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OTTAWA



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MINES BRANCH INVESTIGATION REPORT

IR 73-2

January, 1973

GOLD LOSSES IN THE TREATMENT OF A PLACER
DEPOSIT IN THE ASHCROFT AREA
OF BRITISH COLUMBIA

by

T. F. Berry

Mineral Processing Division

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GOLD LOSSES IN THE TREATMENT OF A PLACER DEPOSIT
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SUMMARY OF RESULTS

The sluice-box tailing sample submitted for investigation had a calculated head analysis of 1.185 oz Au/ton.

Barrel amalgamation on a sample of the tailing recovered 99.7 per cent of the gold, thereby establishing that the gold in the tailing was free.

Subsequent table concentration tests resulted in gold recoveries as high as 98.7% in a concentrate assaying 17.08 oz Au/ton.

The removal of magnetic iron from a table cleaner concentrate gave a final concentrate assaying 54.33 oz Au/ton with a recovery of 97.6%.

*Technical Officer, Non-Ferrous Minerals Section, Mineral Processing Division, Mines Branch, Department of Energy, Mines and Resources, Ottawa, Canada.

INTRODUCTION

In a letter dated November 2, 1971, Mr. R. Orr, 1425 Nation Crescent, Prince George, B.C., asked the Mines Branch in Ottawa to investigate the reason why the sluice-box tailing from the treatment of a gold-bearing placer sand contained fine and apparently free gold in excess of 50% of the gold in the feed.

Mr. Orr stated that very fine flakes of gold could be seen washing over the riffles in the sluice box. He asked that the investigation be centered on gravity concentration methods, specifically tabling, to determine the maximum gold recovery possible.

Shipment

A 20-lb sample of dry sluice-box tailing sand was received in Ottawa from Mr. Orr and work commenced on May 18, 1972.

DETAILS OF INVESTIGATION

Test 1 - Barrel Amalgamation

A 1000 g sample was riffled from the tailing sample. This sample was amalgamated for 1 hour with 20 ml of new mercury and 0.5 g of CaO. The mercury-amalgam was separated and assayed for gold. The amalgamation residue was assayed for gold.

| <u>Product</u> | <u>Weight g</u> | <u>Assay</u> | <u>Distribution %</u> |
|----------------------|-----------------|--------------|-----------------------|
| Amalgamation residue | 998.5 | 0.004 oz/ton | 0.3 |
| Mercury-amalgam | - | 40.4 mg* | 99.7 |
| Feed (calcd) | - | 1.185 oz/ton | 100.0 |

* Equivalent to 1.181 oz Au/ton feed.

Test 2 - Cyanidation Tests

Two 1000 g samples of tailing were riffled out and at a dilution of 2:1 were cyanided for 24 and 48 hours at a solution strength of 1.0 lb NaCN and 1.0 lb CaO/ton. The results were as follows:

Test 2A - Cyanide residue - 0.014 oz/ton - 98.8% Ext.

Test 2B - " " - 0.008 oz/ton - 99.3% "

The extraction in each case was calculated by difference based on the calculated barrel amalgamation head assay of 1.185 oz/ton.

Test 3 - Gravity Concentration

A sample weighing approximately 1700 g was carefully jigged in a Denver laboratory jig. The jig tailing from this test was tabled on the sand deck of a laboratory Deister table. The results were as follows:

| Product | Wt % | Assays | Distribution, % |
|--------------|-------|-----------|-----------------|
| | | Au oz/ton | Au |
| Jig conc | 9.6 | 13.46 | 97.6 |
| Jig bed | 7.8 | 0.28 | 1.6 |
| Table conc | 2.2 | 0.27 | 0.4 |
| Table tail | 80.4 | 0.005 | 0.4 |
| Head (calcd) | 100.0 | 1.32 | 100.0 |

Test 4 - Gravity Concentration

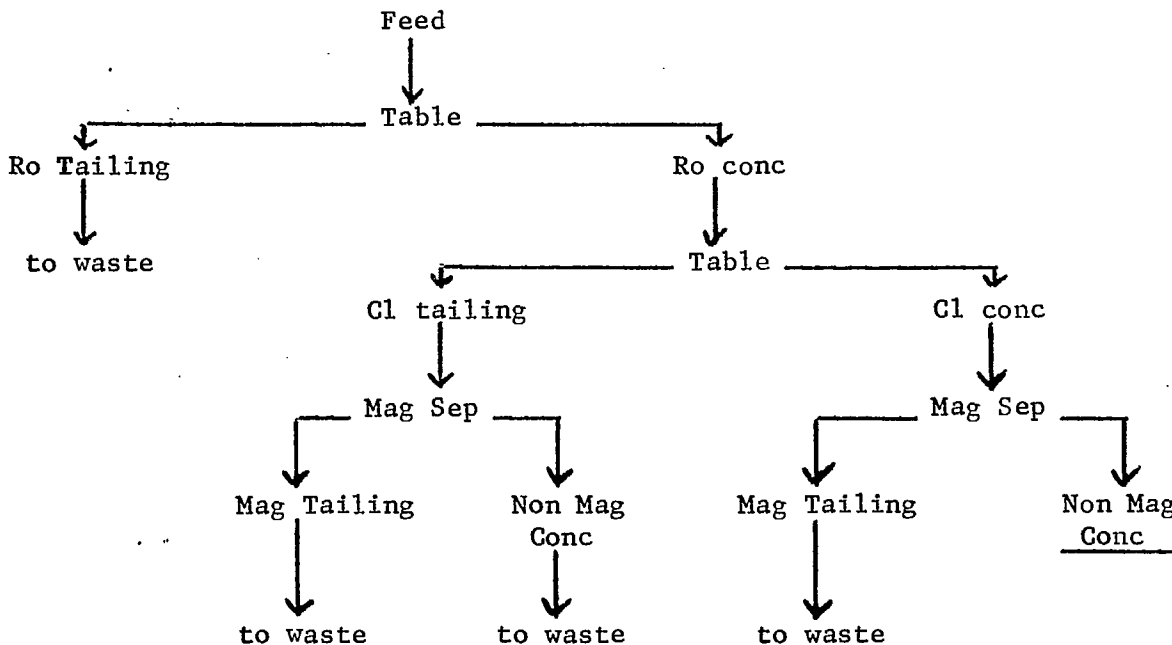
A sample of tailing weighing about 1700 g was tabled on the sand deck of a Deister laboratory table. A rougher concentrate was removed which was retabled producing a cleaner concentrate and a cleaner tailing. The results were as follows:

| Product | Wt % | Assays | | Distribution, % | |
|------------------|-------|-----------|-------|-----------------|-------|
| | | Au oz/ton | Fe, % | Au | Fe |
| Table cl conc | 6.6 | 17.08 | 45.26 | 98.7 | 43.8 |
| Table cl tailing | 16.0 | 0.09 | 14.20 | 1.3 | 33.3 |
| Table ro tailing | 77.4 | trace | 2.02 | - | 22.9 |
| Head (calcd) | 100.0 | 1.14 | 6.82 | 100.0 | 100.0 |

Note: Trace - 0.005 oz Au/ton

Test 5 - Gravity Concentration and Magnetic Separation

Test 4 was repeated with a sample weighing approximately 4300 g and the cleaner concentrate and cleaner tailing were subjected to magnetic separation to remove the iron using a small drum type magnetic separator. A flow sheet for this test was as follows:



The results of Test 5 were as follows:

| Product | Wt % | Assays | | Distribution, % | |
|---------------------------|-------|-----------|--------|-----------------|-------|
| | | Au oz/ton | Fe, % | Au | Fe |
| Non-mag conc from cl conc | 2.2 | 54.330 | 41.12 | 97.57 | 12.8 |
| Mag tail from cl conc | 2.0 | 0.007 | 63.57 | 0.01 | 18.0 |
| Table cl conc (calcd) | 4.2 | 28.46 | 51.81 | 97.58 | 30.8 |
| Non-mag conc from cl tail | 5.4 | 0.221 | 22.43 | 0.97 | 17.1 |
| Mag tail from cl tail | 1.5 | trace | 59.02 | - | 12.5 |
| Table cl tail (calcd) | 6.9 | 0.172 | 30.38 | 0.97 | 29.6 |
| Table ro conc (calcd) | 11.1 | 10.880 | 38.49 | 98.55 | 60.4 |
| Table ro tail | 88.9 | 0.002* | 3.15** | 1.45 | 39.6 |
| Head (calcd) | 100.0 | 1.220 | 7.07 | 100.00 | 100.0 |

*More than one assay ton used to obtain this result.

**Calculated on head sample analysis of 7.07 % Fe.

CONCLUSIONS

A gold recovery in excess of 98% was readily obtained by careful tabling of the placer sand.

The table concentrate contained a considerable quantity of magnetite and it is this mineral which is the probable cause of the lost gold. In a sluice-box operation, magnetite, being very heavy, would settle into the riffles, packing very hard and thus result in a loss in operating efficiency.

A drum-type magnetic separator placed ahead of the sluice box would probably be beneficial. If this is impracticable due to the tonnage involved, then a frequent cleaning of the riffles is indicated.

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