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WILLIAMS CREEK COPPER DEPOSIT  
SUMMARY REPORT  
BY  
THERMAL EXPLORATION COMPANY

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June 5, 1990.

FACT SHEET

LOCATION: Thirty miles north of Carmacks in the the Yukon Territory. Carmacks is one hundred miles north of Whitehorse.

OWNERSHIP: Archer Cathro Associated Limited. Held under option by Western Copper Holdings Ltd. and Thermal Exploration Company, each as to 50%.

HISTORICAL COST: \$2 - \$3 million

OPTION TERMS: Initial payment of \$20,000.00

3% NSR to a total of \$2.5 million or, a 15% NPI at Western's and Thermal's option.

3% NSR +  
\$2.5 million

\$100 thousand advance payment Jan. 1, 1992 and thereafter until production, providing copper price exceeds \$1.10 (US) on average in prior year.

ORE RESERVES: Drill Indicated 18,949,000 tons at 1.04% Cu of which approximately 8.0 million tons is open pitable grading 1.12% cu. in the form of copper oxide. (no cut off)

8% cut 1.12%

MINING:  
Method: Open Pit  
Rate (ore): 750,000 tons per year  
Stripping Ratio: 2 waste to 1 ore  
Project Life: 10.67 yrs.

MILLING:  
Method: Pad Leaching (SX-EW)  
Recovery: 85% of total copper  
Production: 14,280,000 lbs. cu per year

85% extra

CAPITAL COSTS:

	<u>Case 1</u>	<u>Case 2</u>
Mine process etc:	\$39.9 (mill.)	\$41.7 (mill.)
Cost per lb:	\$ 0.26	\$ 0.31
OPERATING COSTS:		
Cost per lb:	\$ 0.83	\$ 0.63

	<u>Copper Price</u>			
	\$1.00	\$1.20	\$1.40	\$1.60
<b>ANNUAL OPERATING INCOME:</b>				
Case 1. (in millions)	\$ 2.14	\$5.00	\$7.85	\$10.17
Case 2. (in Millions)	\$ 5.29	\$8.15	\$11.00	\$13.86

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## INTRODUCTION

The Williams Creek copper gold deposit is located 30 road miles north of Carmacks in the Yukon Territory, and is accessible by a seven mile long, four-wheel drive summer road, from mile 22 on the secondary Freegold Road which extends west from Carmacks. Carmacks is a small community of approximately 600 people and is connected to Whitehorse (100 miles to the south) by a paved highway. Whitehorse is 110 miles by paved highway from the all-weather deep seaport of Skagway, Alaska. The property consists of 66 claims or approximately 3960 acres.

## HISTORY

The Williams Creek copper deposit was found by the Dawson Range Joint Venture in 1970. The venture was financed by Straus Exploration, Inc., Great Plains Development of Canada Ltd., Trojan Consolidated Minerals Ltd. and Molybdenum Corporation of America. Archer Cathro & Associates Limited acted as manager, for which it received a fee, a small net profits interest and the right to acquire abandoned properties. By 1982 all of the participants officially abandoned their interests in the Williams Creek property. The property has now reverted to Archer Cathro who has maintained it since that time.

## OPTION AGREEMENT

On Sept. 14, 1989, Thermal Exploration Company entered into an agreement with Western Copper Holdings, an affiliate of Teck Corporation, to jointly option the Williams Creek copper deposit from Archer Cathrow under the following terms and conditions:

Pay to Archer Cathro the following:

- a) On signing formal letter agreement: \$20,000
- b) On or before January 1, 1991: \$30,000

An advanced net profits royalty of \$100,000 per annum is to start on Jan. 1, 1993, and continue at that rate until the property is placed into production. Advances will be recouped from royalties after production has commenced. The advance royalty will only be paid if the

average price of copper exceeds \$1.10. (US) per lb in the prior year.

Archer Cathro, at the election of Western and Thermal, will be entitled to either a 15% net profits royalty or a 3% net smelter return, up to a maximum of \$2.5 million.

To maintain the option on the property the following aggregate cumulative expenditures must be made:

December 31, 1989	\$ 50,000	firm	
December 31, 1990	\$ 450,000	optional	← what has been done?
December 31, 1991	\$1,150,000	optional	
December 31, 1992	\$2,000,000	optional, or	

Complete a bankable feasibility study on the property on or before December 31, 1992.

#### WESTERN COPPER - THERMAL EXPLORATION AGREEMENT

The basic terms of the Western Copper - Thermal Exploration agreement requires each party to spend \$50,000 which for the most part has now been spent. Each party will then elect if it wishes to proceed to the next phase. If either party elects not to proceed they will forfeit their interest in the property. If Thermal elects to proceed it will be responsible for the next \$640,000 in expenditures by April 1, 1991, at which time it will own a 100% interest. Western Copper will have the right to earn a 50% interest in the property by spending the next \$960,000 by July 31, 1992. If either party fails to meet its full commitment by the due date they will lose all rights to the property. The Agreement also contains a dilution clause, a buy-sell provision and rights of first refusal.

#### MINERALIZATION AND ORE RESERVES

The Williams Creek copper gold deposit is a steeply dipping (-70 east) tabular zone of weakly schism rock of diorite composition enclosed by granodiorite. It is believed to be a recrystallized roof pendant of volcanic or sedimentary rocks. The deposit has a sharp footwall contact and a less well defined, somewhat gradational, hanging wall contact. The deposit has a strike length of 1800 feet at surface, reducing to 1100 feet at a depth of 1200 feet below surface and has an average width of 96 ft.

Drilling at approximately 400 foot centers has traced

the deposit to 1500 feet below surface and shows that it terminates to the north by absorption into the granodiorite and to the south by an assay cutoff due to increasing pyrite. Mineralization consists of disseminated bornite, chalcocopyrite and pyrite with the occasional irregular veinlet of bornite and chalcocopyrite and is best developed in the footwall portion of the deposit. Minor gold and silver values are present and appear to be preferentially contained in the bornite. Small quantities of molybdenum are also present.

The schistose host rock has an unusually high porosity and permeability, this has resulted in the copper minerals being almost totally oxidized to malachite and azurite to approximately 800 feet below surface. For this reason reserves have been divided into oxides and sulfides. The oxides have been subdivided into a lower grade near surface portion called "leached oxide" and a deeper higher grade portion called "enriched oxide". Drill indicated reserves, as outlined on the longitudinal section, which is attached, are further divided into footwall reserves and hanging wall reserves under the assumption that underground mining would only be profitable on the better grade footwall mineralization. A summary of drill indicated reserves follows:

Footwall Reserves (using a 0.6% Cu cutoff)

Mineralized width ranges from 20 to 105 feet and averages 53 feet.

	Million Tons	% Cu	oz/ton Ag.	oz/ton Au
Leached Oxide	1.324	0.79	NA	NA
Enriched Oxide	4.024	1.93	0.228	0.027
Sulfide Ore	4.016	1.35	0.071	0.014

Hanging Wall Reserves (using a 0.6% Cu cutoff)

Mineralized width ranges from 17 to 71 feet and averages 43 feet.

Leached Oxide	1.305	0.70	NA	NA
Enriched Oxide	3.041	0.960	0.150	0.020
Sulfide Ore	2.742	0.678	0.084	0.011

## MINING

Mining during the initial stages is anticipated to be by open pit. A preliminary pit layout indicates that the deposit can be mined to 600 ft with an overall waste to ore stripping ratio of 2 to 1. When infill drilling has been completed a more detailed pit study will be undertaken to better define the stripping ratio. A total of 2,250,000 tons (750,000 ore and 1,500,000 waste) are to be mined annually between the months of May through September. The potential for insitu copper extraction and vertical retreat mining will also be investigated. It is anticipated that due to the schistose nature of the ore zone explosive costs will be quite low (a 20 ft. deep trench for assessment purposes in 1987 was excavated using a bulldozer with a ripper; no explosives were necessary). In order to minimize capital cost requirements contract mining of the ore and waste will also be considered. Sidehill topography permits level and downhill ore and waste hauls and precludes drainage problems during the open pit phase of mining operations.

2:1 strip ratio  
to 600' depth

get a topographic  
map

The planned infill drilling program will also test the gold potential of the deposit. Diamond Drill Hole No.5 located on Section 16+00 N intersected a 60 ft section which averaged 0.07 ounces of gold. Since the gold appears to be associated with bornite close spaced drilling could potentially define a meaningful quantity of copper gold ore which could be processed separately.

## METALLURGY

On September 6, 1989 approximately 2700 kg (6000 lbs) of copper oxide ore was shipped to Bacon Donaldson and Associates at their facilities in Richmond, B.C. for metallurgical testing. Column tests on this material indicated that copper extraction of 86.7% could be attained in 33 days from material crushed to 3/4 inch. Net acid consumption amounted to approximately 3 lbs of acid for each lb. of copper produced. This material was selected as representative samples from the surface trench put in during 1987. Further test of drill core from the proposed drill program will be required to confirm that the results obtained in the above tests would be representative of the overall ore body. Additional tests will also be required to determine the quantity and rate of copper consumption on uncrushed mine rock.

where did they  
get this?

may be more  
S = at  
depth.

## LEACH PAD

Generally a suitable pad site provides natural collection contours for the leach solutions. Preferably, a large open bowl-shaped area would accommodate a large volume of ore without building to unstable heights. The contours would lead the solution to a narrow valley which could be easily blocked by an earth filled dam. There would be room behind the dam for a significant reservoir of solution providing surge capacity and process stability. Due to the low relief rolling nature of the topography, selection of a suitable pad sight is not anticipated to pose a problem.

## SOLVENT EXTRACTION ELECTROWINNING PLANT

A plant capable of producing 30 tons (60,000 lbs.) of copper per day operating 240 days per year is contemplated by Wright Engineering in their economic analysis. If a year round operation is considered feasible this would result in greater copper production or a smaller plant to produce a similar quantity of copper.

## EXPLORATION AND DEVELOPMENT SCHEDULE

Providing funds are available by mid September a plausible development is as follows:

- 1990      September-October; in-fill drilling program using 100 to 200 ft centers. November-December; complete detailed ore reserve calculation and pit design.
- 1991      January-April; undertake large column test of ore acquired from diamond drill intersections. May-October; undertake detailed feasibility and environmental studies.
- 1992      Construct plant, leaching pads and load pads with ore for the first year's operation.
- 1993      April - Commence operations.

## ECONOMIC SUMMARY

An economic analysis of operating and capital costs has been provided by Wright Engineers Limited for planning purposes. This report points out the importance of the next phase of exploration (infill diamond drilling and further metallurgical testing). This work will better define the ore body, determine whether a high grade gold zone (0.06 ounces per ton) can be developed and also determine whether there is sufficient sulfides contained within the oxide zone to generate its own acid through bacterial action. The project is particularly sensitive to copper grade, mining costs and sulfuric acid costs. If there are sufficient sulfides present to generate a portion of the acid requirements then the capital cost of acid plant (\$6 million) could be eliminated.

Commencing in 1993, the project's annual yearly copper production is estimated at 14,280,000 lbs. The average annual income for four different copper prices is shown below.

## Annual Projected Income

Millions of Dollars

Case 1

Price	\$1.00	\$1.20	\$1.40	\$1.60
Revenue	\$14.28	\$17.14	\$19.99	\$22.85
Operating cost	\$12.14	\$12.14	\$12.14	\$12.14
Operating Income	\$ 2.14	\$ 5.00	\$ 7.85	\$10.71

Case 2

Price	\$1.00	\$1.20	\$1.40	\$1.60
Revenue	\$14.28	\$17.14	\$19.99	\$22.85
Operating cost	\$ 8.99	\$ 8.99	\$ 8.99	\$ 8.99
Operating Income	\$ 5.29	\$ 8.15	\$11.00	\$13.86

At current copper prices the project has an approximate 4 year pay back. It is believed that once in

fill drilling and metallurgical test work has been completed that both operating and capital costs can be better defined and possibly be reduced from those indicated in the Wright Engineering Reports.