

0280 0013

268
COPY
Item 15

January 7, 1948

Title

Metallurgical Tests on Three Samples of Antimony Ore from Nevada.

Origin

Southerland, Mitchell and Hollywood Mines

Near Lovelock, Nevada

Submitted by Harry D. Kline

Description

In a letter dated October 3, 1947, Mr. Kline stated:

"Sample No. 1 - From the Southerland Mine, 14 miles east of Lovelock, Nevada. Represents about 1500 tons of dump material available for concentration. This is partially oxidized as it has been on the dump for over 25 years."

Size range 4" to fines

Total weight 51.3 pounds

"Sample No. 2 - From Mitchell Mine, 15 miles south of Battle Mountain, Nevada. This sample is in two parts, part one from underground and represents 30 inches of vein, part two represents approximately 500 tons now on the dump. I would like to have separate samples on these two before mixing for test work."

Size range 4" to fines

Total weight 51.8 pounds

"Sample No. 3 - Hollywood Mine, 25 miles east of Lovelock, Nevada. Represents approximately 400 tons of dump material. This mine shows more oxidation than the others and this should show up in the test work."

Size range 4" to fines

Total weight 50 pounds

In the same letter, Mr. Kline also stated:

"Due to the length of time since these mines have been worked the underground workings are not open for sampling at this time, but think the samples shipped represent what might be expected from underground mining. The Hollywood mine was open from 1940 to this Spring but closed recently. Mr. Fred Dakin and myself examined this in May of this year."

Testing

Each sample (3) was crushed to -1" and was then screened at 10 mesh. A representative portion of each -1" /10 mesh fraction was removed for separation in heavy liquids. Weighted portions of the -1" /10 mesh and the -10 mesh fractions were then recombined to form composite ores for preliminary flotation tests.

Due to the fact that the ores were prepared prior to the receipt of Mr. Kline's letter, and that the instruction sheet placed inside the bag with Sample No. 2 was stuck to the webbing and therefore overlooked, the two parts of this sample were not sampled separately for assay before being combined for testing.

Discussion - Separation in Heavy Liquids

The test results show that the ores from the Southerland and Mitchell mines responded very favorably to separation in Heavy Liquids. The antimony minerals contained in the ore from the Hollywood Mine were more finely disseminated through the gangue which resulted in a lower grade of concentrate and a lower overall recovery.

The results obtained in testing the -1" /10 mesh fraction of the Southerland ore show that 86.1% of the antimony contained in this size fraction reported as sink in a specific gravity of 2.80. This product assayed 35.41% Sb and constituted 39.6% of the weight of this fraction.

In testing the Mitchell ore, 89.2% of the antimony contained in the -1" /10 mesh fraction was recovered as sink in 2.80 which assayed 37.23% Sb. This product constituted 44.4% of the weight of this fraction.

From the Hollywood ore, the sink in 2.80 assayed 30.17% Sb. This product constituted 33.8% of the weight of the -1" /10 mesh fraction and contained 77.3% of the antimony from this material.

The above remarks do not take into consideration the antimony contained in the -10 mesh fractions which were not separated in heavy liquids.

Flotation of Composite Ores

Flotation test indicate that Cyanamid Reagent 404 was, in general, more effective than Reagent 301 (Xanthate) for the recovery of the antimony minerals from these ores. Tests in which this reagent was used gave the following results:

Southerland - 67.5% recovery with 71.96% Sb grade

Mitchell - 63.1% recovery with 60.63% Sb grade

Hollywood - 63.0% recovery with 45.01% Sb grade.

These tests were of a preliminary nature only, but panning of the flotation tailings indicated that fair recoveries of the sulfide mineral had been obtained with all of the ores. No attempt was made to recover the non-sulfide antimony min-

COPY

page 3.

erals as this would require a more extended investigation.

Respectfully submitted,

(signed) C. Marsh

C. Marsh

St. Louis, Missouri
January 7, 1948

Test 1 - 1 Sample No. 1 Southerland Mine
Separation in Heavy Liquids

	<u>% Wt.</u>		<u>Assay</u> <u>% Sb</u>	<u>Sb Dist.</u>	
	<u>Size</u>	<u>Total</u>		<u>Size</u>	<u>Total</u>
Ore		100.0	15.84		100.0
-10 mesh		19.2	13.95		16.9
-1" /10 mesh					
H. L. Head	100.0	80.8	16.29	100.0	83.1
Sink 2.85	35.8	28.9	37.72	82.8	68.8
Sink 2.80	3.8	3.1	13.87	3.3	2.7
Sink 2.75	7.8	6.3	10.06	4.8	4.0
Sink 2.70	7.5	6.1	5.86	2.7	2.3
Float 2.70	45.1	36.4	2.30	6.4	5.3

Recapitulation

Sink 2.85	35.8	28.9	37.72	82.8	68.8
Float 2.85	64.2	51.9	4.35	17.2	14.3
Sink 2.80	39.6	32.0	35.41	86.1	71.5
Float 2.80	60.4	48.8	3.75	13.9	11.6

Test 2 - 1 Sample No. 2 - Mitchell Mine
Separation in Heavy Liquids

	<u>% Wt.</u>		<u>Assay</u> <u>% Sb</u>	<u>Sb Dist.</u>	
	<u>Size</u>	<u>Total</u>		<u>Size</u>	<u>Total</u>
Ore		100.0	19.56		100.0
-10 mesh		10.1	28.69		14.8
-1" /10 mesh					
H. L. Head	100.0	89.9	18.53	100.0	85.2
Sink 2.85	36.7	33.0	41.37	82.0	69.8
Sink 2.80	7.7	6.9	17.28	7.2	6.2
Sink 2.75	5.2	4.7	8.08	2.3	1.9
Sink 2.70	6.8	6.1	7.69	2.8	2.4
Float 2.70	43.6	39.2	2.44	5.7	4.9

Recapitulation

Sink 2.85	36.7	33.0	41.37	82.0	69.8
Float 2.85	63.3	56.9	5.28	18.0	15.4
Sink 2.80	44.4	39.9	37.23	89.2	76.0
Float 2.80	55.6	50.0	3.61	10.8	9.2

page 5.

Test 3 - 1 Sample No. 3 - Hollywood Mine
Separation in Heavy Liquids

	<u>% Wt.</u>		<u>Assay</u>	<u>Sb Dist.</u>	
	<u>Size</u>	<u>Total</u>	<u>% Sb</u>	<u>Size</u>	<u>Total</u>
Ore		100.0	13.77		100.0
-10 mesh		7.1	23.46		12.1
-1" /10 mesh					
H. L. Head	100.0	92.9	13.03	100.0	87.9
Sink 2.85	27.2	25.3	33.76	70.6	62.0
Sink 2.80	6.1	5.7	14.27	6.7	6.0
Sink 2.75	6.5	6.0	11.49	5.7	5.0
Sink 2.70	11.3	10.5	8.64	7.5	6.6
Float 2.70	48.9	45.4	2.54	9.5	8.3

Recapitulation

Sink 2.85	27.2	25.3	33.76	70.6	62.0
Float 2.85	72.8	67.6	5.27	29.4	25.9
Sink 2.80	33.3	31.0	30.17	77.3	68.0
Float 2.80	66.7	61.9	4.44	22.7	19.9

Flotation Testing - General

Each ore had previously been crushed to -10 mesh and then riffled into 600 gram test charges.

Each test charge, as needed, was ground in a laboratory-size rod mill at 67% solids. Reagents were added to the grind, if considered desirable in the particular test being conducted.

The flotation tests were conducted in a laboratory-size Fagergren flotation machine at an initial dilution of approximately 22% solids.

Two tests were conducted on each of the three samples, with the grind being kept constant in all of the tests. Tests 1-2, 2-2 and 3-2 were conducted as follows:

Ground 10 minutes (to -100 mesh) with 4.0 #/t soda ash.
 Conditioned 3 minutes (in flotation machine) with

0.50 #/t lead acetate
 0.50 #/t Reagent 301
 0.22 #/t cresylic acid.

Time of flotation - 5 minutes.

In conducting tests 1-3, 2-3 and 3-3, Reagent 404 was used instead of Reagent 301. Fuel oil was also used in these tests but the excessive amount used

page 6.

resulted in over-floculation and a poor froth condition. These tests were conducted as follows:

Ground 10 minutes with:

4.0 #/t soda ash
0.50 #/t lead acetate
0.50 #/t Reagent H_2O_4
3.30 #/t light fuel oil (excessive amount)

The diluted pulp was conditioned one minute with 0.11 #/t cresylic acid in order to correct the froth condition brought about by an excessive amount of fuel oil. The time of flotation was 5 minutes.

Sample No. 1 - Southerland Mine
Flotation Tests

Test 1 - 2 With Reagent 301

	<u>% Wt.</u>	<u>% Sb</u>	<u>Sb Dist.</u>
Head (Calc.)	100.0	16.59	100.0
Concentrate	18.8	59.83	67.8
Tailing	81.2	6.58	32.2

Test 1 - 3 With Reagent H_2O_4

	<u>% Wt.</u>	<u>% Sb</u>	<u>Sb Dist.</u>
Head (Calc.)	100.0	18.12	100.0
Concentrate	17.0	71.96	67.5
Tailing	83.0	7.09	32.5

Sample No. 2 - Mitchell Mine
Flotation Tests

Test 2 - 2 With Reagent 301

	<u>% Wt.</u>	<u>% Sb</u>	<u>Sb Dist.</u>
Head (Calc.)	100.0	22.68	100.0
Concentrate	14.3	67.36	42.5
Tailing	85.7	15.22	57.5

Test 2 - 3 With Reagent H_2O_4

	<u>% Wt.</u>	<u>% Sb</u>	<u>Sb Dist.</u>
Head (Calc.)	100.0	20.94	100.0
Concentrate	21.8	60.63	63.1
Tailing	78.2	9.87	36.9

Sample No. 3 - Hollywood Mine
Flotation Tests

Test 3 - 2 With Reagent 301

	<u>% Wt.</u>	<u>% Sb</u>	<u>Sb Dist.</u>
Head (Calc.)	100.0	13.86	100.0
Concentrate	12.9	51.03	47.5
Tailing	87.1	8.35	52.5

Test 3 - 3 With Reagent 404

Head (Calc.)	100.0	12.64	100.0
Concentrate	17.7	45.01	63.0
Tailing	82.3	5.68	37.0