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PRELIMINARY REPORT
on the
POTENTIAL VIABILITY
of
PROCESSING AURIFEROUS TAILINGS
from the
NICKEL PLATE MINE
HEDLEY, BRITISH COLUMBIA

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SUMMARY

An estimated 2.8 million tons of auriferous tailings deposited between 1904 and 1961 at Hedley, British Columbia, contain economically significant values in gold, silver, cobalt, and copper metals. The estimated gross value of the contained metals is 111 million dollars (Canadian).

Of primary interest is the recovery of gold from the tailings. Metallurgical bench-test work has shown that recoveries of the order of 85 percent have been realized provided that the tailings are reground to the order of 10 microns.

Successful application of a multi-stage countercurrent carbon-in-pulp-cyanidation process to the reground tailings could potentially see gold and silver recoveries of the order of 90 percent or better. Should this level of recovery be attainable, an operating profit of 48 million dollars is not an unrealistic expectation. A feasibility study which would largely consist of pilot mill evaluation work should not cost more than \$250,000 which represents a profit to risk ratio of 192 to 1.

HISTORY and INTRODUCTION

A summary of gold production from two mining operations on Nickel Plate Mountain, Hedley, British Columbia from 1904 to 1961 is given:

<u>Mine</u>	<u>Period</u>	<u>Tons Processed</u>	<u>Recovered Au (oz/ton)</u>
Nickel Plate	1904 - 1929	1,226,000	0.525
Nickel Plate	1934 - 1955	1,975,597	0.394
French	1950 - 1955	32,463	0.800
French	1957 - 1961	52,463	0.505
Hedley Mascot	1936 - 1949	686,625	0.370
	TOTAL	3,973,148	

Two tailings ponds which received tailings from the Nickel Plate and French deposits are owned by North American Minerals Recovery Ltd., and are estimated to contain 2.8 million tons.

Sampling of the tailings by various parties from 1970 onward resulted in the following average assays:

<u>Operator</u>	<u>Average Au (oz/ton)</u>	<u>Method</u>
Noranda Mines Limited	0.0316	Becker Hammer Drill with Air Lift
Aureola Mines Limited	0.0593	Power Driven Rotary Auger
North American Minerals Recovery Ltd.	0.307	Various
J.M. Ashton & Associates	0.046	Surface Pits

Noranda used a Becker Hammer Drill with an air lift. Today this procedure would not be satisfactory because of loss of heavy particle material. Aureola used a power driven rotary auger which is more acceptable. A Hawker-Siddeley ultrasonic type drill which is the most efficient as there is total core recovery with minimal sample disturbance would be recommended for future evaluation. Notwithstanding, a bulk sampling procedure by trenching would be the best procedure to follow.

A review of comments made in a 1937 Canadian Institute of Mining and Metallurgy publication suggests that gold recoveries of the order of only 80 to 90 percent were experienced during the operating periods 1904 to 1929, and 1934 to 1937. An 80 percent recovery during the first operating period, 1904 to 1929, and a 90 percent recovery during the second operating period, 1934 to 1955 would result in the tailings containing an average gold content of 0.077 ounces per ton. A 90 percent recovery over both periods would result in the tailings containing an average of 0.0494 ounces gold per ton. The average of these two values is 0.0632 ounces gold per ton. Therefore it is a reasonable expectation that the auger drilling results of Aureola Mines is close to the actual gold content of the tailings.

In the original ore, native gold occurs mostly within dense arsenopyrite. Grain analysis (C.I.M.M., 1937) indicated that 63.9 percent of the gold consisted of grains less than 6 microns in size.

Other metals of economic importance are found in the tailings. Of two composite drill hole samples assaying 0.047 and 0.075 ounces gold respectively, the lower grade sample had the following assay of other metals of economic significance:

<u>Element</u>	<u>oz/ton</u>	<u>lbs/ton</u>
Gold, Au	0.047	
Silver, Ag	0.090	
Copper, Cu		0.60
*Cobalt, Co		0.50

* Not sampled for previously. Composite from writer's surface pits.

ESTIMATED GROSS VALUE OF METALS

The gross dollar value of the tailings is estimated from metal prices as of March, 1983.

<u>Element</u>	<u>oz/ton</u>	<u>Tons</u>	<u>Ounces</u>	<u>\$ (U.S.)</u>
Au	0.059	2,800,000	165,200	69,714,000
Ag	0.090	2,800,000	252,000	2,772,000
	<u>lbs/ton</u>		<u>Pounds</u>	
Co	0.50	2,800,000	1,400,000	17,500,000
Cu	0.60	2,800,000	1,680,000	1,260,000
				<hr/>
			TOTAL (U.S.)	91,246,000
			TOTAL (CAN)	111,275,000
				<hr/>

METALLURGY

Work by Noranda Mines Limited in 1974 when gold was priced at \$ 185.00 per ounce showed that fine grinding of tailings followed by flotation and then cyanidation resulted in the following grind versus gold extraction results for the Hedley tailings:

<u>Tests Made</u>	<u>Grind (microns) 80% Passing</u>	<u>Head Au (oz/ton)</u>	<u>Recovery (%)</u>
2	13.0	0.070	68.1
6	13.5	0.082	80.1
3	8.0	0.048	84.8

METALLURGICAL PROCEDURE

The U.S. Bureau of Mines, The Anglo American Corporation and others have developed several new and very efficient procedures for recovering substantial amounts of gold from tailings and other low grade gold sources. One of these procedures is known as the " Carbon-In-Pulp-Cyanidation " process, and it or a modification thereof should have direct application to the Hedley tailings.

This process is particularly successful in recovering gold and silver from ore pulps containing substantial amounts of slimes which will be the case at Hedley because of the very fine grind required. A typical flow diagram is attached which shows a single-stage carbon cyanidation, however in this case a multi-stage countercurrent cyanidation procedure would necessarily be employed to obtain high carbon loading for

maximum efficiency. After cyanidation is complete, the loaded carbon is removed from the barren pulp by screening and sent to desorption for gold-silver recovery. The barren carbon is re-cycled to treat additional cyanide pulp. The gold-silver can be electro-won.

POTENTIAL OPERATING INCOME

Total Production -	2,800,000 Tons
Average Contained Gold -	0.059 oz/ton
Recovery -	90 Percent
Gold Price -	\$514.00 (CAN)/oz
Operating Cost -	\$10.00/Ton

Total Sales Revenue -	\$ 76,421,000
Total Operating Cost -	28,000,000

Operating Income	
Before Taxes -	\$ 48,421,000

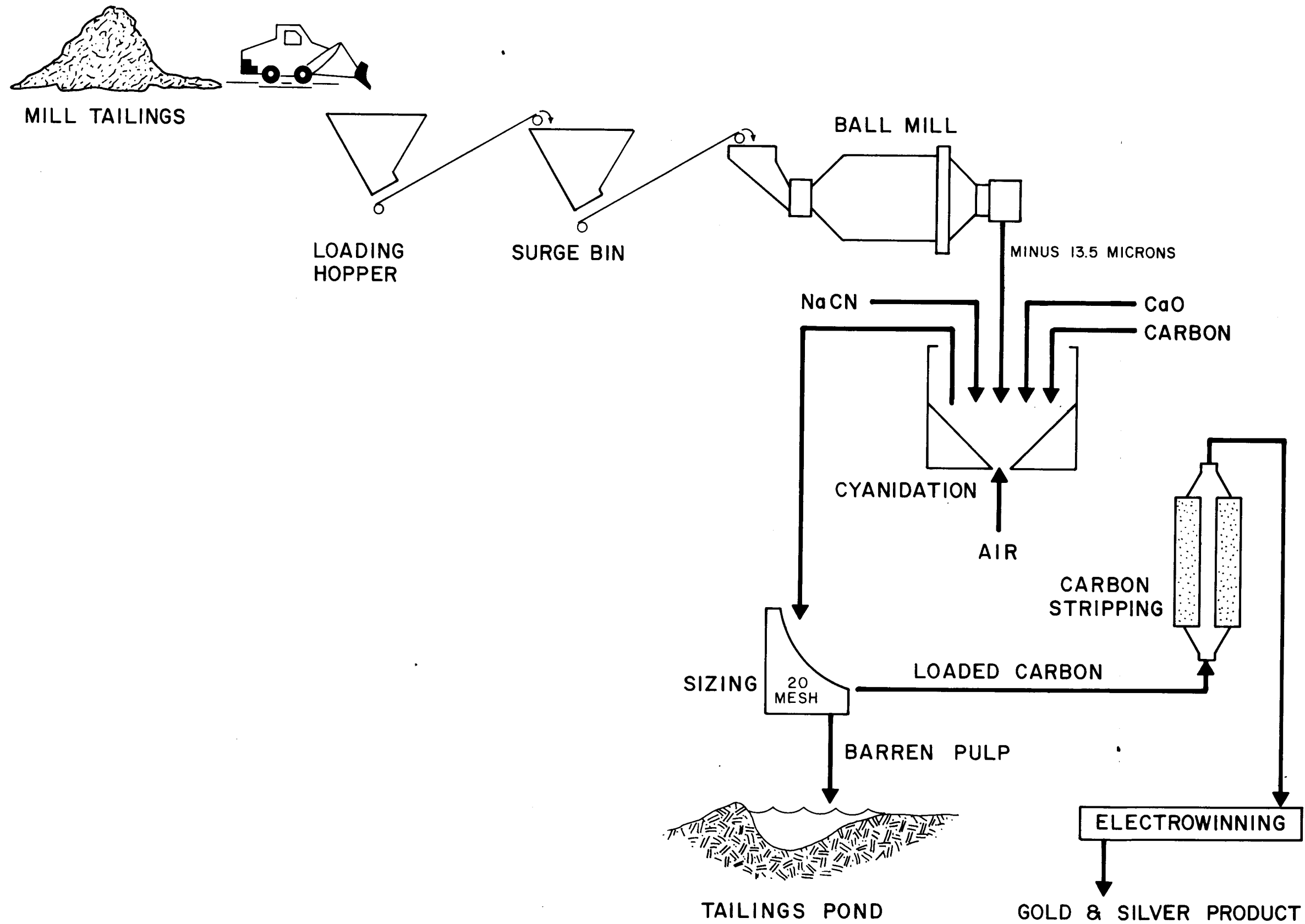
APPENDIX II

GENERAL TERMS OF AGREEMENT

FOR

REPROCESSING THE TAILINGS AT HEDLEY, B.C.

1. Upon signing an Agreement, the Purchaser shall pay to the Vendor the sum of \$25,000. An annual payment of \$15,000.00 shall be made to keep the Agreement in good standing until production proceeds exceed this amount.
2. The Purchaser shall make a production commitment within two years from the signing of the Agreement between Vendor and Purchaser, otherwise the rights to the tailings shall be returned to the Vendor.
3. Only upon committing to process the tailings will the Purchaser earn an equity in the tailings. The Purchaser's equity shall be 60 percent with the Vendor retaining the balance of 40 percent.
4. The 'net profits' of the operation shall be distributed in accordance with the respective equities. The definition of 'net profits' shall be as mutually agreed.
5. The Purchaser shall be responsible for all costs involved in test work, process development, and feasibility, and plant: and the operation of the plant and marketing of the products therefrom. A minimum annual expenditure for the pre-production period shall be required in order to maintain the Agreement in good standing.



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