

082 KNE008 - Malloy Creek  
007 - Vowell Creek

840879

Report on Gravel Occurrences on Leases Of:

TAPIN COPPER MINES LIMITED (N.P.L.)

by

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## CONCLUSIONS

- 1) Drilling has indicated reserves of about 25,000,000 cubic yards or 37,000,000 tons of gravel in two valleys.
- 2) The gross content per yard, using a price of \$10 a pound for  $U_3O_8$  is about .75¢ and the net content is about .50¢.
- 3) The gross content per yard, using a price of \$20 a pound for  $U_3O_8$  is about \$1.20 and the net content is about .80¢.
- 4) These figures may be low by a few cents per yard.
- 5) These figures need to be confirmed by completing work on separation of minerals and recovery of salable products.
- 6) The most important minerals are allanite, monazite, titanite, and unidentified titano-columbate, rutile and zircon.
- 7) Other minerals, possibly of value are magnetite, ilmenite and apatite.

- 8) A concentrate could contain about 2.25%  $U_3O_8$ , 6%  $Cb_2O_5$ , 2.5%  $Th O_2$ , 6% cerium and about 6% of other rare earths.
- 9) About 4900 feet of drilling has been done and this has almost completed the exploration of the gravels.
- 10) The cost of the work done so far is about \$250,000.
- 11) The cost to complete test work on recovery probably will not exceed \$25,000.
- 12) Lower grade gravels surround the possible reserve and if prices continue to increase, some of this lower grade gravel could become of value.
- 13) Concentrates sent to Colorado for testing may be in storage there and would be useful for test work that remains to be done.
- 14) The gravel covers the bottom of attractive alpine valleys and controls to limit environmental damage will be stringent.

### RECOMMENDATIONS

- 1) Determine if concentrates from previous drill program are in storage.
- 2) If so, arrange to complete research on separation and recovery.
- 3) If not, take in back-hoe and track, while ground still frozen and obtain bulk samples from representative areas and carry out the needed research.

### INTRODUCTION

Stream gravels in high valleys in the Purcell Mountains contain considerable amounts of U & Cb minerals and other minerals of interest. They have been explored twice. Leases involved were allowed to lapse because the values in the gravels were marginal at the prices prevailing.

Current shortages of oil and natural gas have caused the price of Uranium to be increased substantially. This raises the possibility that these gravels can be exploited in the future and also that future increases in price of U, will make larger volumes of gravel of economic importance.

### LOCATION AND ACCESS

The gravel is in the valleys of Malloy and Vowell creeks, between 5000 and 5500 feet altitude. See Figure 1. They are accessible by about 35 miles of road from Spillamacheen in the Rocky Mountain Trench. A fair road extends almost to the confluence of the creeks. In 1969 this road was extended to the confluence and temporary roads were built up both creeks. The temporary roads probably have been washed out. To get access now tracked vehicles could be used. Otherwise travel would be possible while ground is frozen or covered with snow.

Landing sites for helicopters are available on creek bars and on nearby swampy meadows.

### HISTORY

In the early 50's prospectors found that the gravel of Bugaboo Creek contained columbium. Continued prospecting and testing found columbium in Vowell and Malloy gravels also. In order to determine grades and reserves an exploration and evaluation program was carried on from 1953 to 1957.

Some drilling was done on Bugaboo Creek and more was done on Vowell. Bugaboo was most easily accessible and a small

concentrator was set up on it. This treated about 10,000 tons, from creek bars. Concentrates were shipped to a laboratory in Ontario for assaying and recovery.

As the work progressed it became apparent that the columbium content was too low. Also the uranium and thorium content became important. An effort was made to get a premium salts contract for the uranium. However this effort coincided with a surplus situation that had developed and therefore a contract could not be obtained. Work was stopped.

#### 1968-1970 PROGRAM

The writer was consultant to Dillingham Mining Co. which carried out the following program of exploration and evaluation. Assay sheets and drill logs are available.

Based somewhat on the results of the earlier program and a firming of the price of uranium, the grounds were re-examined in 1968 and 1969 and some laboratory work was continued into 1970. Seventy-seven holes were drilled. Hundreds of samples were taken and concentrated. Many concentrates were assayed and some mineralogical and recovery work was done.

An air-borne scintillometer survey was made along each of the creeks that was considered to have a potential value (see figure 1). Flown at a height of 150 feet, above the ground, showed that gravel on Bugaboo, Vowell and Malloy creeks had anomalous radioactivity. This was especially true of the latter two and especially near their heads. Other creek gravels were less radioactive.

Ground scintillometer surveys at the other creeks and examination of them, found that they had little gravel. It was concluded that the greatest possibility was on Vowell and Malloy creeks.

A drill program was planned for these 2 creeks for the 1969 season. The drill selected, a Becker, effectively recovers gravel, including small boulders up to 4-7/16" diameter. This is the inside diameter of the inner pipe which is driven down. The drill is very heavy and mounted on a truck; could only be moved over the soft ground with great difficulty by a big cat.

77 holes were completed, totalling 3837 feet. These are shown on Figures 2 and 3. Also shown are 21 holes totalling 1046 feet, drilled on Vowell during the earlier program.



The gravel was caught in a bucket. A sample was taken from each 4 feet of run. These samples weighed about 40 pounds each.

The samples were passed through a Denver gold saver. This was modified in order to recover the bulky concentrate required. The saver is equipped with a revolving trommel and into this was fitted a screen to retain small pebbles and grit. The underside pushed through to a screen that was inserted to retain coarse sand grains. It was shaken by the same action that shook the shaking riffled trays that were the next stage in these trays, most of the lighter minerals flowed over and heavy minerals were trapped.

The contents of the riffled trays were panned to remove more of the lighter particles. The ratio of concentration ranged between 8 and 25 to 1.

A small proportion of very large grains of some of the heavy minerals may have been kept out of the concentrate by the second screen.

Malloy was the first creek tested. A comparison was made of results obtained from small concentrates and large concentrates.

It was found that the grade determined from large concentrates was higher than from small concentrates. This showed that prolonged panning had lost some fine heavy particles.

When testing Vowell, panning was reduced. A total of 227 concentrates were assayed by x-ray fluorescence. This method was checked by fluorimetric uranium analyses to determine if the x-ray analyses were sufficiently accurate. This showed that the x-ray results for U were high by about 10%. Then some samples were split and the results for U were compared by x-ray fluorescence and chemical. It was found that the x-ray results were on the average about 30% high. Accordingly results for U from all samples were reduced by this factor.

Likewise Cb assays were determined chemically on the split samples. The results from the chemical analyses were higher. However the x-ray results were used and these probably underestimate the Cb content slightly.

All the concentrates were measured by a scintillometer and an average for each hole was compiled. Not all the concentrates were used, in correlation with the assay results, to outline limits of reserves.

The first estimates of reserves, based largely on the appearance of the samples, were reduced as assay results became available. The assay results showed that some gravel that appeared attractive was low grade.

The final results were of gravel with a net content about 50¢ per yard. It was considered that total costs would approach this figure and therefore the work was discontinued.

#### GEOLOGY

The rock at the head of all the creeks with markedly radioactive gravels is a granite mass.

The area is high and has been intensively glaciated. The glacial history has not been studied but it appears that at times meltwater streams were blocked by ice or morainal material and lakes were formed. In these clay accumulated. Following the disappearance of the ice, erosion, on the high ground, was rapid. This provided a great volume of granitic rubble which was washed down the slopes to the broad deep valleys of Malloy and Vowell and to a lesser extent some of the other valleys. This rubble, slightly rounded, overlies clay, till and other morainal material to depths of as much

as 100 feet. It is variable in composition and size. Most of it is pebbly and sandy and it is not well stratified. Some clay streaks occur. Some boulders and logs are present.

The period when the gravels have accumulated has been relatively short and the degree of concentration has been relatively slight. In panning, no gold was seen and this is taken to show that concentration was slight.

The creeks with the most extensive and the highest grade gravels, Malloy and Vowell flow northwards. They may follow fault traces so the valleys could be eroded deeper. Since they are north of the main mountain mass, ice may have stayed in them longer and also eroded more completely. The result was that they became wider and deeper. When granitic rubble became available for filling the valleys, they were best suited to receive large volumes.

#### MINERALOGY

The elements sought occur in the minerals allanite, rutile, zircon, monazite and an unidentified titano-columbate. A minor amount of the elements sought occurs also in titanite.

Of possible importance are magnetite, ilmenite and apatite.

### RECOVERY

Laboratory tests showed that a clean sink concentrate with the magnetite and ilmenite removed would recover the 5 minerals referred to above. A clean concentrate consisting mostly of these 6 plus minor amounts of epidote and clinozoisite would contain about 2.25%  $U_3O_8$ , 6%  $Cb_2O_5$ , 2.5%  $Th O_2$ , 6% cerium and almost as much in total of other rare earths.

A small proportion of apatite is present. It can be obtained by sinking in a liquid of specific gravity of 2.96 and then floating it in a liquid of specific gravity of 3.3. If its recovery is worthwhile, it contains about 1.5% of rare earths.

Magnetite of which 10 to 15 pounds is present in each cu. yd. many, after grinding, be sold for use as a heavy media for coal washing plants in the Rocky Mountains.

Ilmenite, of which 1 to 2 pounds is present in each cu. yd. may be sold as a superior coating for pipe lines.

### GRADES

The average content in pounds per cubic yard and in cents per cubic yard, with  $U_3O_8$  at \$20 per pound is as follows:

	$U_3O_8$	$Cb_2O_5$	$Th O_2$	Magnetite	Ilmenite
Malloy cents	0.039 78	0.165 21	0.116 11	13.5 6	1 2 = 1.18
Vowell cents	0.038 76	0.25 32	0.056 5	10 5	1.65 3 = 1.21

This is an average content per yard of about \$1.20. It is estimated that about 2/3 of this may be recovered or 80%.

As noted above the grade slightly greater than this estimate because of small losses in concentrating and slight under-estimation of the amount of columbium. Also this figure does not include any value for the content of cerium and other rare earths. These also might add a few cents per yard.

The costs of operation have not been estimated accurately and a flow sheet has not yet been worked out. Presumably the costs will have advanced in the 4 years since they were estimated to be approaching 50¢ per yard.

Current and potential shortages of oil and natural gas have increased the price of  $U_3O_8$  to \$20 per pound for delivery in the 80's. If this trend continues, as is to be expected, future contracts at even higher prices can be anticipated.

RESERVES

For these grades, the indicated reserves on Malloy are 12,200,000 cu. yds. and on Vowell 12,750,000 cu. yds. or a total of about 25,000,000 cu. yds. At higher prices this yardage could be increased.

POSSIBILITIES

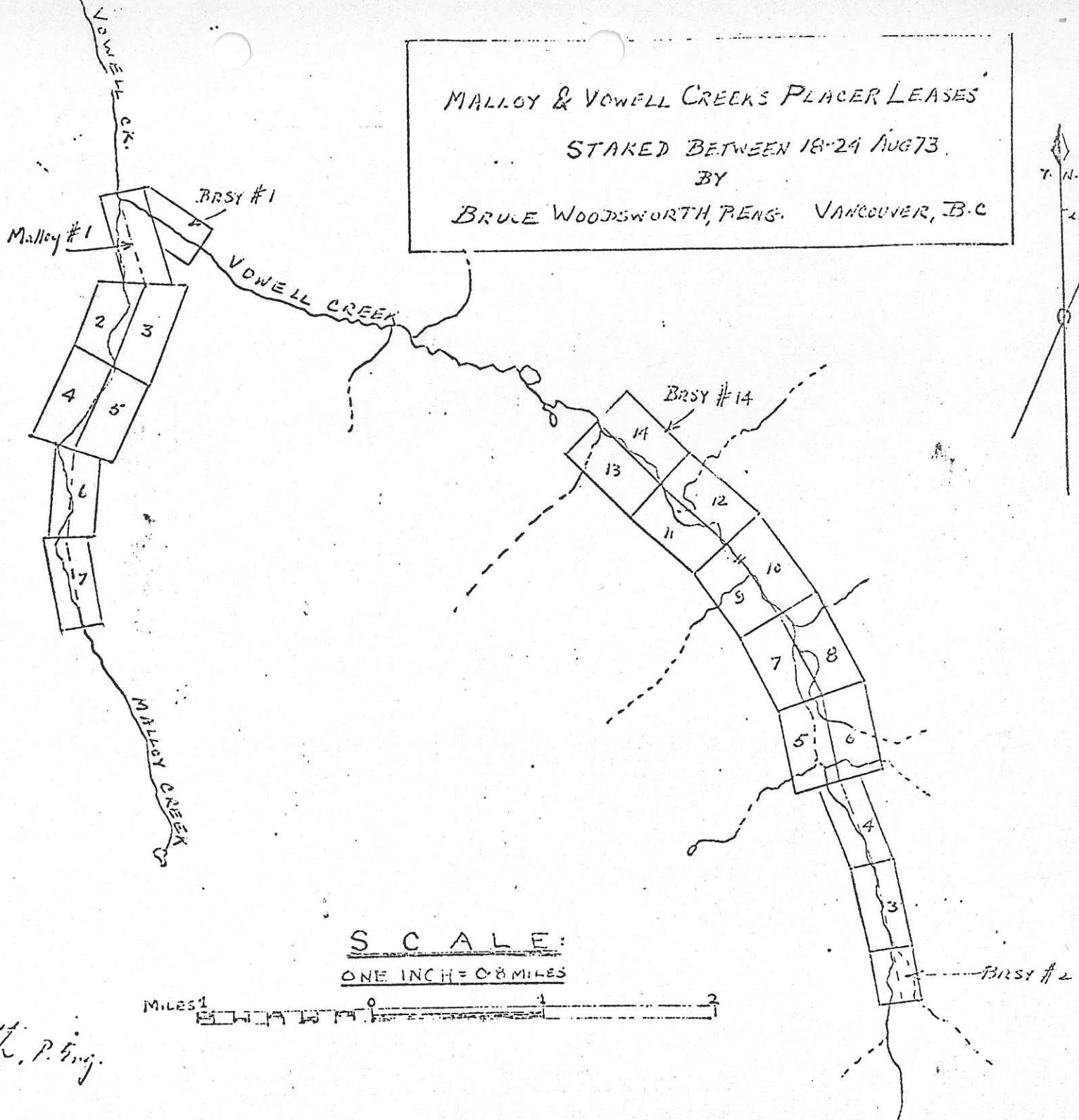
The reserves include the highest grade gravel in the valleys. Surrounding these indicated reserves is lower grade gravel. The value of these lower grade gravels has not been calculated at higher prices. Continued increase in the price of uranium would have the effect of increasing the yardage of gravel of about the value noted above. The amount of the increase would be related to the sales price of uranium. The estimated yardage could become double the 25,000,000 cu. yds. indicated at \$20 a pound for  $U_3O_8$ .

MALLOY & VOWELL CREEKS PLACER LEASES

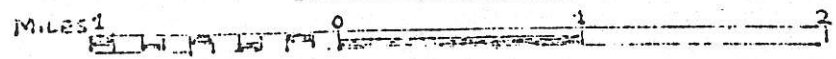
STAKED BETWEEN 18-24 AUG 73.

BY

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SCALE:  
ONE INCH = 0.8 MILES



*Bruce Woodsworth, P. Eng.*  
21 Sep 73