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Summary Report on the
Lillooet River Alluvial Deposits
British Columbia

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LILLOET RIVER ALLUVIAL DEPOSITS
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INTRODUCTION

This report has the purpose to summarize the informations made available to us on a group of placer mining leases which cover approximately 34 miles of the Lillooet River Valley in the New Westminster Mining Division, British Columbia, Canada.

A group of local private companies, Zyrox Mining Co. Ltd., Aurox Mining Co. Ltd., and Garibaldi Alluvial Mines Ltd., holds title to a total of 80 contiguous placer mining leases.

Fourteen leases, held by Zyrox Mining Co. Ltd., have been optioned to Chemalloy Minerals Ltd. of Toronto. Under the agreement Chemalloy has the right to earn 55% interest by providing \$300,000 to carry out pre-production metallurgical tests. Chemalloy has then to provide approximately \$5,000,000 to bring the property into production.

The property of Garibaldi Alluvial Minerals, consisting of ten leases covering a surface of approximately one square mile, is offered for option to any financially sound mining company. The terms of the agreement have not been finalized by Garibaldi Alluvial Mines Ltd.

The informations contained in this report are taken from internal reports by Dr. Skov, President of the three mentioned companies, from a report by G.L. Kirwan, Mining Geologist (see Reference List), and are at the same time a condensation of several discussions with the officers

of the above three companies and with research personnel involved in the project.

The writers did not visit the property. They visited, however, a commercial refinery in Vancouver which conducted considerable research work on the assaying and extraction of the precious metals present in the placer sands.

PROPERTY

The group of placer leases is located between the northern end of Harrison Lake and the southern end of Lillooet Lake, along the Lillooet Valley, some fifty miles north-east of Vancouver. The leases cover the bottom of the valley which is 1300 ft. to 2600 ft. wide. The valley floor is occupied by unconsolidated alluvial sands to a depth of 100 ft. plus, containing the precious metals.

Access from Vancouver is possible by road via Squamish-Pemberton for a total distance of 100 miles, or by road to Harrison Hot Springs and then by boat on Harrison Lake. An airstrip at the southern end of the property can accommodate light aircraft, while float-planes can land on Harrison Lake.

GEOLOGY

The Lillooet River drains an area of approximately 2000 square miles, underlain by acid to intermediate intrusives, sedimentary and volcanic rocks, of Mesozoic Age. Basic

and ultrabasic intrusives also occur in the area and they are considered to be the primary source of the precious metals. Minor gold occurrences in place are known in the drainage area.

The placer deposit consists of alluvial sands. The estimated tonnages are reported to be "25 million tons of alluvial sand material" underlying each lease to "depth 100 ft. from surface" (Kirwan's report, pp. 3-4). The drainage system is still very active and new detrital material is being continuously added to the Harrison delta.

The sands contain variable amounts of the following metals: gold, silver, platinum, plus erratic occurrences of metals of the platinum group. The precious metals are present in sub-microscopic size; this explains the late discovery of the deposit and probably also the considerable difficulties encountered in the analysis of the metal contents (see later chapter).

WORK PERFORMED ON PROPERTIES

The leases have been surveyed subsequent to their staking; therefore, the status of the leases' boundaries is well-established and the mining rights protected.

Twenty vertical Becker drill holes, 100 ft. deep, have been carried out on the properties, namely 18 on Zyrox ground, one on Garibaldi Alluvial Mines ground and one

further to the northwest. Bedrock was not intersected by any of the 20 holes. This adds further potential to the estimated tonnages which are already considerably large. The sands gained through the drilling programme served as raw material for a number of analytical and metallurgical investigations.

PRECIOUS METALS CONTENTS

Considerable effort and moneys have been and are currently being spent by the owners of the properties, though the first results were very discouraging.

i) The sands were firstly analysed by conventional methods. Both the standard fire assay and atomic absorption, however, showed only traces of gold and silver in the sands. The writers submitted a number of drill hole samples for analysis to a commercial laboratory in Vancouver. The analyses, carried out by atomic absorption, showed only traces of Au and Ag.

ii) Samples from the 18 drill holes of the Zyrox property were assayed by Robert E. Craig Laboratory, Sun Valley, California. No information was supplied to us with respect to the particular assay technique used. From these assays G.L. Kirwan calculated an average gold and silver value of "\$10.73 per ton at today's prices (\$35.00/oz. Au and \$1.80/oz. Ag) for the first 50 ft., while from 50 ft. to 100 ft. averaged \$16.90 per ton, the values increasing substantially with depth. Competency of the Craig Laboratory

was established by Mining Consultants, Ford, Bacon and Davis, Inc., New York City" (Kirwan's report, pp 4-5).

iii) Delta Smelting and Refining Co. Ltd. of Richmond, B.C., is working on the assaying and recovery of the precious metals from the Lillooet sands since 1968. During the research work carried out by Delta the following results were obtained subsequently:

- a) Standard fire assay using different fluxes yielded up to 0.5 oz. precious metal per ton (one assay ton).
- b) Fire assay with 20 assay tons. The detected amounts increased surprisingly by a factor of 2 to 3, using the following fluxes:

Litharge	25.6 g	24.5 g	32.5 g
Borax	7.7 g	11.0 g	18.1 g
Lime	6.4 g	4.2 g	-
Soda Ash	44.9 g	30.0 g	-
Sodium Bicarbonate	-	6.0 g	28.9 g
Silica	15.4 g	11.8 g	7.2 g
Flour	-	2.5 g	3.3 g
	<u>90.0 g</u>	<u>90.0 g</u>	<u>90.0 g</u>

The following results were obtained:

Samples:

- a) 1200 lbs. random samples at surface
- b) 248 lbs. drill holes material
- C₁ and C₁₁) ? swamp (eastern part of lease)

Samples were ball milled to -200 mesh.

Results:

		Average breakdown *			
No. of Assay Tons	Average	Samples	Gold	Silver	Platinum
1 20	0.14 0.561	a)	74.3%	24.5%	0.70%
1 20	0.553 0.930	b)	89.6%	9.7%	Trace %
1 20	0.227 0.3826	C ₁)	65.0%	34.2%	0.37%
1 80 to 388.8	0.437 1.453	C ₁₁)			

oz/ton
Total precious metals

* Analysis by Warnock Hersey International Ltd.

c) Laboratory work was later carried out on a bulk sample consisting of "about a ton of surface material made up of batches taken from areas all over Zyrox leases; about 1/2 ton of Drill Hole Core material from five drill holes representing a cross section of Zyrox properties down to 25 feet" (Zyrox, internal report).

Delta was able to recover the following bulk of precious metals by means of bulk smelting:

Surface material: .73 oz/ton (or gross-value \$20.12)
Drill holes material: .93 oz/ton (or gross-value \$25.64)

The precious metal ingots, analysed by Coast Eldridge of Vancouver, contained:

76.35% Au
23.28% Ag
0.36% Pt

d) The latest bulk smelting is reported to have recovered

the following average values:

0.782 oz.Au/ton and 3.61 oz.Ag/ton.

These values, as well as the values reported under c), are well in excess of the already mentioned assay values by Robert Craig Laboratory.

iv) Results have been recently obtained from Atolia Research and Testing Laboratory in California. This laboratory used a new technique to recover soluble precious metals salts using a selective chelating resin which acts as ion exchanger. The technique is patented in U.S.A. (see reference list). The resin has been tested by the U.S. Bureau of Mines (see reference list): the report on the investigation is positive with respect to the specific resin's qualities.

The Atolia Laboratory reports a recovered 0.5 oz.Au/ton and 4.1 oz.Ag/ton. These contents are supposed to represent only the soluble fraction (mineral-salts), thus, they must be added to the contents recovered by smelting.

v) Cyclasizer, infrasizer, and electromagnetic separation of the sand is currently investigated by Cyclone Engineering Ltd., Edmonton, and Rapid Magnetic Ltd., Birmingham, England. Goal of these studies is to find a possible way to concentrate the precious metals into a fraction and to eliminate interfering elements.

ECONOMIC ASPECTS

From the results of the above discussed research work it appears that the alluvial sands of the Lillooet Valley contain precious metals in considerable amounts, at least .5 oz.Au/ton, taking into account only the fire assay results obtained by Delta Laboratory.

The owners of the property indicate "mining and recovery costs on a production rate of 2,000 tons per day should not exceed \$3.00 per ton and probably will be about \$2.00".

Kirwan states other, probably more realistic figures: "Based upon results of research to date but with many variables yet to consider, the indicated all-inclusive cost to process the Lillooet sands would be in the range \$5.00 to \$8.00 per ton". (Kirwan's report, p. 6).

It is important to note that further plans on the Zyrox property, optioned to Chemalloy, call for installation of a pilot plant on the property. This plant would apply the resin process and thus recover only the soluble portion of the precious metals in the sands. The tailings would be stockpiled and processed later through the best metallurgical process that will result from the studies currently being carried out.

CONCLUSIONS

The writers are of the opinion that the Lillooet alluvial deposits represent a very attractive prospect. If the future research work will substantiate the presently

indicated precious metal contents, and if recovery can be achieved on an industrial and economic basis, which seems to be feasible, then the deposit with its conspicuous tonnages would result in a very profitable operation.

The ten Garibaldi leases, now made available for option, appear to us as a promising prospect worth a more detailed consideration.

REFERENCE LIST

G.L. Kirwan: Appraisal of the Lillooet River Alluvium British Columbia. May 25, 1970.

Zyrox Mines Ltd.: Various Internal Report Analyses. 1970

G. Schmuckler: U.S. Patent 3,473,921, Method of Recovery of Noble Metals. Filed Jan. 6, 1969.

U.S. Bureau of Mines: R.I. 7358, Properties of an Ion Exchange Resin with High Selectivity for Gold, by T.E. Green and S.L. Law. 1970.

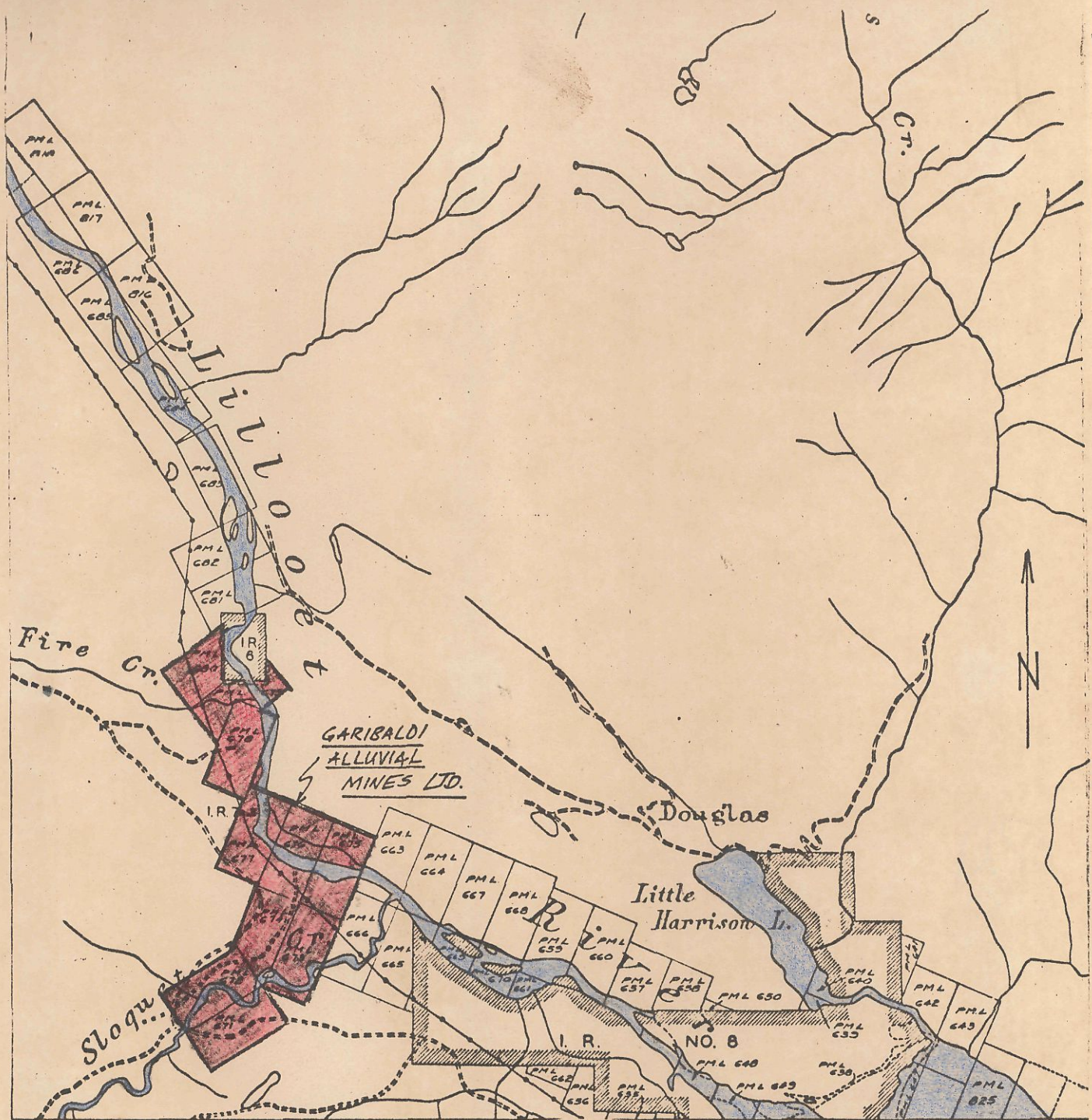
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MINERAL CLAIM MAP 92G/16E(M)Placer

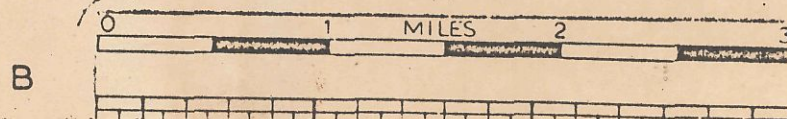


Fig. 1. Location of leases owned by Garibaldi Alluvial Mines. Note: indicated boundaries very approximate.