


 Major copper + gold + molybdenum porphyry deposit owned by BIG CREEK RESOURCES LTD.

 CASINO copper + gold ± molybdenum porphyry deposit under option to BIG CREEK RESOURCES LTD.

 Winter road

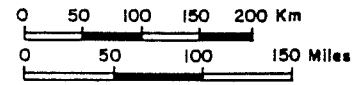
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

## LOCATION MAP

**BIG CREEK PORPHYRY COPPER BELT**

BIG CREEK RESOURCES LTD.

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The Yukon government has long recognized the significance of the Casino deposit and recently extended the Freegold Road as part of a road to resources program intended to eventually access the Casino property and other en route mineral and placer prospects.

Total road distance from Casino to deepsea loading facilities at Skagway, Alaska is 338 miles. The road from Carmacks to Skagway is paved and currently handles about twenty, 52 ton truck loads of concentrate per day from the Curragh lead-zinc mine.

## HISTORY

Although the Casino area has been actively explored for placer gold since 1912 and silver-lead-zinc veins since the 1930's, the porphyry deposit was unrecognized until 1968 because it is poorly exposed and deeply weathered.

Casino Silver Mines Ltd. was formed in 1965 and aggressively explored the silver-lead-zinc veins both on surface and underground. The Brynelsen Group acquired control of the company in 1967 and did grid soil sampling to explore the porphyry potential before optioning the property to Brameda Resources Ltd. in May 1969. During the period June 1969 to March 1970, Brameda conducted detailed geological mapping, IP and magnetic surveys, and 36,922 feet of diamond drilling in 49 holes (mostly BQ in size). A rotary drill was taken to the property in January 1970. It completed a total of 17,481 feet in 35 holes (5" in diameter) by August 1970 when exploration terminated. The first nine rotary holes were directed toward the best mineralization outlined by diamond drilling, with three of them twinning diamond drill holes to allow assay comparison of the two drilling methods. The last 26 rotary holes were mainly directed toward peripheral portions of the deposit.

In 1973, Teck Corporation acquired 38.4% of Casino Silver's stock and conducted 4,659 feet of diamond drilling in seven NQ size holes. Two holes were drilled to test the extent of a better than average grade area indicated by 1969 drilling while the remaining five tested selected areas within and peripheral to the main area of interest.

In 1985, the upper part of the deposit (leached cap) was optioned to Permian Resources Ltd. and Nordac Mining Corporation (now Big Creek Resources Ltd.) which conducted soil geochemical surveys, column tests and 19,360 feet of bulldozer trenching to explore its heap leach gold potential.

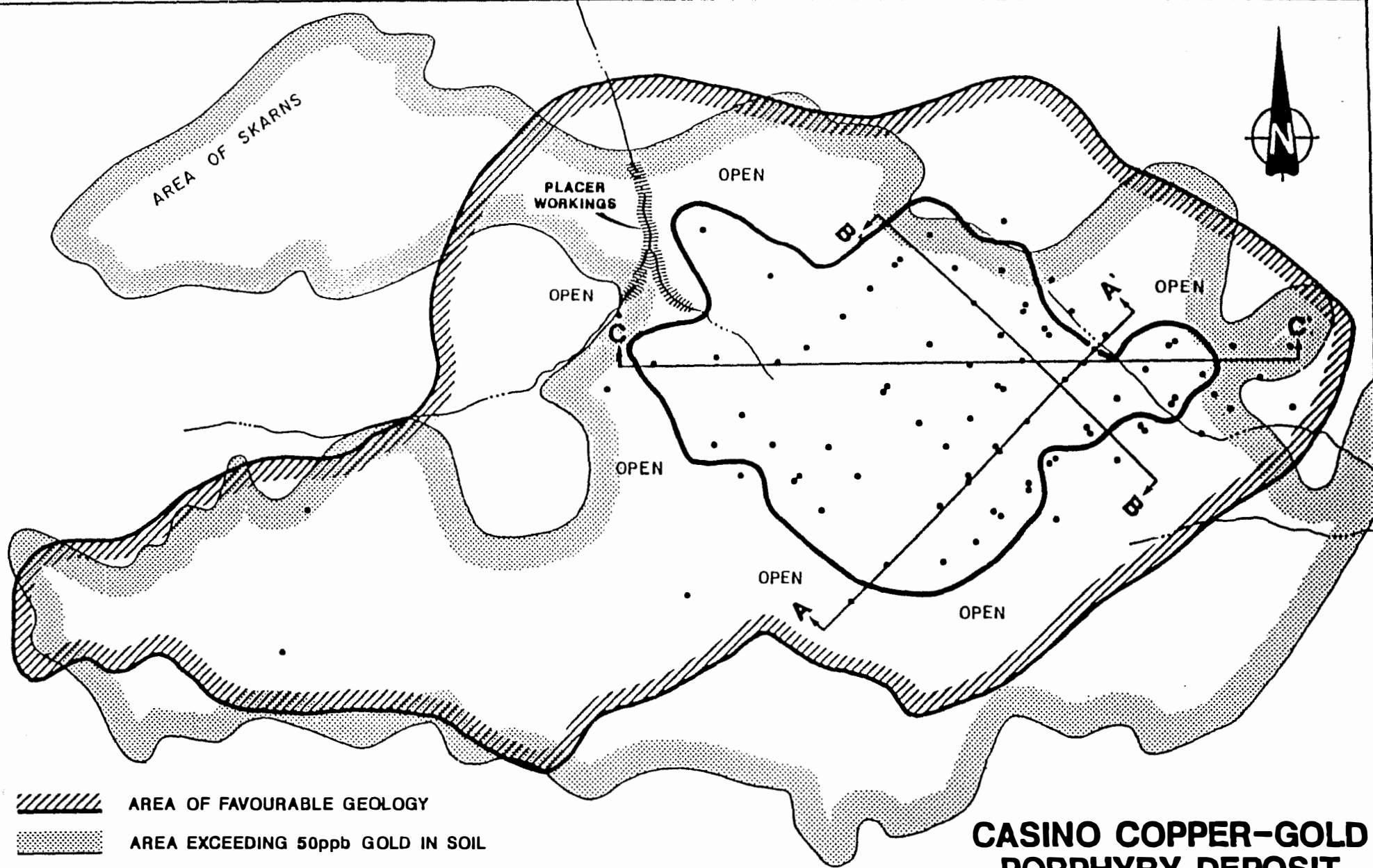
## GEOLOGY





The porphyry deposit is hosted by the Casino Complex, a volcanic and subvolcanic suite composed of rhyolite tuffs and related breccia pipes, dykes and porphyritic stocks. The complex is approximately 12,000 feet long by 6,000 feet wide and is dated at 70 million years. It intrudes or overlies Paleozoic metamorphic rocks and Triassic granodiorite. The map on the following page shows the approximate boundary of the Casino Complex, along with the outline of the deposit, drill hole locations and the area of anomalous soil geochemical response for gold.

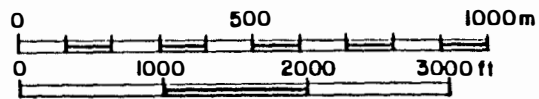
Mineralization occurs throughout the complex but appears to be best developed in and adjacent to breccia pipes, particularly within a 2000 by 1200 foot area near the southeast end of the complex. Hydrothermal alteration affects most of the complex and some of the surrounding wallrocks. It is concentrically zoned with a core of potassic alteration surrounded by less intense phyllic, argillic and propylitic facies.

The deposit has not been glaciated and this, coupled with a high degree of fracturing and permeability, has resulted in deep weathering and development of a classic Arizona-type porphyry with marked vertical zonation of copper. Gold and molybdenum, which are less mobile during surface weathering, do not show the same zonation. The uppermost zone is the leached cap from which the copper has been largely carried away by descending groundwater. It is underlain by an enriched or supergene zone where the dissolved copper has been redeposited as higher grade secondary minerals (primarily chalcocite) that usually replace or coat primary chalcopyrite and pyrite. At Casino, the leached cap ranges from 30 to 500 feet thick and the supergene-enriched zone averages about 250 feet thick. Grades in the supergene-enriched zone are about 1.7 times higher in copper than the primary mineralization it replaces. The deepest zone is referred to as the hypogene zone which consists of primary mineralization that has not been affected by surface weathering or supergene enrichment. The leached cap and supergene-enriched zone are presumed to have had copper grades identical to the hypogene zones before weathering and reprecipitation. The hypogene minerals consist primarily of pyrite, magnetite, chalcopyrite and molybdenite with traces of bornite and hubnerite. The bottom of the hypogene mineralization has not been identified and drilling has shown that it extends to at least 1400 feet below surface.

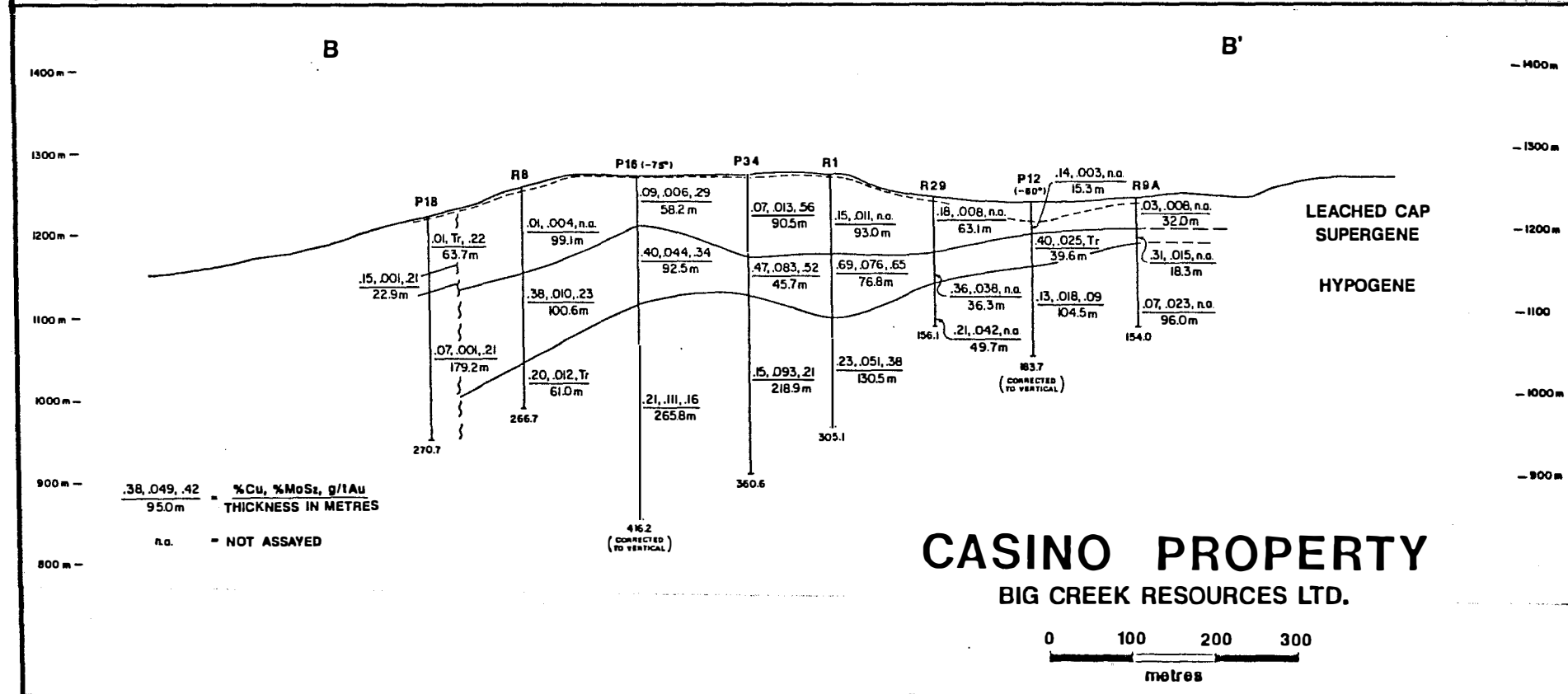
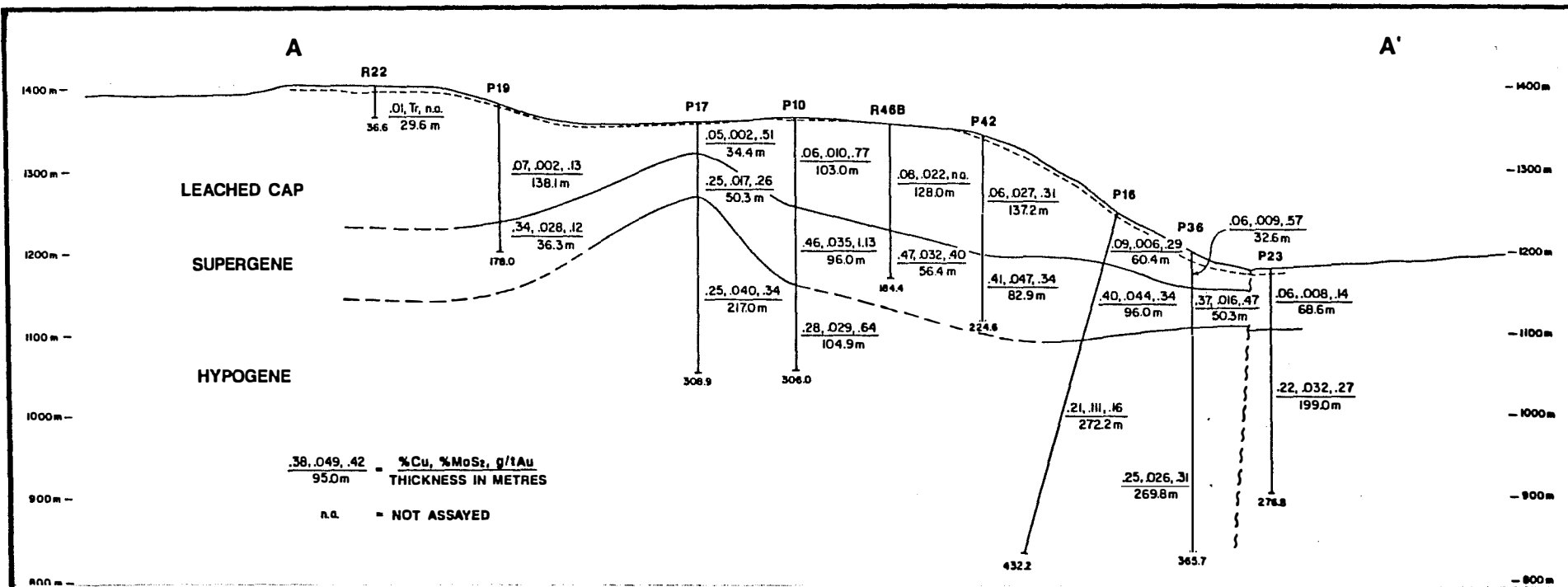
Three sections through the deposit appear on the following pages. These sections clearly demonstrate the enormous size of the system, the continuity of assays and the marked vertical zonation. They also show that the deposit is open to depth and in three directions laterally. Soil geochemical, ground magnetic and IP surveys have identified several promising targets on the periphery of the deposit that have not yet been drilled.

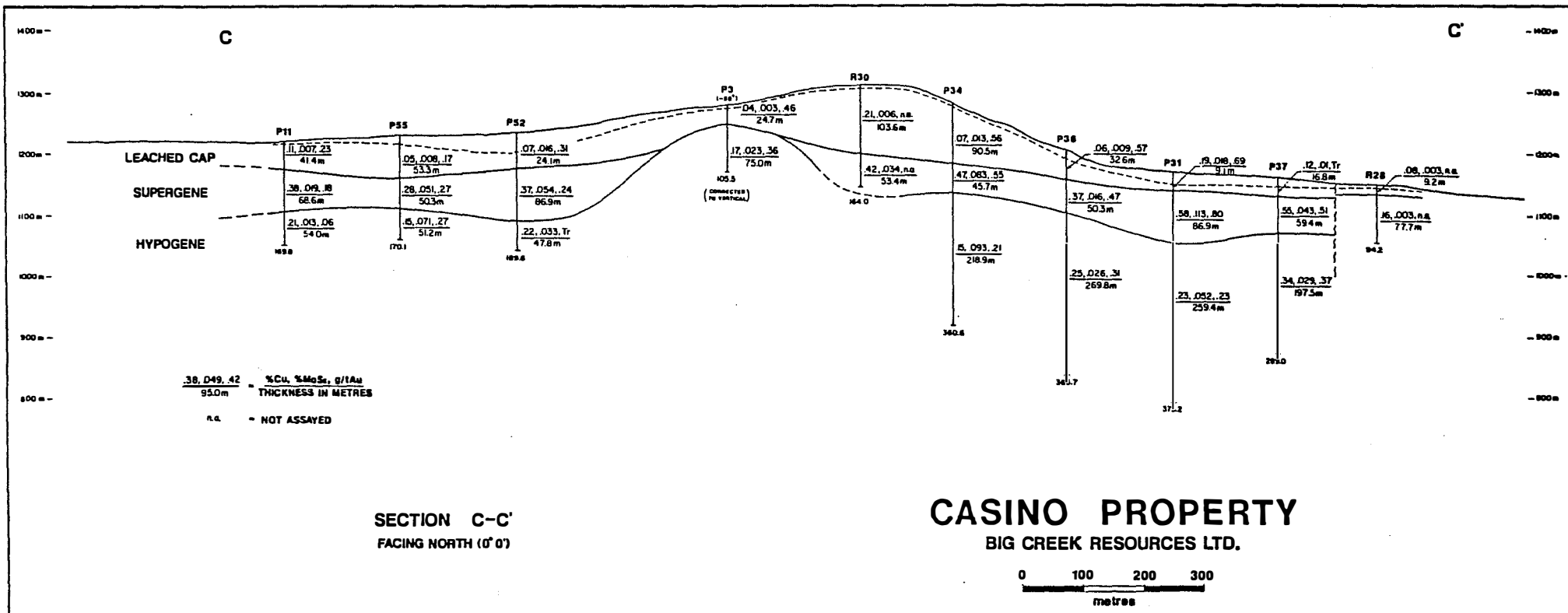


-  AREA OF FAVOURABLE GEOLOGY
-  AREA EXCEEDING 50ppb GOLD IN SOIL
-  379 MILLION TONNES TO 300m GRADING 0.3%Cu AND 0.038% MoS<sub>2</sub>
-  PRE-1992 DRILL HOLE



**CASINO COPPER-GOLD PORPHYRY DEPOSIT**  
**BIG CREEK RESOURCES LTD.**





RESERVES

In late March 1970 after completion of the diamond drilling and the first few rotary holes, mineral inventories were independently calculated by four consultants as follows.

<u>Consultant</u>	<u>Tons</u>	<u>Cu (%)</u>	<u>MoS2 (%)</u>	<u>Pit Depth (ft)</u>	<u>Approximate Stripping Ratio</u>
Chapman, Wood and Griswold	193,000,000	0.36	0.065	not specified	not specified
	629,000,000	0.33	0.053	not specified	0.55 to 1
	1,132,000,000	0.29	0.044	1400	0.15 to 1
Walter Clarke	272,000,000	0.27	0.035	1000	0.97 to 1
Colin Knight	427,900,000	0.27	0.037	1000	1.4 to 1
Archer Cathro	209,400,000	0.35	0.047	900	1.62 to 1

Average gold grades were not calculated by these consultants because the assay data was incomplete and the price was too low in 1970 for it to be a major factor in the economics of the deposit. Drill hole spacing over the deposit ranges from 400 to 800 feet; thus, most of the mineral inventory falls into a possible reserve category.

In 1991, Archer Cathro recalculated the mineral inventory using all of the drill data. This calculation integrated available gold assays and identified an area of higher grade supergene mineralization in the core of the deposit that could be mined during initial production. The 1991 mineral inventory is as follows.

	<u>Tons</u>	<u>Cu (%)</u>	<u>MoS2 (%)</u>	<u>Au (opt)</u>	<u>Pit Depth (ft)</u>	<u>Approximate Stripping Ratio</u>
	417,000,000	0.30	.038	0.010	1000	1 to 1*
including Hypogene	275,000,000	0.25	.040	0.009	1000	
Supergene	142,000,000	0.39	.033	0.011	500	
of which	71,000,000	0.46	.036	0.014	500	0*

\*Assumes the leached cap overlying the high grade supergene core contains enough recoverable gold to pay for its stripping.

Initial work on the deposit did not systematically evaluate its gold potential. Based on available data, the average gold content in the deposit is 0.010 opt; however, this estimate is almost certainly low for the following reasons. First, the gold assays were done on composite samples using lower analytical sensitivities and higher detection limits than are now used. These analytical procedures resulted in the majority of the assays being reported as trace (which were assigned a zero value in the estimation of average gold content). Second, and probably more important, most of the samples came from small diameter diamond drill holes which typically produced poor core recovery, especially in highly fractured and brecciated areas. Only eight rotary holes were assayed for gold and three of those twinned diamond drill holes so that

comparisons could be made between the two drill methods. Assays from the three rotary holes were significantly higher than the diamond drill holes with grade improvements averaging 37% for copper, 5% for molybdenum and 86% for gold.

Gold grades given in the 1991 mineral inventory are estimates because most of the rotary holes used in the inventory calculations were not assayed for gold. Grades in these holes had to be extrapolated from those in adjacent diamond drill holes. Gold assays are available for 68% of the tons in the supergene core and 52% of the tons in the leached cap overlying the supergene core. Assuming the unassayed material had a similar grade to the assayed material, both the supergene core and overlying leached cap average 0.014 opt gold. These average grades are supported by results from chip samples collected from 19,360 feet of bulldozer trenches cut over the deposit in 1985. The trenches averaged 0.013 opt gold over their entire length and 0.017 opt gold over a 1640 by 1300 foot area in the core of the deposit.

### METALLURGICAL TESTING

Preliminary metallurgical tests on drill core composites were carried out by the Colorado School of Mines Research Institute, Golden, Colorado; Britten Research Ltd. of Vancouver; and, Seymour Laboratories of North Vancouver. The Colorado School of Mines testing was done solely on supergene-enriched material and recovered 86% of the copper and 88% of the molybdenite by conventional flotation. Work by Britten was conducted on three types of mineralization: supergene; a mixture of supergene and hypogene; and, hypogene. These tests showed an average work index of 12.0 and flotation recoveries of at least 80% copper and 88% molybdenite in a concentrate grading 25% copper. Gold and silver were found to report with the copper with recoveries up to 88% for gold. Flotation tests on hypogene mineralization by Seymour gave recoveries of 90.7% copper and 93.7% molybdenite.

A 1985 column test of crushed leached cap material recovered 73% of the gold in twelve days with acceptable cyanide and lime consumption.

### ECONOMIC EVALUATION

#### PRODUCTION PARAMETERS

- Assume a 40,000 ton/day mining rate for a mine life of 28.6 years.
- Assume the 71,000,000 tons of high grade supergene ore is mined during the first 4.9 years. This material averages 0.456% copper, 0.036% MoS<sub>2</sub> and 0.0138 opt gold and is capped by 74,500,000 tons of leached material averaging 0.014 opt gold. Because the MoS<sub>2</sub> is much less significant than copper or gold, in subsequent calculations it has been converted to copper equivalents (at a factor of 1.3% MoS<sub>2</sub> to 1% copper). This brings the copper equivalent head grade to 0.50% (excluding gold values). Later mining will focus on the remaining 346,000,000 tons of combined supergene and hypogene ore grading 0.263% copper, 0.038% MoS<sub>2</sub> and 0.009 opt gold. The copper equivalent for copper plus molybdenum in this material is 0.31%.
- Assume stripping of the initial 71,000,000 tons of supergene enriched ore is paid for by heap leach recovery of gold from the leached cap, thereby reducing the effective stripping ratio for this stage of mining to zero.

- Then:

Year 0 to 4.9

- head grade 0.50% copper equivalent plus 0.0138 opt gold
- copper concentrate grade 25%
- copper recovery 85%
- gold recovery 80%
- copper produced per year = 62,050 tons
- copper concentrate per year = 248,200 tons (dry)
- gold produced per year = 161,184 oz
- gold grade of concentrate = 0.649 opt
- zero stripping ratio

Year 4.9 to 28.6

- head grade 0.31% copper equivalent plus 0.009 opt gold
- copper concentrate grade 20%
- copper recovery 90%
- gold recovery 80%
- copper produced per year = 40,734 tons
- copper concentrate per year = 203,670 tons (dry)
- gold produced per year = 105,120 oz
- gold grade of concentrate = 0.516 opt
- 1 to 1 stripping ratio

### CAPITAL COST

Current construction cost estimates for a 40,000 ton/day conventional milling operation (including allowances for the remote location where applicable) are as follows:

<u>Item</u>	<u>Description</u>	<u>Cost Million \$ Can.</u>
Access road*	- initial road access	5.0
Plant site	- excavations, piping, concrete	8.0
Primary crusher	- 60" x 89"	10.0
Coarse ore stockpile		6.0
Conveying		7.0
Concentrator		85.0
Water systems		6.0
Shops and warehouse	- including tools and equipment	10.0
Change house		2.0
General office		2.0
Assay lab		1.0
Miscellaneous buildings		2.0
Power supply	- 31 miles of transmission lines	5.0
	- substations and distribution	3.0
	- 50 MW coal plant	50.0
Open pit equipment**	- 3x27 cu yd electric shovels	15.0
	- 13x195 ton haulage trucks	19.5
	- 3x12.5" blasthole drills	3.0
	- dozer, graders, etc.	3.0
	- service vehicles	3.0

<u>Item</u>	<u>Description</u>	<u>Cost</u> <u>Million \$ Can.</u>
Pre-stripping		5.0
Tailing dam	- initial construction	5.0
	- pond preparation	2.0
	- pipeline and reclaim system	5.0
Port facilities	- concentrate storage facilities in Skagway	5.0
Accommodation	- 150 single person accom. and recreation	5.0
Transportation	- employee transport system	<u>2.0</u>
	TOTAL DIRECT COSTS	- 274.5
Indirect costs	- construction overhead (7%)	19.2
	- operation overhead (1%)	2.8
	- project management (10%)	27.5
	- design and engineering (6%)	16.5
	- freight and duty (3%)	<u>8.2</u>
	TOTAL INDIRECT COSTS	- 74.2
Other costs	- contingency (15% of total)	52.3
	- initial operating costs	20.0
	- warehouse inventory	<u>4.0</u>
	TOTAL OTHER COSTS	- <u>76.3</u>
	TOTAL PROJECT COSTS	- <u><u>425.0</u></u>

\* - Assumes Yukon Government will construct the final access road.

\*\* - Includes sufficient equipment to mine leached cap.

### SUSTAINING CAPITAL

Use about 1% of total project costs as an annual expenditure toward capital projects: say \$4 million/annum.

### FREIGHT

Concentrate will be hauled in 52 ton loads by truck from the mine site to the port facility in Skagway, a distance of 338 miles. This will cost about \$42/ton of concentrate based on existing contract prices in Yukon. Assuming concentrate handling and loading in Skagway costs \$2.50/ton and ocean shipping costs \$25.00/ton, total shipping costs will be \$69.50/ton of concentrate. Add 8% for moisture content for a total of \$75.06/ton.



Total Costs:	
- operating costs 14,600,000 tons @ \$3.33/ton	48,618,000
- sustaining capital	4,000,000
- freight 248,200 tons concentrate at \$75.06/ton	<u>18,629,900</u>
TOTAL ANNUAL COSTS	- \$ 71,247,900
Profit/year before taxes, interest costs and capital payback	- \$103,991,600

Year 4.9 to 28.6

Copper Revenue:	
95% of 203,670 tons concentrate x (400 lbs contained copper less 20 lb smelter deduction) x (\$1.22/lb less \$0.10/lb refining charge) less (203,670 tons concentrate x 1.08 to correct for moisture) x \$75/ton smelter charges	\$ 65,850,600
Gold Revenue:	
93% of 203,670 tons concentrate x (0.516 opt less 0.03 opt deduction) x (\$488/oz less \$8/oz refining charge)	<u>44,186,300</u>
TOTAL ANNUAL SMELTER RETURN	- \$110,036,900

Total Costs:	
- operating costs 14,600,000 tons @ \$3.98/ton	\$ 58,108,000
- sustaining capital	4,000,000
- freight on 203,670 x \$75.06/ton	<u>15,287,500</u>
TOTAL ANNUAL COSTS	- \$ 77,395,500
Profit/year before taxes	- \$ 32,641,400

CONCLUSION

Preliminary economic evaluation of the Casino deposit indicates that the mineral inventory as defined is profitable at current metal contract prices. The \$425 million projected capital cost is repaid in less than five years. Subsequent operations will be highly profitable and can be expected to continue for at least 23 years. There is excellent potential to significantly expand the present mineral inventory by exploring peripheral to and beneath the known deposit.

The 1992 development program will focus on better defining the 71 million tons of high grade supergene ore because this material forms the nucleus of the initial production. The program will also include some holes to test the best soil geochemical and geophysical targets on the periphery of the deposit to look for other previously unidentified high grade centres. All of the drilling will be done with large diameter diamond drill equipment and is expected to significantly increase gold and copper values and dramatically enhance the economics of the project.