


THE ROSEBUD MINING CO., LLC
MEMORANDUM

TO: Ron Clayton
FROM: Kurt D. Allen 
DATE: August 25, 1997

SUBJECT: Results of the 35 Bulk Density Samples Submitted to McClelland Labs.

A total of 35 ore host rock samples were collected from Stopes 13, 22, and 23, for bulk density analysis. Samples collected consist of 10 samples from Stope 13-4868, 7 samples from Stope 22-4640, 6 samples from Stope 22-4652, and 12 samples from Stope 23-4592. Sample rock types consist of planar laminated flow (PLAT), pink matrix breccias (PMBX), and leopard skin tuff (LST). These samples were submitted to McClelland Laboratories, Inc., in Sparks, Nevada, where bulk density determinations were completed by a standard volume displacement method with a weight differential check.

Results from the above 35 samples are attached. These results indicate that the average bulk density of all 35 samples is 13.7 cu. ft./ton (we currently use 14.4 cu. ft./ton). The average bulk density for Stope 13 is 14.1 cu. ft./ton, Stope 22 is 13.9 cu. ft./ton, and Stope 23 is 13.2 cu. ft./ton. The average bulk density of these latest samples is 5.1% lower (higher density) than the 14.4 cu. ft./ton we are currently using. We need to keep in mind that for these 35 samples, the 13.7 cu. ft./ton value is the most optimistic (densest) value because there is no way to account for open fractures or large voids not represented within the samples.

If we look at model vs. truck tonnages for June and July (assuming same moisture content in July as for June) using the current 14.4 cu. ft./ton bulk density and then at the same using the indicated 13.7 cu. ft./ton, we see the following:

AT BULK DENSITY OF 14.4 cu. ft./ton			
	MODEL TONS	TRUCK TONS	DIFFERENCE
JUNE	15,896	17,795	1,899
JULY	23,404	24,270	866

AT BULK DENSITY OF 13.7 cu. ft./ton			
	MODEL TONS	TRUCK TONS	DIFFERENCE
JUNE	16,708	17,795	1,087
JULY	24,600	24,270	(330)

It appears that a bulk density change as indicated by the new samples would bring the tonnage discrepancy observed in June and July to a much lower level.

An additional 10 samples (5 from Stope 14 and 5 from Stope 21) have been taken and will be sent to McClelland Laboratories, Inc., this week for additional bulk density determinations. These samples, in addition to the previous 35 will give us results from each of the stopes we are

currently mining. When we receive the results from these last ten samples, I recommend the following:

- That we track tonnages as we currently are using a bulk density of 14.4 cu. ft./ton.
- That we track tonnages using the average bulk density of the latest 45 samples from all stopes (currently 13.7 cu. ft./ton).
- That we track tonnages using the average bulk density by stope (stope 13 currently 14.1 cu. ft./ton, stope 22 currently 13.9 cu. ft./ton, and stope 23 currently 13.2 cu. ft./ton).
- Compare tonnages calculated using bulk densities listed above to actual tonnages for a few months.
- Make necessary changes to the currently used bulk density.

1997 BULK DENSITY TEST RESULTS BY STOPE, LEVEL, AND ROCK TYPE RBB-1 thru RBB-35 (n=35)						
STOPE	LEVEL		MOISTURE WT. PCT.	SPECIFIC GRAVITY	BULK DENSITY lb/cu. ft	BULK DENSITY cu. ft./ton
13	4868.0		4.0	2.28	142.4	14.1
22	4640.0		4.1	2.29	143.1	14.0
22	4652.0		3.6	2.32	144.9	13.8
23	4592.0		2.5	2.44	152.1	13.2
ALL	ALL		3.4	2.34	146.3	13.7

STOPE	LEVEL	ROCK TYPE	MOISTURE WT. PCT.	SPECIFIC GRAVITY	BULK DENSITY lb/cu. ft	BULK DENSITY cu. ft./ton
13	4868.0	PLAT	4.1	2.34	146.1	13.8
		PMBX	3.9	2.27	141.5	14.2
22	4640.0	PLAT	4.3	2.27	141.9	14.1
		PMBX	3.9	2.31	144.0	14.0
22	4652.0	LST (W)	5.5	2.27	141.8	14.1
		PLAT	1.2	2.49	155.4	12.9
		PMBX	1.9	2.31	144.1	13.9
23	4592.0	PLAT	1.5	2.50	155.8	12.8
		PMBX	3.5	2.38	148.3	13.5

STOPE	LEVEL	ROCK TYPE	MOISTURE WT. PCT.	SPECIFIC GRAVITY	BULK DENSITY lb/cu. ft	BULK DENSITY cu. ft./ton
ALL	ALL	LST	5.5	2.27	141.8	14.1
		PLAT	2.6	2.41	150.7	13.3
		PMBX	3.6	2.31	144.3	13.9

Table 1. - Bulk Density Test Results, Rosebud Samples

Sample Number	Moisture Wt. Pct.	Specific Gravity	Bulk Density	
			lb/cu ft	cu ft/ton
RBBD 1	5.2	2.30	143.5	13.9
RBBD 2	1.8	2.48	154.8	12.9
RBBD 3	9.1	2.13	132.9	15.0
RBBD 4	1.4	2.57	160.4	12.5
RBBD 5	1.3	2.54	158.5	12.6
RBBD 6	1.2	2.44	152.3	13.1
RBBD 7	1.8	2.42	151.0	13.2
RBBD 8	2.2	2.41	150.4	13.3
RBBD 9	1.6	2.53	157.9	12.7
RBBD 10	1.5	2.50	156.0	12.8
RBBD 11	3.0	2.37	147.9	13.5
RBBD 12	10.3	1.98	123.6	16.2
RBBD 13	3.5	2.29	142.9	14.0
RBBD 14	10.4	2.27	141.6	14.1
RBBD 15	7.4	2.14	133.5	15.0
RBBD 16	6.1	2.23	139.2	14.4
RBBD 17	6.9	2.06	128.5	15.6
RBBD 18	2.9	2.33	145.4	13.8
RBBD 19	2.1	2.45	152.9	13.1
RBBD 20	4.3	2.25	140.4	14.2
RBBD 21	3.6	2.36	147.3	13.6
RBBD 22	1.4	2.35	146.6	13.6
RBBD 23	2.0	2.37	147.9	13.5
RBBD 24	3.0	2.28	142.3	14.1
RBBD 25	2.3	2.35	146.6	13.6
RBBD 26	1.3	2.43	151.6	13.2
RBBD 27	1.7	2.47	154.1	13.0
RBBD 28	6.7	2.19	136.7	14.6
RBBD 29	3.1	2.26	141.0	14.2
RBBD 30	2.9	2.27	141.6	14.1
RBBD 31	0.6	2.48	154.8	12.9
RBBD 32	2.1	2.44	152.3	13.1
RBBD 33	0.8	2.35	146.6	13.6
RBBD 34	2.6	2.26	141.0	14.2
RBBD 35	1.2	2.49	155.4	12.9
Average	3.4	2.34	146.3	13.7

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