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An investigation in concentrating a certain tailing on Wilfley tables

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AN INVESTIGATION IN CONCENTRATING A CERTAIN TAILING ON WILFLEY TABLES.

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AN INVESTIGATION IN CONCENTRATING A CERTAIN TAILING ON WILFLEY TABLES.

The object of this investigation was to determine the adaptibility to concentration on a Wilfley table of a certain tailing carrying silver, lead, and zinc.

The material was from the tailing dump of the Red Elephant Mine , operated by the Danaher Mining and Milling Company, of Hailey, Idaho, who are now considering treating this material if it can be done economically.

The material shipped to us for thisinvestigation is evidently, to a great extent, a jig tailing product, as over 67 % of it was found to be larger than 12 mesh, grading from very fine material to pieces 1 inch in diameter. The valuable content consists of zinc, lead, and silver. The two former occuring as the sulphides, sphalerite and galena, the silver being associated with the galena. The gangue material is quartz and iron, chiefly as pyrite, slthough there is a little siderite found.

The material was carefully sampled and assayed with the following results:

Silver	6.45 oz. per ton.
Zinc	3.35 %
Lead	1.50 %
Iron	6.50 %
Silica	66.60 %

A screen analysis was then made and the products of each screen assayed. The results are given in the following table.

Mesh		Wgt.	Assay.			
Thru	On	%	Ag	Zn	Pb	SiO
	6	37.81	7.08	3.26	0.75	67.50
6	12	29.58	5.44	3.50	1.10	66.30
12	24	14.90	5.08	3.25	2.25	65.90
24	35	6.53	5.32	3.50	2.50	64.30
35	48	2.96	5.40	3.55	2.60	66.80
48	65	1.87	5.40	3.30	3.05	62.30
65	80	0.82	5.92	3.30	2.80	68.40
80	100	1.23	7.08	3.24	3.25	66.00
100	150	1.27	9.48	3.50	3.10	61.30
150	200	0.83	14.04	3.22	3.25	66.30
200		2.20	19.08	2.26	3.50	66.80

The first test in concentration was made on the material finer than 24 mesh and gave fair results. The coarse material was then crushed through 24 mesh and concentrated but with very poor results.

Crushing to 30 mesh gave no better results and examination of the crushed material under a microscope showed that the crushing was not fine enough to release the contained values.

Small amounts of the material were then taken and crushed to various sizes to determine, if possible the size at which the maximum amount of valuable material was freed for concentration. The results showed that, while fine crushing released the values, crushing finer than 40 mesh caused the silver and lead to slime so badly that it was impossible to recover them on a Wilfley table.

It was accordingly decided to crush through 40 mesh and try the effect of treating classified and unclassified feed on the table.

One hundred pounds of the material was crushed through 40 mesh and concentrated. The run resulted in 3.34 pounds of concentrate, practically a 30 to 1 concentration.

The amount of valuable material recovered in the concentrate was very small and the percentage of recovery was too low to be economical as is shown in the table on the following page.

Unclassified feed to Wilfley Table.

Feed.- 100 pounds through 40 mesh.

Concentrate.- 3.34 pounds.

	Assays. Ag (oz)	Zn (%)	Pb (%)
Feed.	6.45	3.35	1.50
Concentrate.	24.06	23.50	6.32
Middlings.	5.08	2.17	0.91
Tailing.	2.14	1.55	0.72
Slime.	6.04	1.14	2.17

Percentage of total values recovered in the concentrates was as follows:

Silver	28.00 %
Zinc	52.60 %
Lead	31.70 %

An equal amount of the material was then crushed through 40 mesh and classified in a six spigot hydraulic classifier the resulting products being as follows:

Spigot.	Weight of Product.	Assay of Product. Ag (oz)	Zn (%)	Pb (%)
No. 1	14#	5.70	6.10	1.30
No. 2	20#	6.40	5.20	1.49
No. 3	10#	5.25	4.10	1.24
No. 4	8#	5.50	3.20	1.03
No. 5	12#	5.60	2.10	1.17
No. 6	16#	6.00	1.25	1.29
Overflow	20#	9.27	1.00	2.39

These products were then concentrated with the following results:

Spigot No. 1.

	Ag (oz)	Zn (%)	Pb (%)
Feed.	5.70	6.10	1.30
Concentrate.	22.60	33.30	6.17
Middling.	5.20	2.00	0.73
Tailing.	0.725	1.325	0.39

Percentage of total values recovered in the concentrate was as follows:

Silver	56.70 %
Zinc	78.10 %
Lead	67.80 %

Spigot No. 2.

	Ag (oz)	Zn (%)	Pb (%)
Feed.	6.40	5.20	1.49
Concentrate.	21.20	20.00	4.39
Middling.	5.60	1.40	0.84
Tailing.	2.08	1.54	0.54

Percentage of total value recovered in the concentrate:

Silver	66.25 %
Zinc	77.00 %
Lead	49.30 %

Spigot No. 3.

	Ag (oz)	Zn (%)	Pb (%)
Feed.	5.25	4.10	1.24
Concentrate.	18.80	18.00	2.80
Middling.	9.08	4.00	0.75
Tailing.	0.27	2.16	0.33

Percentage of total value recovered in the concentrate:

Silver	55.70 %
Zinc	65.95 %
Lead	30.30 %

Spigot No. 4.

	Ag (oz)	Zn (%)	Pb (%)
Feed.	5.50	3.20	1.03
Concentrate.	19.36	16.00	4.50
Middling.	7.10	3.00	0.81
Tailing.	2.09	1.40	0.32

Percentage of toatal value recovered in the concentrate:

Silver	44.00 %
Zinc	62.50 %
Lead	60.80. %

Spigot No. 5.

	Ag (oz)	Zn (%)	Pb (%)
Feed.	5.60	2.10	1.17
Concentrate.	23.40	8.00	4.50
Middling.	3.00	1.00	0.39
Tailing.	1.40	0.83	0.26

Percentage of total value recovered in the concentrate:

Silver	69.70 %
Zinc	63.50 %
Lead	64.20 %

Spigot No. 6.

	Ag (oz)	Zn (%)	Pb (%)
Feed.	6.00	1.25	1.29
Concentrate.	22.30	5.00	5.18
Middling.	3.00	4.00	1.08
Tailing.	1.16	3.75	0.35

Percentage of total value recovered in the concentrate:

Silver	69.70 %
Zinc	75.00 %
Lead	75.40 %

The results of the investigation as a whole were unsatisfactory, while one or two of the runs made on classified material gave a fair recovery of the values contained, the total amount recovered was very low and the amount lost in the slimes exceptionally large. These values contained in the slime are a total loss as attempts to recover them on tables and slimers were absolute failures.

Also the values recovered in the concentrate were combined silver, lead, and zinc and, before the product could be marketed, it would be necessary for the zinc to be separated from the lead and silver by some method. After this was done the finished products would have to be shipped to a smelter some distance from the mine. The combined costs of treatment, freight, and smelter charges would be more than the values recovered would warrant,

We therefore draw the conclusion that this material cannot be profitably treated on Wilfley tables or by other means of water concentration, Some other method must be found if it is ever expected to treat this material at a profit.