159	0.0162	0.0163	0.0162	0.0159	0.0159	
Zn-Std	0.1440	0.0847	0.0853	0.0851	0.0849	0.0847	0.0824	0.0816	

Notes

1) The hardness dependent standards for Cd, Cu, Ni, Pb and Zn are listed below the deterministic water quality predictions for each parameter

Table 8-1. Source Term Flows, Cell 2E Tailings Basin - Geotechnical Mitigation

Year	Embankment		LTV Crest		PolyMet Beach		Pond Recharge	
	Infiltration	Flow	Infiltration	Flow	Infiltration	Flow	Infiltration	Flow
	inches	m3/year	inches	m3/year	inches	m3/year	inches	m3/year
1	8	8223	8	36602	25	251427	64	2337119
2	8	18461	8	36136	25	250709	47	1763671
3	8	28699	8	35670	25	249991	43	1614279
4	8	37144	8	35204	26	249273	42	1629465
5	8	47382	8	34738	26	248555	41	1583630
6	8	57620	8	34272	26	247837	39	1561452
7	8	67858	8	33806	26	247118	39	1552223
8	8	78096	8	33340	26	246400	38	1550850
9	8	98103	8	30067	17	142544	34	1378863
10	8	103530	8	30105	16	142251	33	1337550
11	8	108958	8	30143	16	142003	32	1300352
12	8	114385	8	30181	16	141795	31	1266684
13	8	119812	8	30219	16	141627	30	1236067
14	8	125240	8	30256	16	141495	30	1208103
15	8	130667	8	30294	16	141396	29	1182462
16	8	136094	8	30332	15	141330	28	1158866
17	8	141521	8	30370	15	141294	28	1137080
18	8	146949	8	30408	15	141286	27	1116903
19	8	152376	8	30446	15	141304	27	1098163
20	8	157803	8	30483	15	141348	26	1080713

Table 8-2. Embankment Loads, Cell 2E Tailings Basin - Geotechnical Mitigation

	SO ₄	F	Cl	Al	Sb	As	Ba	Be	B	Cd	Ca	Co	Cu	Fe	Pb	Mg	Mn	Ni	K	Se	Ag	Na	Tl	Zn
Year	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr
1	6.46E+00	5.13E-02	1.54E-01	3.27E-04	1.38E-05	6.21E-04	6.57E-04	7.96E-06	6.47E-03	5.23E-06	1.99E+00	3.31E-05	3.47E-04	2.68E-03	9.02E-06	2.17E+00	7.72E-03	9.62E-05	4.89E-01	1.42E-04	5.90E-06	1.32E+00	6.81E-07	2.05E-04
2	1.58E+01	1.25E-01	3.76E-01	8.05E-04	3.38E-05	1.53E-03	1.60E-03	2.00E-05	1.58E-02	1.44E-05	4.90E+00	8.40E-05	8.50E-04	6.55E-03	2.30E-05	5.32E+00	1.88E-02	2.38E-04	1.20E+00	3.45E-04	1.61E-05	3.22E+00	1.67E-06	5.02E-04
3	2.55E+01	2.03E-01	6.09E-01	1.31E-03	5.49E-05	2.48E-03	2.60E-03	3.31E-05	2.57E-02	2.56E-05	7.99E+00	1.40E-04	1.38E-03	1.06E-02	3.86E-05	8.64E+00	3.04E-02	3.90E-04	1.94E+00	5.58E-04	2.83E-05	5.22E+00	2.70E-06	8.16E-04
4	3.32E+01	2.64E-01	7.93E-01	1.73E-03	7.18E-05	3.25E-03	3.38E-03	4.42E-05	3.35E-02	3.71E-05	1.05E+01	1.90E-04	1.80E-03	1.38E-02	5.25E-05	1.13E+01	3.95E-02	5.14E-04	2.53E+00	7.25E-04	4.05E-05	6.79E+00	3.53E-06	1.06E-03
5	2.71E+01	2.15E-01	6.53E-01	1.47E-03	5.99E-05	2.73E-03	2.76E-03	4.03E-05	2.77E-02	4.35E-05	8.86E+00	1.81E-04	1.50E-03	1.13E-02	5.07E-05	9.44E+00	3.20E-02	4.46E-04	2.09E+00	5.90E-04	4.63E-05	5.54E+00	2.92E-06	8.82E-04
6	2.74E+01	2.17E-01	6.62E-01	1.52E-03	6.12E-05	2.80E-03	2.78E-03	4.32E-05	2.82E-02	5.15E-05	9.12E+00	1.98E-04	1.53E-03	1.14E-02	5.57E-05	9.65E+00	3.21E-02	4.65E-04	2.12E+00	5.94E-04	5.44E-05	5.59E+00	2.96E-06	8.98E-04
7	2.77E+01	2.19E-01	6.71E-01	1.57E-03	6.26E-05	2.88E-03	2.81E-03	4.62E-05	2.87E-02	6.02E-05	9.40E+00	2.15E-04	1.56E-03	1.15E-02	6.11E-05	9.88E+00	3.23E-02	4.86E-04	2.16E+00	5.99E-04	6.31E-05	5.64E+00	3.01E-06	9.16E-04
8	3.69E+01	2.92E-01	8.91E-01	2.05E-03	8.25E-05	3.79E-03	3.75E-03	5.86E-05	3.80E-02	7.09E-05	1.23E+01	2.69E-04	2.06E-03	1.53E-02	7.59E-05	1.30E+01	4.32E-02	6.29E-04	2.86E+00	8.00E-04	7.47E-05	7.52E+00	3.99E-06	1.21E-03
9	2.82E+01	2.23E-01	6.89E-01	1.68E-03	6.53E-05	3.04E-03	2.86E-03	5.29E-05	2.96E-02	7.95E-05	9.99E+00	2.55E-04	1.62E-03	1.17E-02	7.31E-05	1.03E+01	3.25E-02	5.30E-04	2.23E+00	6.06E-04	8.25E-05	5.73E+00	3.11E-06	9.50E-04
10	2.86E+01	2.26E-01	7.02E-01	1.76E-03	6.72E-05	3.14E-03	2.90E-03	5.71E-05	3.03E-02	9.13E-05	1.04E+01	2.79E-04	1.67E-03	1.18E-02	8.04E-05	1.07E+01	3.27E-02	5.58E-04	2.28E+00	6.12E-04	9.43E-05	5.81E+00	3.18E-06	9.73E-04
11	2.90E+01	2.28E-01	7.15E-01	1.82E-03	6.90E-05	3.24E-03	2.94E-03	6.10E-05	3.09E-02	1.02E-04	1.07E+01	3.02E-04	1.71E-03	1.20E-02	8.74E-05	1.09E+01	3.29E-02	5.85E-04	2.32E+00	6.18E-04	1.05E-04	5.88E+00	3.25E-06	9.95E-04
12	2.93E+01	2.31E-01	7.24E-01	1.88E-03	7.04E-05	3.32E-03	2.96E-03	6.41E-05	3.14E-02	1.11E-04	1.10E+01	3.20E-04	1.74E-03	1.21E-02	9.28E-05	1.12E+01	3.31E-02	6.05E-04	2.36E+00	6.22E-04	1.14E-04	5.93E+00	3.30E-06	1.01E-03
13	2.91E+01	2.28E-01	7.20E-01	1.90E-03	7.06E-05	3.34E-03	2.93E-03	6.64E-05	3.14E-02	1.19E-04	1.11E+01	3.35E-04	1.74E-03	1.20E-02	9.74E-05	1.12E+01	3.25E-02	6.18E-04	2.35E+00	6.15E-04	1.22E-04	5.87E+00	3.29E-06	1.01E-03
14	2.94E+01	2.30E-01	7.30E-01	1.96E-03	7.20E-05	3.42E-03	2.96E-03	6.95E-05	3.19E-02	1.28E-04	1.14E+01	3.53E-04	1.77E-03	1.21E-02	1.03E-04	1.14E+01	3.27E-02	6.39E-04	2.39E+00	6.19E-04	1.31E-04	5.92E+00	3.35E-06	1.03E-03
15	2.97E+01	2.33E-01	7.40E-01	2.01E-03	7.34E-05	3.50E-03	2.99E-03	7.27E-05	3.24E-02	1.37E-04	1.17E+01	3.72E-04	1.81E-03	1.22E-02	1.08E-04	1.17E+01	3.29E-02	6.60E-04	2.43E+00	6.24E-04	1.40E-04	5.98E+00	3.40E-06	1.05E-03
16	3.00E+01	2.35E-01	7.52E-01	2.07E-03	7.51E-05	3.59E-03	3.03E-03	7.63E-05	3.30E-02	1.47E-04	1.20E+01	3.93E-04	1.84E-03	1.23E-02	1.15E-04	1.20E+01	3.31E-02	6.85E-04	2.47E+00	6.29E-04	1.50E-04	6.04E+00	3.46E-06	1.07E-03
17	3.94E+01	3.09E-01	9.75E-01	2.58E-03	9.55E-05	4.52E-03	3.97E-03	8.99E-05	4.24E-02	1.61E-04	1.51E+01	4.53E-04	2.36E-03	1.62E-02	1.32E-04	1.52E+01	4.41E-02	8.36E-04	3.18E+00	8.32E-04	1.65E-04	7.94E+00	4.46E-06	1.37E-03
18	3.24E+01	2.53E-01	8.14E-01	2.29E-03	8.21E-05	3.94E-03	3.26E-03	8.62E-05	3.58E-02	1.71E-04	1.33E+01	4.48E-04	2.01E-03	1.33E-02	1.31E-04	1.31E+01	3.54E-02	7.62E-04	2.68E+00	6.76E-04	1.74E-04	6.51E+00	3.76E-06	1.16E-03
19	3.27E+01	2.55E-01	8.24E-01	2.35E-03	8.35E-05	4.01E-03	3.29E-03	8.93E-05	3.63E-02	1.80E-04	1.35E+01	4.66E-04	2.04E-03	1.34E-02	1.37E-04	1.33E+01	3.56E-02	7.83E-04	2.72E+00	6.81E-04	1.83E-04	6.56E+00	3.82E-06	1.18E-03
20	3.30E+01	2.58E-01	8.34E-01	2.40E-03	8.48E-05	4.09E-03	3.32E-03	9.23E-05	3.68E-02	1.88E-04	1.38E+01	4.83E-04	2.07E-03	1.35E-02	1.42E-04	1.35E+01	3.57E-02	8.03E-04	2.75E+00	6.85E-04	1.92E-04	6.62E+00	3.87E-06	1.20E-03

Table 8-3. LTVSMC Crest Loads, Cell 2E Tailings Basin - Geotechnical Mitigation

	SO ₄	F	Cl	Al	Sb	As	Ba	Be	B	Cd	Ca	Co	Cu	Fe	Pb	Mg	Mn	Ni	K	Se	Ag	Na	Tl	Zn
Year	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr
1	6.01E-01	4.28E-03	1.93E-02	1.07E-04	2.79E-06	1.53E-04	5.66E-05	6.15E-06	9.95E-04	1.74E-05	5.67E-01	3.60E-05	6.37E-05	2.30E-04	1.09E-05	4.59E-01	3.25E-04	4.16E-05	7.18E-02	9.15E-06	1.75E-05	1.08E-01	1.04E-07	3.47E-05
2	5.12E-01	3.64E-03	1.65E-02	9.09E-05	2.38E-06	1.31E-04	4.82E-05	5.24E-06	8.48E-04	1.48E-05	4.83E-01	3.07E-05	5.42E-05	1.96E-04	9.26E-06	3.91E-01	2.77E-04	3.54E-05	6.12E-02	7.79E-06	1.49E-05	9.23E-02	8.82E-08	2.95E-05
3	1.41E-01	1.00E-03	4.53E-03	2.50E-05	6.54E-07	3.60E-05	1.33E-05	1.44E-06	2.33E-04	4.08E-06	1.33E-01	8.44E-06	1.49E-05	5.40E-05	2.55E-06	1.08E-01	7.63E-05	9.75E-06	1.68E-02	2.14E-06	4.10E-06	2.54E-02	2.43E-08	8.13E-06
4	6.71E-02	4.77E-04	2.16E-03	1.19E-05	3.11E-07	1.71E-05	6.32E-06	6.86E-07	1.11E-04	1.94E-06	6.33E-02	4.02E-06	7.11E-06	2.57E-05	1.21E-06	5.12E-02	3.63E-05	4.64E-06	8.02E-03	1.02E-06	1.95E-06	1.21E-02	1.16E-08	3.87E-06
5	3.19E-02	2.27E-04	1.03E-03	5.67E-06	1.48E-07	8.15E-06	3.01E-06	3.26E-07	5.28E-05	9.24E-07	3.01E-02	1.91E-06	3.38E-06	1.22E-05	5.77E-07	2.43E-02	1.73E-05	2.21E-06	3.81E-03	4.86E-07	9.28E-07	5.75E-03	5.50E-09	1.84E-06
6	8.23E-03	5.86E-05	2.65E-04	1.46E-06	3.82E-08	2.10E-06	7.75E-07	8.42E-08	1.36E-05	2.38E-07	7.76E-03	4.93E-07	8.72E-07	3.15E-06	1.49E-07	6.28E-03	4.45E-06	5.70E-07	9.84E-04	1.25E-07	2.39E-07	1.48E-03	1.42E-09	4.75E-07
7	1.35E-02	9.64E-05	4.36E-04	2.41E-06	6.29E-08	3.46E-06	1.28E-06	1.39E-07	2.24E-05	3.93E-07	1.28E-02	8.11E-07	1.44E-06	5.19E-06	2.45E-07	1.03E-02	7.33E-06	9.38E-07	1.62E-03	2.06E-07	3.94E-07	2.44E-03	2.33E-09	7.82E-07
8	1.34E-02	9.51E-05	4.30E-04	2.37E-06	6.20E-08	3.41E-06	1.26E-06	1.37E-07	2.21E-05	3.87E-07	1.26E-02	8.00E-07	1.42E-06	5.12E-06	2.42E-07	1.02E-02	7.23E-06	9.25E-07	1.60E-03	2.03E-07	3.88E-07	2.41E-03	2.30E-09	7.71E-07
9	1.20E-02	8.57E-05	3.87E-04	2.14E-06	5.59E-08	3.08E-06	1.14E-06	1.23E-07	2.00E-05	3.49E-07	1.14E-02	7.22E-07	1.28E-06	4.62E-06	2.18E-07	9.20E-03	6.52E-06	8.34E-07	1.44E-03	1.83E-07	3.50E-07	2.17E-03	2.08E-09	6.95E-07
10	1.21E-02	8.59E-05	3.88E-04	2.14E-06	5.60E-08	3.08E-06	1.14E-06	1.23E-07	2.00E-05	3.50E-07	1.14E-02	7.23E-07	1.28E-06	4.62E-06	2.18E-07	9.21E-03	6.53E-06	8.35E-07	1.44E-03	1.84E-07	3.51E-07	2.17E-03	2.08E-09	6.96E-07
11	1.21E-02	8.60E-05	3.88E-04	2.15E-06	5.61E-08	3.08E-06	1.14E-06	1.24E-07	2.00E-05	3.50E-07	1.14E-02	7.23E-07	1.28E-06	4.63E-06	2.19E-07	9.22E-03	6.54E-06	8.36E-07	1.44E-03	1.84E-07	3.51E-07	2.18E-03	2.08E-09	6.97E-07
12	1.21E-02	8.61E-05	3.89E-04	2.15E-06	5.61E-08	3.09E-06	1.14E-06	1.24E-07	2.00E-05	3.50E-07	1.14E-02	7.24E-07	1.28E-06	4.64E-06	2.19E-07	9.23E-03	6.55E-06	8.37E-07	1.45E-03	1.84E-07	3.52E-07	2.18E-03	2.08E-09	6.98E-07
13	1.21E-02	8.62E-05	3.89E-04	2.15E-06	5.62E-08	3.09E-06	1.14E-06	1.24E-07	2.01E-05	3.51E-07	1.14E-02	7.25E-07	1.28E-06	4.64E-06	2.19E-07	9.24E-03	6.55E-06	8.38E-07	1.45E-03	1.84E-07	3.52E-07	2.18E-03	2.09E-09	6.99E-07
14	1.21E-02	8.63E-05	3.90E-04	2.15E-06	5.63E-08	3.10E-06	1.14E-06	1.24E-07	2.01E-05	3.51E-07	1.14E-02	7.26E-07	1.28E-06	4.65E-06	2.19E-07	9.25E-03	6.56E-06	8.39E-07	1.45E-03	1.85E-07	3.53E-07	2.19E-03	2.09E-09	7.00E-07
15	1.21E-02	8.64E-05	3.90E-04	2.16E-06	5.63E-08	3.10E-06	1.14E-06	1.24E-07	2.01E-05	3.52E-07	1.15E-02	7.27E-07	1.29E-06	4.65E-06	2.20E-07	9.26E-03	6.57E-06	8.40E-07	1.45E-03	1.85E-07	3.53E-07	2.19E-03	2.09E-09	7.00E-07
16	1.22E-02	8.65E-05	3.91E-04	2.16E-06	5.64E-08	3.10E-06	1.15E-06	1.24E-07	2.01E-05	3.52E-07	1.15E-02	7.28E-07	1.29E-06	4.66E-06	2.20E-07	9.28E-03	6.58E-06	8.41E-07	1.45E-03	1.85E-07	3.53E-07	2.19E-03	2.09E-09	7.01E-07
17	1.22E-02	8.66E-05	3.91E-04	2.16E-06	5.65E-08	3.11E-06	1.15E-06	1.25E-07	2.02E-05	3.53E-07	1.15E-02	7.29E-07	1.29E-06	4.67E-06	2.20E-07	9.29E-03	6.59E-06	8.42E-07	1.46E-03	1.85E-07	3.54E-07	2.19E-03	2.10E-09	7.02E-07
18	1.22E-02	8.67E-05	3.92E-04	2.16E-06	5.66E-08	3.11E-06	1.15E-06	1.25E-07	2.02E-05	3.53E-07	1.15E-02	7.30E-07	1.29E-06	4.67E-06	2.21E-07	9.30E-03	6.60E-06	8.43E-07	1.46E-03	1.86E-07	3.54E-07	2.20E-03	2.10E-09	7.03E-07
19	1.22E-02	8.68E-05	3.92E-04	2.17E-06	5.66E-08	3.12E-06	1.15E-06	1.25E-07	2.02E-05	3.54E-07	1.15E-02	7.31E-07	1.29E-06	4.68E-06	2.21E-07	9.31E-03	6.60E-06	8.45E-07	1.46E-03	1.86E-07	3.55E-07	2.20E-03	2.10E-09	7.04E-07
20	1.22E-02	8.69E-05	3.93E-04	2.17E-06	5.67E-08	3.12E-06	1.15E-06	1.25E-07	2.02E-05	3.54E-07	1.15E-02	7.32E-07	1.29E-06	4.68E-06	2.21E-07	9.32E-03	6.61E-06	8.46E-07	1.46E-03	1.86E-07	3.55E-07	2.20E-03	2.11E-09	7.05E-07

Table 8-4. PolyMet Beach Loads, Cell 2E Tailings Basin - Geotechnical Mitigation

	SO ₄	F	Cl	Al	Sb	As	Ba	Be	B	Cd	Ca	Co	Cu	Fe	Pb	Mg	Mn	Ni	K	Se	Ag	Na	Tl	Zn
Year	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr	tonne/yr
1	8.43E+01	3.75E-01	2.21E+00	6.44E-01	2.03E-03	1.43E-02	1.71E-02	9.78E-04	3.86E-02	2.31E-04	2.65E+01	7.80E-04	7.01E-03	1.48E-01	4.85E-04	1.11E+01	6.15E-02	6.27E-03	1.19E+01	1.11E-03	3.91E-04	6.66E+00	2.63E-04	1.38E-02
2	4.21E+01	2.14E-01	1.50E+00	2.27E-01	1.50E-03	4.90E-03	1.16E-02	3.40E-04	2.94E-02	1.03E-04	1.47E+01	4.47E-04	3.05E-03	1.16E-01	3.05E-04	5.17E+00	5.19E-02	5.00E-03	4.17E+00	4.75E-04	2.31E-04	4.41E+00	1.99E-04	7.68E-03
3	6.18E+01	2.89E-01	1.83E+00	4.22E-01	1.75E-03	9.30E-03	1.42E-02	6.38E-04	3.37E-02	1.63E-04	2.02E+01	6.03E-04	4.90E-03	1.31E-01	3.89E-04	7.94E+00	5.64E-02	5.59E-03	7.78E+00	7.73E-04	3.06E-04	5.46E+00	2.29E-04	1.05E-02
4	1.01E+02	4.39E-01	2.50E+00	8.09E-01	2.23E-03	1.80E-02	1.93E-02	1.23E-03	4.23E-02	2.81E-04	3.11E+01	9.11E-04	8.57E-03	1.61E-01	5.57E-04	1.35E+01	6.53E-02	6.78E-03	1.50E+01	1.37E-03	4.54E-04	7.56E+00	2.88E-04	1.62E-02
5	6.75E+01	3.11E-01	1.93E+00	4.78E-01	1.82E-03	1.06E-02	1.49E-02	7.25E-04	3.50E-02	1.80E-04	2.18E+01	6.48E-04	5.44E-03	1.35E-01	4.14E-04	8.75E+00	5.77E-02	5.77E-03	8.83E+00	8.60E-04	3.28E-04	5.77E+00	2.38E-04	1.13E-02
6	8.68E+01	3.85E-01	2.26E+00	6.69E-01	2.06E-03	1.49E-02	1.74E-02	1.02E-03	3.92E-02	2.38E-04	2.72E+01	8.00E-04	7.24E-03	1.50E-01	4.96E-04	1.15E+01	6.21E-02	6.35E-03	1.24E+01	1.15E-03	4.00E-04	6.80E+00	2.67E-04	1.41E-02
7	9.36E+01	4.11E-01	2.37E+00	7.36E-01	2.14E-03	1.64E-02	1.83E-02	1.12E-03	4.07E-02	2.59E-04	2.91E+01	8.53E-04	7.88E-03	1.56E-01	5.25E-04	1.24E+01	6.37E-02	6.56E-03	1.36E+01	1.25E-03	4.26E-04	7.16E+00	2.77E-04	1.51E-02
8	4.90E+01	2.40E-01	1.62E+00	2.95E-01	1.59E-03	6.44E-03	1.25E-02	4.44E-04	3.09E-02	1.24E-04	1.66E+01	5.02E-04	3.70E-03	1.21E-01	3.34E-04	6.13E+00	5.35E-02	5.20E-03	5.43E+00	5.79E-04	2.57E-04	4.78E+00	2.10E-04	8.67E-03
9	3.75E+01	1.66E-01	9.74E-01	2.89E-01	8.88E-04	6.43E-03	7.53E-03	4.39E-04	1.69E-02	1.03E-04	1.17E+01	3.45E-04	3.13E-03	6.49E-02	2.14E-04	4.95E+00	2.68E-02	2.74E-03	5.34E+00	4.97E-04	1.73E-04	2.94E+00	1.15E-04	6.10E-03
10	5.58E+01	2.36E-01	1.28E+00	4.71E-01	1.11E-03	1.06E-02	9.89E-03	7.18E-04	2.08E-02	1.59E-04	1.68E+01	4.89E-04	4.85E-03	7.85E-02	2.92E-04	7.54E+00	3.07E-02	3.27E-03	8.72E+00	7.76E-04	2.42E-04	3.90E+00	1.42E-04	8.72E-03
11	4.38E+01	1.90E-01	1.07E+00	3.53E-01	9.56E-04	7.89E-03	8.28E-03	5.38E-04	1.81E-02	1.22E-04	1.35E+01	3.94E-04	3.73E-03	6.88E-02	2.40E-04	5.85E+00	2.78E-02	2.89E-03	6.54E+00	5.95E-04	1.96E-04	3.25E+00	1.23E-04	6.99E-03
12	2.73E+01	1.26E-01	7.89E-01	1.92E-01	7.46E-04	4.24E-03	6.10E-03	2.90E-04	1.44E-02	7.26E-05	8.84E+00	2.63E-04	2.19E-03	5.57E-02	1.69E-04	3.53E+00	2.38E-02	2.37E-03	3.54E+00	3.46E-04	1.33E-04	2.36E+00	9.75E-05	4.61E-03
13	3.11E+01	1.40E-01	8.48E-01	2.29E-01	7.87E-04	5.09E-03	6.56E-03	3.48E-04	1.51E-02	8.40E-05	9.87E+00	2.92E-04	2.55E-03	5.81E-02	1.84E-04	4.06E+00	2.44E-02	2.47E-03	4.24E+00	4.04E-04	1.47E-04	2.55E+00	1.03E-04	5.13E-03
14	4.52E+01	1.94E-01	1.08E+00	3.70E-01	9.59E-04	8.28E-03	8.38E-03	5.64E-04	1.81E-02	1.27E-04	1.38E+01	4.03E-04	3.88E-03	6.87E-02	2.44E-04	6.06E+00	2.75E-02	2.88E-03	6.86E+00	6.19E-04	2.00E-04	3.29E+00	1.23E-04	7.17E-03
15	6.04E+01	2.52E-01	1.34E+00	5.21E-01	1.14E-03	1.17E-02	1.03E-02	7.95E-04	2.13E-02	1.73E-04	1.80E+01	5.22E-04	5.30E-03	8.00E-02	3.08E-04	8.20E+00	3.07E-02	3.32E-03	9.65E+00	8.49E-04	2.57E-04	4.09E+00	1.46E-04	9.34E-03
16	3.26E+01	1.46E-01	8.63E-01	2.47E-01	7.93E-04	5.49E-03	6.67E-03	3.75E-04	1.51E-02	8.89E-05	1.03E+01	3.03E-04	2.70E-03	5.81E-02	1.89E-04	4.29E+00	2.42E-02	2.46E-03	4.57E+00	4.29E-04	1.52E-04	2.60E+00	1.03E-04	5.33E-03
17	2.92E+01	1.32E-01	8.03E-01	2.15E-01	7.47E-04	4.76E-03	6.21E-03	3.26E-04	1.43E-02	7.89E-05	9.31E+00	2.76E-04	2.39E-03	5.52E-02	1.74E-04	3.82E+00	2.32E-02	2.34E-03	3.97E+00	3.79E-04	1.39E-04	2.41E+00	9.73E-05	4.84E-03
18	4.43E+01	1.90E-01	1.05E+00	3.64E-01	9.30E-04	8.15E-03	8.15E-03	5.55E-04	1.75E-02	1.25E-04	1.35E+01	3.94E-04	3.80E-03	6.65E-02	2.38E-04	5.94E+00	2.65E-02	2.78E-03	6.74E+00	6.07E-04	1.95E-04	3.20E+00	1.20E-04	7.00E-03
19	6.47E+01	2.68E-01	1.40E+00	5.68E-01	1.18E-03	1.27E-02	1.08E-02	8.66E-04	2.20E-02	1.87E-04	1.92E+01	5.55E-04	5.73E-03	8.20E-02	3.25E-04	8.83E+00	3.10E-02	3.39E-03	1.05E+01	9.18E-04	2.73E-04	4.29E+00	1.50E-04	9.95E-03
20	6.39E+01	2.65E-01	1.38E+00	5.60E-01	1.17E-03	1.26E-02	1.07E-02	8.54E-04	2.17E-02	1.84E-04	1.90E+01	5.48E-04	5.65E-03	8.10E-02	3.21E-04	8.71E+00	3.07E-02	3.35E-03	1.04E+01	9.05E-04	2.69E-04	4.24E+00	1.48E-04	9.81E-03

Table 8-5. Pond Loads, Tailings Basin - Geotechnical Mitigation

	SO ₄	F	Cl	Al	Sb	As	Ba	Be	B	Cd	Ca	Co	Cu	Fe	Pb	Mg	Mn	Ni	K	Se	Ag	Na	Tl	Zn
Year	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1	189.998	2.903	15.247	0.010	0.008	0.007	0.050	0.000	0.138	0.000	77.281	0.001	0.007	0.004	0.001	44.028	0.240	0.019	9.307	0.001	0.001	52.949	0.001	0.018
2	187.058	0.747	5.417	0.010	0.011	0.007	0.048	0.000	0.135	0.001	93.965	0.002	0.007	0.004	0.001	15.482	0.209	0.027	6.155	0.001	0.001	19.223	0.001	0.025
3	180.242	0.478	4.320	0.010	0.011	0.006	0.048	0.000	0.134	0.001	99.561	0.001	0.007	0.004	0.001	10.980	0.194	0.025	5.532	0.001	0.001	15.226	0.001	0.026
4	174.679	0.439	4.311	0.010	0.010	0.006	0.048	0.000	0.134	0.001	103.019	0.001	0.006	0.004	0.001	9.444	0.182	0.023	5.268	0.001	0.001	14.839	0.001	0.027
5	221.341	0.459	4.925	0.010	0.012	0.007	0.049	0.000	0.151	0.001	109.233	0.002	0.006	0.004	0.003	8.861	0.154	0.025	6.272	0.001	0.001	32.068	0.001	0.065
6	234.246	0.462	5.251	0.010	0.012	0.008	0.050	0.000	0.158	0.001	108.849	0.002	0.006	0.004	0.004	8.598	0.148	0.025	6.500	0.002	0.001	37.666	0.001	0.077
7	220.929	0.447	5.378	0.010	0.012	0.007	0.050	0.000	0.157	0.001	102.276	0.002	0.006	0.004	0.004	8.544	0.160	0.023	6.106	0.001	0.001	35.624	0.001	0.073
8	164.238	0.391	5.946	0.010	0.009	0.005	0.054	0.000	0.156	0.000	75.465	0.001	0.006	0.004	0.002	8.743	0.214	0.016	4.667	0.001	0.001	25.631	0.001	0.050
9	162.495	0.384	5.619	0.010	0.009	0.005	0.051	0.000	0.150	0.000	75.050	0.001	0.006	0.004	0.002	8.553	0.200	0.016	4.743	0.001	0.001	25.482	0.001	0.050
10	179.379	0.485	5.544	0.010	0.010	0.006	0.050	0.000	0.151	0.001	81.998	0.002	0.008	0.004	0.003	9.026	0.188	0.023	5.140	0.001	0.001	25.513	0.001	0.070
11	188.732	0.572	5.790	0.010	0.010	0.006	0.052	0.000	0.157	0.001	85.520	0.002	0.011	0.004	0.003	9.625	0.193	0.027	5.317	0.001	0.001	24.604	0.001	0.085
12	169.292	0.532	6.035	0.010	0.009	0.006	0.055	0.000	0.158	0.001	73.012	0.002	0.010	0.004	0.002	10.258	0.225	0.025	4.884	0.001	0.001	20.378	0.001	0.067
13	164.472	0.521	5.920	0.010	0.009	0.005	0.054	0.000	0.155	0.001	70.196	0.002	0.010	0.004	0.002	10.252	0.225	0.024	4.772	0.001	0.001	19.421	0.001	0.064
14	175.393	0.557	6.100	0.010	0.010	0.006	0.055	0.000	0.161	0.001	76.691	0.002	0.011	0.004	0.003	10.231	0.221	0.026	5.031	0.001	0.001	21.312	0.001	0.074
15	159.238	0.544	5.872	0.010	0.009	0.006	0.055	0.000	0.158	0.000	64.601	0.002	0.011	0.004	0.002	10.384	0.233	0.025	4.898	0.001	0.001	21.596	0.001	0.061
16	147.579	0.543	6.009	0.010	0.009	0.006	0.059	0.000	0.163	0.000	55.191	0.002	0.012	0.004	0.002	10.927	0.258	0.023	4.853	0.001	0.001	22.031	0.001	0.051
17	146.148	0.552	6.062	0.010	0.009	0.006	0.060	0.000	0.165	0.000	53.608	0.002	0.012	0.004	0.002	11.076	0.264	0.023	4.900	0.001	0.001	22.696	0.001	0.050
18	148.566	0.569	6.038	0.010	0.009	0.006	0.060	0.000	0.167	0.000	54.535	0.002	0.012	0.004	0.002	11.054	0.262	0.024	5.022	0.001	0.001	24.012	0.001	0.053
19	143.251	0.542	6.083	0.010	0.009	0.006	0.060	0.000	0.165	0.000	52.214	0.002	0.012	0.004	0.002	11.035	0.266	0.023	4.831	0.001	0.001	22.139	0.001	0.047
20	129.657	0.482	5.810	0.010	0.008	0.005	0.056	0.000	0.154	0.000	48.003	0.002	0.010	0.004	0.002	10.506	0.258	0.020	4.291	0.001	0.001	17.443	0.001	0.033

**Table 8-6. Source Years Data Used in Deterministic Water Quality Predictions for
Cell 2E - Tailings Basin - Geotechnical Mitigation**

Prediction Year	LTVSMC Crest Source Year (yr)	PolyMet Beach Source Year (yr)	Embankment Source Year (yr)	Pond Source Year (yr)
1	0	0	0	1
2	0	0	0	1
3	0	0	0	1
4	0	0	0	1
5	0	0	0	1
6	0	0	0	1
7	0	0	0	2
8	0	1	0	3
9	0	2	0	4
10	0	3	0	5
11	1	4	1	6
12	2	5	2	7
13	3	6	3	8
14	4	7	4	9
15	5	8	5	10
16	6	9	6	11
17	7	10	7	12
18	8	11	8	13
19	9	12	9	14
20	10	13	10	15

Table 8-7. Predicted groundwater flow out of the Tailings Basin to the north of Cell 2E - Tailings Basin - Geotechnical Mitigation

Year	gpm
1	1570
2	1610
3	1640
4	1680
5	1710
6	1750
7	1780
8	1800
9	1810
10	1830
11	1840
12	1860
13	1870
14	1890
15	1900
16	1910
17	1920
18	1930
19	1940
20	1950

Table 8-8. Predicted Total Concentrations Cell 2E Tailings Basin - Geotechnical Mitigation

Prediction	SO4	Sb	As	Co	Cu	Ni	Zn	F	Cl	Al	Ba	Be	B	Cd	Ca	Fe	Pb	Mg	Mn	K	Se	Ag	Na	Tl	Hardness
Year	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
GW Standard	250	0.006	0.01	--	1	0.1	2	2	250	0.05	2	8.00E-05	0.6	0.004	--	0.3	0.015	--	0.05	--	--	0.03	--	0.0006	--
SW Standard	--	0.031	0.053	0.005	0.024	0.132	0.306	--	230	0.125	--	--	--	0.006	--	--	0.013	--	--	--	--	0.001	--	0.00056	--
1	190	0.00805	0.00677	0.00150	0.00681	0.01914	0.01821	2.90335	15.24697	0.01000	0.05046	0.00038	0.13784	0.00033	77.28098	0.00400	0.00089	44.02811	0.24035	9.30705	0.00111	0.00086	52.94899	0.00091	374
2	190	0.00805	0.00677	0.00150	0.00681	0.01914	0.01821	2.90335	15.24697	0.01000	0.05046	0.00038	0.13784	0.00033	77.28098	0.00400	0.00089	44.02811	0.24035	9.30705	0.00111	0.00086	52.94899	0.00091	374
3	190	0.00805	0.00677	0.00150	0.00681	0.01914	0.01821	2.90335	15.24697	0.01000	0.05046	0.00038	0.13784	0.00033	77.28098	0.00400	0.00089	44.02811	0.24035	9.30705	0.00111	0.00086	52.94899	0.00091	374
4	190	0.00805	0.00677	0.00150	0.00681	0.01914	0.01821	2.90335	15.24697	0.01000	0.05046	0.00038	0.13784	0.00033	77.28098	0.00400	0.00089	44.02811	0.24035	9.30705	0.00111	0.00086	52.94899	0.00091	374
5	190	0.00805	0.00677	0.00150	0.00681	0.01914	0.01821	2.90335	15.24697	0.01000	0.05046	0.00038	0.13784	0.00033	77.28098	0.00400	0.00089	44.02811	0.24035	9.30705	0.00111	0.00086	52.94899	0.00091	374
6	190	0.00805	0.00677	0.00150	0.00681	0.01914	0.01821	2.90335	15.24697	0.01000	0.05046	0.00038	0.13784	0.00033	77.28098	0.00400	0.00089	44.02811	0.24035	9.30705	0.00111	0.00086	52.94899	0.00091	374
7	187	0.01063	0.00653	0.00153	0.00735	0.02653	0.02503	0.74660	5.41693	0.01000	0.04796	0.00046	0.13543	0.00051	93.96505	0.00400	0.00112	15.48190	0.20899	6.15520	0.00122	0.00076	19.22317	0.00085	298
8	191	0.01049	0.00972	0.00155	0.00838	0.02516	0.02841	0.54898	4.63454	0.18909	0.04900	0.00069	0.13562	0.00059	99.95855	0.04516	0.00123	13.31180	0.19774	8.46787	0.00147	0.00082	16.01842	0.00089	304
9	174	0.01016	0.00679	0.00136	0.00689	0.02303	0.02729	0.46751	4.42685	0.07219	0.04758	0.00050	0.13286	0.00059	99.92731	0.03579	0.00121	10.21950	0.18361	6.05729	0.00131	0.00079	15.03050	0.00089	292
10	223	0.01173	0.00943	0.00163	0.00698	0.02482	0.06357	0.50704	5.09065	0.12514	0.04921	0.00059	0.14997	0.00065	107.27244	0.03972	0.00300	10.43427	0.15849	7.97846	0.00157	0.00084	31.36633	0.00103	311
11	245	0.01205	0.01229	0.00177	0.00787	0.02496	0.07567	0.55961	5.55699	0.22969	0.05112	0.00074	0.15891	0.00067	109.30312	0.04842	0.00358	12.29341	0.15620	10.20968	0.00181	0.00091	37.09655	0.00109	324
12	225	0.01127	0.01000	0.00163	0.00701	0.02298	0.07001	0.52900	5.56481	0.13872	0.05064	0.00059	0.15832	0.00060	101.23511	0.04211	0.00335	11.75210	0.16730	8.33318	0.00168	0.00089	35.16079	0.00108	301
13	181	0.00862	0.00952	0.00136	0.00755	0.01657	0.04978	0.51639	6.21731	0.18882	0.05445	0.00060	0.16053	0.00045	78.60652	0.04683	0.00241	13.43220	0.22117	8.11694	0.00167	0.00099	26.71499	0.00109	252
14	182	0.00853	0.01013	0.00137	0.00772	0.01673	0.05002	0.53085	5.98399	0.20544	0.05210	0.00063	0.15681	0.00045	79.20806	0.04873	0.00241	14.15260	0.21066	8.63844	0.00170	0.00095	27.03131	0.00104	256
15	184	0.00929	0.00783	0.00193	0.00905	0.02217	0.06657	0.56315	5.66230	0.08737	0.04996	0.00049	0.15353	0.00057	81.61110	0.03860	0.00270	12.36098	0.19382	6.68053	0.00153	0.00089	26.02499	0.00103	255
16	194	0.00993	0.00822	0.00249	0.01147	0.02640	0.08163	0.63740	5.86357	0.08568	0.05195	0.00053	0.15944	0.00069	85.73298	0.02378	0.00295	12.87000	0.19649	6.95112	0.00161	0.00093	25.32803	0.00108	267
17	180	0.00900	0.00871	0.00225	0.01140	0.02400	0.06558	0.61732	6.16023	0.13287	0.05454	0.00058	0.16125	0.00057	75.21797	0.02727	0.00239	14.15859	0.22702	7.41637	0.00161	0.00099	21.57378	0.00108	246
18	175	0.00870	0.00810	0.00218	0.01104	0.02345	0.06204	0.61199	6.04044	0.10176	0.05336	0.00053	0.15954	0.00054	72.27612	0.02560	0.00226	14.48484	0.22822	6.90292	0.00158	0.00096	20.94284	0.00104	240
19	178	0.00917	0.00723	0.00233	0.01116	0.02477	0.07010	0.60844	6.05610	0.05931	0.05358	0.00048	0.16082	0.00060	76.20966	0.02113	0.00252	13.10784	0.21986	6.17127	0.00153	0.00097	21.91684	0.00108	244
20	163	0.00878	0.00745	0.00219	0.01143	0.02357	0.05869	0.59938	5.85490	0.06879	0.05400	0.00047	0.15866	0.00050	65.23767	0.02172	0.00230	13.43794	0.23079	6.22836	0.00143	0.00095	22.21623	0.00100	218

Table 8-9. Analytical Data Summary, Polymet Mining Company (units as noted)

Location Date Dup	GW-001 8/17/2007	GW-001 10/11/2007	GW-002 8/17/2007	GW-002 10/10/2007	GW-006 8/17/2007	GW-006 10/10/2007	GW-007 8/17/2007	GW-007 8/17/2007 DUP	GW-007 10/10/2007	GW-007 10/10/2007 DUP	GW-008 8/17/2007	GW-008 10/10/2007
General Parameters, mg/L (unless noted otherwise)												
Alkalinity, total	394	387	46.5	34.1	576	521	274	279	280	281	158	135
Chemical Oxygen Demand	48.0	43	<10	38	23.0	10	27.0 *	95.4 *	10	8	<10	18
Chloride	26.9	27.3	0.65	0.74	22.7	8.26	30	30	28.6	28.7	1.16	1.02
Cyanide, ug/L	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Hardness, total	367	352	66	73.9	933	757	390	392	416	408	184	167
Nitrogen Nitrate	<0.1 h	--	<0.1 h	--	<0.1 h	--	<0.1 h	<0.1 h	--	--	<0.1 h	--
Nitrogen Nitrite	<0.05 h	--	<0.05 h	--	<0.05 h	--	<0.05 h	<0.05 h	--	--	<0.05 h	--
Nitrate + Nitrite	--	0.11	--	<0.1	--	<0.1	--	--	<0.1	<0.1	--	<0.1
Nitrogen, ammonia as N, ug/L	150	130 b	<100	<100	110	<100	<100	<100	<100	<100	<100	<100
Phosphorus total	<0.1	<0.1	0.37	0.41	0.11	<0.1	<0.1	<0.1	<0.1	<0.1	0.12	0.12
Sulfate	36.8	36.8	7.74	6.39	430	217	161	158	169	166	23.5	21.3
Fluoride	<0.1	0.11	<0.1	<0.1	2.56	1.67	1.79	1.79	1.89	1.89	<0.1	<0.1
pH, standard units	7.1	7.2	7.4	7.4	7.5	7.4	7.8	7.8	7.7	7.8	7.1	7.0
Carbon, total organic	8.6	9.1	1.9	7.4	2.8	2.4	1.6	1.7	1.9	1.9	1.8	1.6
Metals, ug/L (unless noted otherwise)												
Aluminum	1600	1100	9800	16000	89	33	<40	<40	12	14	6300	6600
Antimony	<0.5	<0.50	<0.5	<0.50	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.5	<0.50
Arsenic	<10	<0.50	<10	2.2	4.3	2.0	4.2	4.4	3.3	3.6	<2.0	<2.0
Barium	300	280	59	110	110	66	4.2	4.5	4.0	4.1	76	81
Beryllium	<1.0	<2.0	<1.0	<2.0	<1.0	<2.0	<1.0	<1.0	<2.0	<2.0	<1.0	<2.0
Boron	300	260	<200	<200	540	330	430	430	410	400	<200	<200
Cadmium	<0.20	0.98	0.44	0.46	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Calcium, mg/L	76	71.7	15.0	16.6	110	81.9	49.0	50	51.4	50.3	31	26.5
Chromium	<5.0	7.7 b	17	31	<1.0	<2.0	<1.0	<1.0	<2.0	<2.0	9.5	15 b
Cobalt	1.4	1.1	4.2	7.9	1.9	1.6	0.96	1.0	1.0	1.0	2.5	3.1
Copper	7.9	7.5	17	32	1.4	1.7	0.86	0.99	1.2	1.3	9.7	13
Iron	14000	13000	12000	18000	3000	830	290	290	360	370	6700	7100
Lead	1.2	5.6	2.6	4.0	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	1.5	1.9
Magnesium, mg/L	43	42	7.0	7.88	160	134	65.0	67	69.7	68.5	26	24.5
Manganese	2400	2300	230	340	1200	580	1200	1200	1100	1100	530	220
Mercury, ng/L	--	4.6	--	7.7	--	1.4	--	--	1.0	0.9	--	8.5
Mercury methyl, ng/L	--	<0.05	--	<0.05	--	<0.05	--	--	<0.05	<0.05	--	<0.05
Molybdenum	8.7	8.0	0.33	0.48	47	30	35 *	34 *	32	31	0.43	0.33
Nickel	6.6	7.6	15	32 b	5.8	7.0	2.5	2.6	3.9	3.8	11	18 b
Palladium	<0.3	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Platinum	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium	4000	3500	2700	4000	16000	9600	9700	9800	9400	9100	3300	3300
Selenium	<10	1.3	<5.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	<1.0
Silver	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Sodium	65000	61000	5500	5400	80000	33000	48000	48000	47000	46000	7800	7300
Strontium	250	240	92	110	550	350	310	310	330	330	130	110
Thallium	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Titanium	57	40	820	720	6.8	4.1	<2.0	<2.0	3.0	2.7	150	240
Zinc	<30	33	<30	48	<30	6.5	<30	<30	<6.0	<6.0	<30	23
Dissolved Metals, ug/L												
Aluminum, dissolved	<10	<10	56	110	<10	<10	<10	<10	<10	<10	25	16
Cadmium, dissolved	<0.20	<0.20	<0.20	<0.20	0.34 b	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chromium, dissolved	<1.0	<2.0	1.7	<2.0	<1.0	<2.0	<1.0	1.5	<2.0	<2.0	2.1	2.9
Copper, dissolved	0.92 b	0.93	1.9 b	4.7	1.4 b	11	0.76 b	<0.70	<0.70	0.78	1.8 b	1.9
Molybdenum dissolved	8.6 b	8.0	<0.30	<0.30	45 b	30	34 b	<0.30	30	30	0.30 b	0.31
Nickel, dissolved	3.1 b	4.4	1.1 b	2.0	5.2 b	7.0	2.5 b	<0.60	3.9	4.0	1.7 b	2.5
Selenium, dissolved	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Silver, dissolved	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Zinc, dissolved	17	16	<30	<6.0	<30	12	<30	<30	6.8	7.9	<30	7.1

-- Not analyzed.

* Estimated value, QA/QC criteria not met.

b Potential false positive value based on blank data validation procedure.

DUP Duplicate sample.

h EPA sample extraction or analysis holding time was exceeded.

Table 8-10. Source Area Concentrations for Closure - Tailings Basin - Geotechnical Mitigation

	SO ₄	F	Cl	Al	Sb	As	Ba	Be	B	Cd	Ca	Co	Cu	Fe	Pb	Mg	Mn	Ni	K	Se	Ag	Na	Tl	Zn
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
GW Standard	250	2	250	0.05	0.006	0.01	2	8.00E-05	0.6	0.004	--	--	1	0.3	0.015	--	0.05	0.1	--	0.03	0.03	--	--	2
SW Standard	--	--	230	0.125	0.031	0.053	--	--	--	0.006	--	0.005	0.023	--	0.012	--	--	0.127	--	0.005	0.001	--	--	0.295
PolyMet Beach Cell 1E east	712	2.73	12.0	7.04	0.0088	0.159	0.0931	1.08E-02	0.16	0.00216	199.2	0.0056	0.067	0.55	0.0030	100.4	0.163	0.022	130.6	0.0108	0.00269	38.1	1.08E-03	0.1025
PolyMet Beach Cell 1E south	712	2.73	12.0	7.04	0.0088	0.159	0.0931	1.08E-02	0.16	0.00216	199.2	0.0056	0.067	0.55	0.0030	100.4	0.163	0.022	130.6	0.0108	0.00269	38.1	1.08E-03	0.1025
PolyMet Beach Cell 2E	731	2.80	12.4	7.23	0.0091	0.163	0.0955	1.11E-02	0.16	0.00221	204.5	0.0058	0.069	0.56	0.0031	103.1	0.167	0.022	134.1	0.0111	0.00277	39.1	1.11E-03	0.1053
Pond	5	0.02	0.2	0.05	0.0002	0.001	0.0005	8.04E-05	0.02	0.00002	5.3	0.0001	0.002	0.01	0.0001	1.6	0.005	0.001	1.7	0.0001	0.00002	0.5	8.04E-06	0.0005
LTVSMC Crest Cell 1E east	1012	7.89	25.6	0.07	0.0026	0.127	0.1017	2.90E-03	1.13	0.00599	428.8	0.0152	0.064	0.41	0.0045	418.3	1.090	0.025	84.7	0.0210	0.00610	202.7	1.19E-04	0.0369
LTVSMC Crest Cell 1E south	1071	8.36	27.0	0.08	0.0027	0.132	0.1076	2.96E-03	1.19	0.00601	446.1	0.0155	0.067	0.44	0.0045	437.4	1.161	0.026	89.1	0.0222	0.00612	214.7	1.25E-04	0.0388
LTVSMC Crest Cell 2E	1099	8.60	27.4	0.07	0.0027	0.130	0.1107	2.72E-03	1.20	0.00518	435.5	0.0140	0.067	0.45	0.0041	433.8	1.214	0.025	89.9	0.0231	0.00529	221.2	1.26E-04	0.0389
Embankment Cell 1E east	558	4.40	13.6	0.03	0.0013	0.060	0.0565	1.24E-03	0.58	0.00350	196.6	0.0072	0.032	0.23	0.0022	203.8	0.642	0.010	44.0	0.0120	0.00351	113.3	6.14E-05	0.0187
Embankment Cell 1E south	571	4.51	13.9	0.03	0.0013	0.061	0.0578	1.32E-03	0.60	0.00374	201.1	0.0077	0.033	0.24	0.0023	208.5	0.657	0.011	45.0	0.0123	0.00375	115.9	6.29E-05	0.0192
Embankment Cell 2E	396	3.08	10.0	0.03	0.0011	0.053	0.0397	1.99E-03	0.44	0.00563	189.7	0.0116	0.025	0.16	0.0035	169.6	0.426	0.013	33.2	0.0082	0.00564	79.2	4.66E-05	0.0145
2W Recharge	152	1.55	21.5	1.58	0.0003	0.003	0.0930	7.50E-04	0.33	0.00019	59.8	0.0016	0.005	4.59	0.0012	70.0	1.183	0.007	7.8	0.0011	0.00010	44.3	2.00E-04	0.0144
Background	9	0.39	1.8	0.03	0.0015	0.003	0.0681	2.30E-05	0.02	0.00030	19.0	0.0011	0.004	0.04	0.0012	10.7	0.188	0.007	1.6	0.0030	0.00001	4.9	4.00E-06	0.0115

	Parameter concentrations predicted for closure conditions
	Parameter concentrations not predicted because source concentrations all less than standard
	Parameter concentrations not predicted because existing or background concentrations are higher than standard
	Parameter concentrations not predicted because there is no applicable standard