

US EPA ARCHIVE DOCUMENT

Attachment 4

Calculations



Foth & Van Dyke

Client:	<u>Kennecott Minerals Company</u>	Scope ID.: <u>04W018</u>
Project:	<u>Eagle Project</u>	
Prepared by:	<u>JJF1</u>	Date: <u>04/01/06</u>
Checked by:	<u>HJA</u>	Date: <u>04/12/06</u>

Notes:

- ¹ Data from holes 04EA-054A, -054B, -054D, and -054E from Table 6.2 Golder Associates, Eagle Project Bedrock Hydrogeologic Investigation, 2005.
- ² Data from holes 05EA-107 and 04EA-084 from Attachment 1.
- ³ The upper bedrock leakage composite is the average of holes 04EA-054A, 04EA-054B, 04EA-054D, 04EA-054E, 05EA-107 (60 ft - 115 ft) and 05EA-107 (320 ft - 375 ft).
- ⁴ The lower bedrock leakage is from hole 04EA-084, 817-991 ft.
- ⁵ The total leakage composite is estimated as 55% from the upper bedrock leakage and 45% from the lower bedrock leakage.
- ⁶ The incremental change is the incremental water quality for underground mine during operations due to rock wall leachings. Data from Table 2, Geochimica Technical Memorandum titled Water Quality in Underground Mine During Operational Conditions. , November 7, 2005. (Attachment 2) The incremental change for nitrogen (ammonia) is the estimated increase in ammonia due to blasting residuals.
- ⁷ The composite mine drainage is the sum of the total leakage composite and the incremental change.
- ⁸ The TDRSA contact runoff is the water quality for the development Rock stockpile with limestone addition. Data from Table 3, Geochimica Technical Memorandum titled Water Quality from the Development Rock Storage Pad During Operations, November 7, 2005. (Attachment 2)
- ⁹ The WWTP influent wastewater is the water quality of the of the combined 180 gpm mine drainage water and the 21.7 gpm TDRSA runoff water.



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*all calc. -
not data*

Wastewater Treatment Plant Water Quality Estimates

	04EA-054A ¹	04EA-054B ¹	04EA-054D ¹	04EA-054E ¹	18-34 m	97-114 m	Upper Bedrock Leakage ³	86 purges 249 - 302 m	Lower Bedrock Leakage ⁴	Total Leakage ⁵	Incremental Change ⁶	Composite Mine Drainage ⁷	TDRSA Contact Runoff ⁸	WWTP Influent Wastewater ⁹
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Aluminum	100	100	100	100	50	50	83	50	50	68	88	156	1.0	140
Antimony	5	5	5	5	5	5	5.0	5	5	5.0	16	21	0.4	19
Arsenic	2	2	2	2	2	2	2.0	19	19	10	17.0	27	83	33
Barium	27	60	20	20	20	20	28	20	20	24	4.0	28	30	28
Beryllium	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0		1.0
Boron	1,340	1,370	2,720	3,910	940	4,100	2,397	5,900	5,900	3,973	70	4,043	580	3,671
Cadmium	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.0	5.0	2.5	10.0	13	0.2	11
Calcium	8,900	34,000	25,000	19,000	5,900.0	3,100.0	15,983	76,000	76,000	42,991	4,000	46,991	199,000	63,345
Chloride	18,000	26,000	64,000	42,000	1,200	97,000	41,367	2,000,000.0	2,000,000	922,752	1,580	924,332	10,000	825,963
Chromium	5	5	5	5	5	5	5.0	5	5.0	5.0	4.5	10	0.45	8.5
Cobalt	10	10	10	10	10	10	10.0	10	10.0	10	720	730	0.80	652
Copper	5	5	5	5	5	5	5.0	5	5.0	5.0	150	155	60	145
Fluoride	170	190	140	120	530	850	333	1,000	1,000	633	98	731	500	706
Iron	22	20	130	61	88	79	67	1,800	1,800	847	6,400	7,247	2.0	6,467
Lead	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	9.0	10	0.40	9.0
Lithium	10	14	23	14	13	16	15	130	130	67	26	93	19	85
Magnesium	3,600	2,500	4,100	3,800	2,400	980	2,897	61,000	61,000	29,043	5,000	34,043	18,000	32,317
Manganese	20	20	20	20	22	20	20	68	68	42	950	992		992
Mercury	0.000653	0.000428	0.000651	0.00495	0.00081	0.00351	0.00183	0.00021	0.00021	0.00110	0.04000	0.04110	0.04000	0.0410
Molybdenum	10	10	11	10	10	10	10	10	10	10	13	23	1.5	21
Nickel	25	29	25	25	25	25	26	25	25	25	36,400	36,425	8,330	33,403
Nitrogen, Ammonia					76	93	85	260	260	163	10,000	10,163		10,163
Nitrogen, Nitrate					50	50	50	50	50	50		50		50
Phosphorus, total					10	33	22	15	15	18		18		18.5
Potassium	2,000	8,100	7,100	4,300	2,900	1,700	4,350	9,200	9,200	6,533	1,000	7,533	29,000	9,842
Selenium	1.0	1.0	1.1	1.0	1.0	1.0	1.0	17.0	17	8.2	20.0	28	4.0	26
Silver	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5	0.5	0.3	4.5	4.8	0.05	4.3
Sodium	24,000	27,000	41,000	40,000	21,000	80,000	38,833	970,000	970,000	457,858	1,000	458,858	19,000	411,536
Strontium					170	91	131	4,800	4,800	2,232	20	2,252	200	2,031
Sulfate	5,600	6,300	28,000	12,000	5,000	5,000	10,317	5,000	5,000	7,924	110,000	117,924	575,000	167,099
Thallium							~		~	-	8.0	8.0	0.05	7.1
Vanadium							~		~	-	7.0	7.0	0.75	6.3
Zinc	10	10	11	12	10	12	11	19	19	15	150	165	1,900	351

Totals:

0.00056