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PRELIMINARY REPORT

CAROLIN MINES LTD. 924/3

INTRODUCTION

On ~~December~~^{January} 4, 1983, consultant Ivor Watson informed us that Ocelot Industries Ltd. is seeking a purchaser of its 22¹/₂% interest in the Ladner Creek, B.C. gold mine of Carolin Mines Ltd. and the joint venture exploring various holdings adjacent to the mine. On ~~December~~^{January} 10, 1983, Watson supplied us with a series of mining and geological sections through the mine, a June 1981 evaluation report by Wright Engineers, some background notes (attached hereto) and miscellaneous other data including two geochemical maps of the exploration area. Ivor's contact with Ocelot is John Gunton, Manager, Mineral Exploration and Mining.

Reasons given for the desire to sell are disenchantment with the management of the mine (Carolin Mines Ltd.) and the slow progress being made on the exploration side. From discussions with others, there are deeper reasons but for purposes of this exercise the data will be reviewed on an "as received basis" to see if further investigations are warranted.

LOCATION

The mine is in the Cascade Mountains, 20 kms. northeast of Hope, B.C. at an elevation of 850 metres. It's located geologically in the Coquihalla Gold Belt comprising the old Emancipation, Aurum, Georgia No. 2, Pipestem, Idaho and other prospects. The Idaho Zone is the focus of current mining activities.

GEOLOGICAL CONTEXT

Most of the Coquihalla gold prospects, including the Idaho Zone, lie within Ladner Group (L-M Jurassic) sediments east of the Hozameen Fault which separates the Ladner Group from a 60 km long band of ultramafic rocks striking north-northeast (see GSC Map 12-1969, Paper 69-47).

IDAHO ZONE

Ore occurs in quartz veins associated with steep faults and gently dipping replacement zones in greywacke. Ore zones are not striking, sulphide content is low (avg. 3%) and gold values are scattered throughout the zone. Mining blocks are defined by assay walls.

The deposit comprises a series of lenses with generally 20° plunges northwards and varying from 50 to 200 metres in length and 10 to 100 metres in vertical height. Grouped together the lenses are contained within a structurally controlled, northerly plunging zone (20°), 50 metres in horizontal width (easterly), 100 metres in vertical height and 420 metres downplunge (northerly).

MINING METHODS

Trackless mining equipment is used to extract ore by long hole stoping methods with tracked main haulage tramping. Main access is via two drifts 80 metres apart on the 900 and 820 levels from which up and down spiral ramps, at inclinations of 15%, are driven to establish draw points and drilling sub-levels. Because of the plunging tubular shape of the overall zone, the workings extend 700 metres N-S by only 100 metres E-W. Mining is proceeding from the northern part of the zone, southerly up the 20° plunge.

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Stopes are backfilled with deslimed tailings and cement and the plan is to mine all pillars eventually to give 100% recovery of ore. Each stope is individually designed because of the variability in size and shape of the individual ore lenses.

MILLING METHODS

Crushing is carried out underground. The gold is recovered by primary flotation to produce a bulk concentrate assaying about 1.8 ozs/ton gold. This is then subjected to conventional cyanide leaching and gold precipitation by the Merrill-Crowe process. Since milling started in November 1981 recoveries were well below expectations but it is reported that major refinements have increased recoveries from 30% to 70% as of November 1982 and further gradual improvement is expected.

The environmentally sensitive location of the tailings disposal area and reported cyanide leakage therefrom caused a 10 week closure of operations during official investigations of the situation. Apparently the problems have been overcome and operations have resumed and no further investment in the facility are foreseeable for the next five years.

The designed milling rate is 1500 tpd with a potential of 1800 tpd with 5% downtime.

ORE RESERVES

The latest figures were supplied by Gunton (see background notes referred to earlier) effective December 2, 1982:

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In place diluted:	
Proven @ 0.08 cutoff	906,000 tons @ 0.135 ^{Au} ozs/ton
Proven @ 0.05 cutoff	429,000 tons @ 0.100 ozs/ton
Drill indicated @ 0.05 cutoff	<u>366,900 tons @ 0.106 ozs/ton</u>
TOTAL:	<u>1,702,500 tons @ 0.117 ozs/ton</u>

The ore zone is relatively narrow in overall horizontal width (50 metres) but plunges 20° into a steep hillside. Exploration drilling terminated downplunge when both surface and/or underground drilling became very costly. While downplunge continuation of ore is distinctly probable, verbal reports indicate lower grades in recent drilling in this area - something to check carefully in view of the absolute necessity to prove more ore (see later).

OWNERSHIP SITUATION (SEE BACKGROUND NOTES ATTACHED)

The mine is managed by a committee of 4 Aquarius Group members and 3 Carolin Mines members but is operated by Carolin.

The ultimate ownership is Carolin 50% and Aquarius Group 50% (including Ocelot's 22½%.)

Total investment of all currently participating parties is \$49.54 million broken down under the following headings:

	<u>MILLIONS OF DOLLARS</u>		
	<u>OCELOT</u>	<u>ALL OTHERS</u>	<u>TOTAL</u>
Exploration/Feasibility	.41	3.13	3.54
Construction/Development	9.00	11.00	20.00
Overruns	5.86	20.14	26.00
TOTAL	15.27	34.27	49.54

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Although we have no details, Ocelot arranged its share of the financing through the Royal Bank and has apparently a \$15.6 million loan outstanding at a floating interest rate. Current interest charges are \$169,000 per month which infers an annual interest rate of 13.00%. We understand that Ocelot also guaranteed an additional \$2 million in financing.

The payback formula is described in the background notes attached and involves the allocation among the 5 parties of the first \$73 million in net cash flow. This figure is \$23.5 million greater than the \$49.5 million investment because some of the parties have been bonused for putting up more than their fair share of the cost overruns.

After the first \$73 million cash flow, cash flow is allocated in proportion to each party's interest.

The exploration joint venture is apparently controlled by Ocelot which has a 40% interest. Any deal on this aspect alone could involve the right to operate and control it.

TENTATIVE OFFER

According to Watson, Ocelot is willing to sell its interest in the mine for the following consideration:

- new party assumes the \$15.6 million loan outstanding
- new party assumes the additional \$2 million loan guarantee
- new party pays Ocelot \$7 million cash or in securities of equivalent value.

Carolyn have a right of first refusal on Ocelot's interest so there is always the risk that the interested new party is merely forcing the hand of Carolyn into exercising its rights.

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ECONOMICS

It should be clearly understood that this assessment is a very preliminary one based on the scant information received, much of which is out of date, and some vague guesstimates. Also, we must assume that mill recoveries will improve and Carolin's teething problems will be solved if the situation is to appear at all attractive. The objective of this valuation is two-fold:

- assess the economics without becoming enmeshed in time consuming sessions with the vendors and mine operators - this can come later if the first study is promising.
- see whether a duplicate orebody is worth looking for in the exploration joint venture which can be dealt with separately from the mine interest.

Certainly current operating statistics would be interesting to come by but will give little indication of how they can be improved. Detailed work at the mine is required to decide that.

We have assumed the basic parameters described in Table "A" and assessed the economics in Tables "B" and "C" at gold prices of \$500 and \$600 U.S. per oz. respectively.

The parameters assumed are very optimistic yet the resulting analysis is dismal.

At \$500 U.S. gold, Ocelot will not repay its back loan and interest through mining the current ore reserves - after 39 months the reserves will be depleted (including pillars!) and \$2.7 million will remain to be paid off, assuming 13.0 interest on outstanding debt prevails during this period.

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At \$600 U.S. gold, Ocelot will repay its loans and net about \$4.2 million cash with a present value of \$2.3 million at a discount rate of 20%.

CONCLUSIONS

1. The Ocelot offer is unacceptable. Even at \$600 U.S. gold, its interest in the mine would only be worth 2.3 million at best, assuming everything goes without a hitch during the next 3 to 4 years.

2. The reserves are grossly inadequate to service the investment which suffered 130% in overruns.

3. Further expansion of reserves down plunge will involve costly development, possibly involving a new haulage level and lowering of the crusher to that level. A major investment would be necessary.

4. Lower grades with depth have been indicated in recent exploratory work.

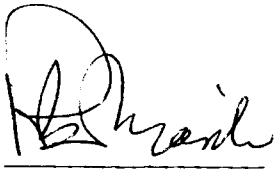
5. The configuration and gentle plunge of the orebody is complex and not ideally suited to long hole sub-level stoping. We very much doubt that the modest operating costs, amounting to bulk mining costs, will be achieved.

6. The future efficient operation of the tailings pond is still in doubt. Tailings have to be pumped to a head of several hundred feet from the mill, in alpine terrain with very cold winters.

7. If the Idaho Zone is typical of ore bodies in the Coquihalla Gold Belt, further exploration seems unattractive from a new, third party perspective but might be essential to those already with an investment in the mine.

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I will inform Ivor Watson that we do not want to follow-up his
overture and the data will be returned.

A handwritten signature in cursive script, appearing to read "R.A. Dujardin", written in black ink. The signature is positioned above a horizontal line.

R.A. Dujardin

January 19, 1983

TABLE "A"

BASIC PARAMETERS

Reserves (diluted) Proven & Indicated	:	1,702,000 tons @ 0.117 oz/ton
Milling rate (as designed)	:	1500 tons per day
	:	525,000 tons per year
Present life of mine (current reserves)	:	3.24 yrs or 39 months
Ultimate mill recovery "hoped-for"	:	83%
Present mill recovery (verbal)	:	70%
Operating costs (1982 dollars)	:	\$23.45/ton (1983), \$24.60 (1984,85) \$24.90 (1986) as estimated in Wright Engineers Report, June 1981 and NOT actual cost data 1982 (assumed abnormal)
Capital investment (excl. exploration & feasibility)	:	\$46 million <u>before</u> interest
Ocelot's share of capital investment	:	\$14.86 million
Ocelot's share of total investment	:	\$15.27 million
Ocelot's current loans	:	\$15.60 million
Ocelot's current interest rate	:	13.00%
Payout formula re cash flow:		
First \$26.0 million Ocelot's share	:	22.5%
Next \$2.62 million Ocelot's share	:	0
Next \$20.92 million Ocelot's share	:	45.0%
Next \$23.52 million Ocelot's share	:	30.0%
Thereafter Ocelot's share	:	22.5%
Gold Prices (\$1 U.S. = \$1.225 C)	:	\$400 U.S. \$490 C \$450 U.S. \$551 C \$500 U.S.* \$612 C \$550 U.S. \$674 C \$600 U.S.* \$735 C

TABLE "B"

CASH FLOW FORECASTS

(\$000's)

Au @ \$500/oz. U.S.

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Ore Milled (000 tons)	525	525	525	127
Gold Grade (ozs/ton)	0.117	0.117	0.117	0.117
Plant Recovery (%)	83	83	83	83
Gold Production (ozs)	50,983	50,983	50,983	12,330
Gold Price (Cdn. \$/oz)	612	612	612	612
Gross Revenue (no escalation)	31,201	31,201	31,201	7,548
Operating Costs (1982 dollars)	12,311	12,915	12,915	3,162
Operating Profit at Mine Site	18,890	18,286	18,286	4,386
Payout of first 26,000	18,890	7,110	-	-
next 2,620	-	2,620	-	-
next 20,920	-	8,556	12,364	-
next 23,520	-	-	5,922	4,386
<u>Ocelots Share</u> 1st 26,000 (22½%)	4,250	1,600	-	-
next 2,620 (0)	-	-	-	-
next 20,920 (45%)	-	3,850	5,564	-
next 23,520 (30%)	-	-	1,777	1,316
Thereafter (22½%)	-	-	-	-
Yearly totals	4,250	5,450	7,341	1,316

Ocelots debt repayment schedule:

Loan at start of year	15,600	13,378	9,667	3,583
Interest during year @ 13%	2,028	1,739	1,256	466
Repayment at end of year	4,250	5,450	7,341	1,316
Carried forward	13,378	9,667	3,583	2,733
Project R.O.R. Operating Profits v. Capitalised Debt				7.4%

TABLE "C"

CASH FLOW FORECASTS

Au @ \$600/oz. U.S.

(\$000's) except where stated

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Ore Milled (000 tons)	525	525	525	127
Gold Grade (ozs/ton)	0.117	0.117	0.117	0.117
Plant Recovery (%)	83	83	83	83
Gold Production (ozs)	50,983	50,983	50,983	12,330
Gold Price (Cdn. \$/oz)	735	735	735	735
Gross Revenue (no escalation)	37,472	37,472	37,472	9,064
Operating Costs (1982 dollars)	12,311	12,915	12,915	3,162
Operating Profit at Mine Site	25,161	24,557	24,557	5,903
Payout of first 26,000	25,161	839	-	-
next 2,620	-	2,620	-	-
next 20,920	-	20,920	-	-
next 23,520	-	178	23,342	-
<u>Ocelots share</u> first 26,000 (22½%)	5,661	189	-	-
next 2,620 (0)	-	-	-	-
next 20,920 (45%)	-	9,414	-	-
next 23,520 (30%)	-	53	7,002	-
Thereafter (22½%)	-	-	273	1,328
Yearly totals	5,661	9,656	7,275	1,328
<u>Ocelots debt repayment schedule:</u>				
Loan at start of year	15,600	11,967	3,867	-
Interest during year at 13%	2,028	1,556	503	-
Repayment at end of year	5,661	9,656	4,370	-
Carried forward	11,967	3,867	-	-
<u>Ocelots net cash flow (before taxes)</u>	-	-	2,905	1,328
NPV @ 15% cumulative	-	-	1,910	2,669
NPV @ 20% cumulative	-	-	1,681	2,322
Project R.O.R. Operating Profit v. \$15,600 cap. debt (before taxes)				22½%
Project R.O.R. Oper. Profit less interest v. \$15,600 debt (before taxes)				11¼%

oil, a bulk rougher concentrate totalling 6 percent by weight of the feed is recovered in four 300-cubic-foot (8.5-cubic-meter) flotation cells. The metallurgical testwork showed only 91 percent of the gold was recovered by flotation, and therefore, 50 percent more retention time than was actually used in the laboratory tests was designed into the circuit. The slurry is scavenged in four 300-cubic-foot (8.5-cubic-meter) cells, and the scavenger concentrate is discharged back to the conditioner tank. Scavenger tailings are pumped to the tailings pond.

At this point all that remains is 100 tons per day of bulk concentrate assaying 1.8 ounces gold per ton. The flow-sheet now becomes typical of most small gold mill operations. Rougher concentrate reports to a 10-inch (250-millimeter) cyclone and the underflow goes to a 7 by 6-foot (2.1 by 1.8-meter) regrind mill for reduction to 98 percent minus-325-mesh. Regrinding is done with high-lime addition to neutralize the acid products formed by pyrrhotite, which would otherwise consume excessive cyanide. Fuel oil is also added in the regrind mill to deactivate any carbonaceous material in the concentrate. The ore body does contain minor amounts of graphite.

The reground and thickened pulp is agitated in leach tanks with cyanide reagent and dispersed air for 72 hours. Anticipated reagent consumptions are

1.28 pounds (0.58 kilogram) per ton sodium cyanide and 2.6 pounds (1.2 kilograms) per ton lime. Gold dissolution in the testwork was 91 percent for an overall recovery of 83 percent. Experience has shown that better recoveries can be achieved in a plant environment versus bench testing, and we believe that the 83 percent overall recovery predicted in the feasibility study is a conservative figure.

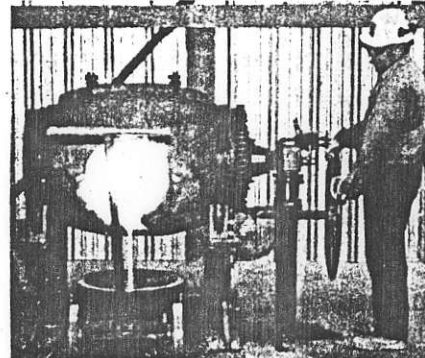
After it decants from the last leach tank, the pregnant solution is recovered in a 40-foot (12.2-meter) thickener as overflow. The thickener underflow is pumped to a primary 10 by 10-foot (3 by 3-meter) drum filter, where additional pregnant solution is recovered. The filter cake is repulped in barren solution and subsequently filtered in a secondary 10 by 10-foot (3 by 3-meter) drum filter. The filter cake is repulped and charged to tailings. All filtrates return to the pregnant solution thickener, where they are recovered as pregnant solution overflow. The overflow is pumped to a leaf clarifier to ensure the removal of finely divided, suspended solids, and passed through a deaeration tower. Zinc dust and lead nitrate are added to the deaerated solution and the gold-zinc precipitate is removed from the now barren solution by one of two 36-inch (0.9-meter) Perrin filter presses. The air dried gold-zinc precipitate is then fluxed and smelted to bullion in a single chamber, oil

fired, smelting furnace.

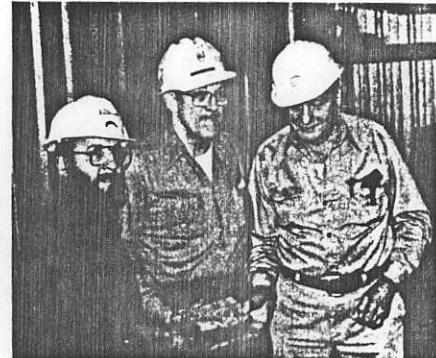
To avoid leach circuit contamination, a bleed from the barren stream must be continually removed. Cyanide must be destroyed prior to disposal of the solution to tailings. Carolin has elected to install an alkali chlorination system to oxidize and destroy cyanide. Chlorine gas is bubbled through the solution at a maintained alkaline pH. After retention in two 6 by 6-foot (1.8 by 1.8-meter) fiberglass tanks, the treated barren solution is passed through a carbon column for extraction of residual chlorine and other undesirable ions. In addition to its environmental advantage, it is felt that the carbon system will prove to be a profitable back-up for collecting gold not precipitated by zinc.

Solid tailings disposal is a significant operating cost. There are no downstream impoundment sites where effluent can be discharged by gravity from the mill.

The flotation tailings will not require any chemical treatment prior to disposal. However, it is proposed that the sand portion will be used as mine backfill, the need for which will not arise until early 1983. At that time, a backfill preparation plant will be required. This plant will consist of two stages of pumping and hydrocyclone classification. The coarse sands will be pumped to the mine and the overflow, comprising a product that is primarily fines, at approximately 17 per-



FIRST DORE BULLION BAR, left, was poured at the Carolin Mine on February 3, 1982, after ten years and \$C37,000,000. GOLD BRICK, right, is held by Rod Samuels, mill superintendent, Kelson Collins,



general manager, and Ted Worthington, consulting metallurgist. Mill output has already exceeded design capacity. Plans for the near future call for an output of some 300 ounces of gold per day.

cent by weight, will be delivered to the tailings pond.

Flotation and leach tailings are currently collected and pumped through a series of five 6 by 4-inch (150 by 100-millimeter) Warman pumps. A final discharge pressure of approximately 400 pounds per square inch (28 bar) boosts the tailings up a 6-inch (150-millimeter) pipeline through approximately 600 feet (183 meters) of head to the tailings impoundment area.

Tailings Containment

The tailings dam is an earthfill structure, constructed mainly of compacted boulder clay from a borrow pit local to the site. First stage construction includes a downstream zone of free draining shot rock, which will become a central chimney drain in the final design. The two zones are separated by filter cloth. In the summer and fall of 1981 approximately 350,000 cubic yards (270,000 cubic meters) of earthfill were placed on the dam to net one year of storage capacity. In the future, the dam will be raised annually to meet the production requirements.

Final dam crest will be 148 feet above the valley floor. It will require 1,140,000 cubic yards (872,000 cubic meters) of earthworks, which should provide 6½ years of tailings storage. This capacity will be substantially increased by implementing underground back filling. Seepage is controlled by a small downstream sump and pumping system. Pumps on a floating barge reclaim clarified water and pump it up to a head tank. From here the water flows by gravity back to the mill to meet much of the process water demand.

Make-up water for the process and

for fire storage is pumped from Ladner Creek. The potable water system is charged by a separate upstream infiltration gallery.

Inflation Causes Cost Overrun

The 1979 feasibility study estimated that the Idaho zone ore body could be brought into production at an estimated cost of C\$19,300,000 (\$15,600,000). The actual production cost was about C\$37,000,000 (\$30,000,000). It can be appreciated that there is a significant difference between those second quarter 1979 dollars and the dollar's current purchasing power.

Although a good portion of the overrun can be attributed to inflation, there have been other contributing factors. Most notable of these was a C\$1,242,000 (\$1,006,000) extra cost to place a 10-foot (3-meter) diameter, precast concrete culvert to divert Ladner Creek past the mill site. After backfilling with mine waste, the culvert placement provided much needed office and shop space as well as reducing the environmental impact of the possible silting of Ladner Creek. In addition, the change to underground crushing from surface crushing increased the final cost. The requirement to shotcrete both crusher rooms was another major expense not covered by this study.

The Carolin operation is now making a significant contribution to the economy of the Hope area and adds another 63,000 annual ounces to Canadian gold production. With favorable geology, encouraging exploration results, a strong management team, and no debt, Carolin Mines Ltd. looks to the future with enthusiasm.

