A REPORT ON THE GEOLOGY, GEOCHEMISTRY AND GEOPHYSICS

OF THE CAM CLAIMS (1-16)

Tincup Lake Area (61°40' N. Lat., 139°20' W. Long.)

Claim Sheet 115-G-11

by E. O. Chisholm, P. Eng.

August 29, 1969 to September 30, 1969

This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representative work in the amount of $5,700.

[Signature]

Assistant Commissioner of Territorial Mines

Considered as representative work under Section 89 (3) Yukon Territories Mining Act.

[Signature]

Commissioner of Yukon Territory
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CAM CLAIMS
Whitehorse Mining District
Yukon
Part of NTS 115G-11
Introduction

From early June, 1969 to the end of September, 1969 a detailed exploration program was carried out on the Cam Claim Group in the Tincup Lake area of the western Yukon. The work was done by Arrow Inter-America Corporation of 535 Thurlow St., Vancouver, B. C. on behalf of the owners of the claims, T. L. Sadlier-Brown and E. O. Chisholm. The program consisted of geological mapping and magnetometer and geochemical surveys over the entire claim group, an E.M. survey over part of the claims, and detailed mapping and hand trenching in certain selected areas. Although much of the work was carried out prior to August 28, 1969 all detailed geology, follow up geochemistry, E.M. surveys, and part of the trenching were done between that date and Sept. 27, 1969. The results of this work are shown on maps along with the portion of the program carried out prior to August 28, 1969, as it is an integral part of the same program and none of the work has been previously filed as assessment. During the period in which the present program was done, August 29 to September 27 inclusive, Arrow Inter-America Corporation spent a total of $8,100.96.

All survey work was controlled by a cut grid consisting of some 21 line miles of picket lines which were put in during the early summer of 1969. North-south cross lines were turned off from an east-west base line at intervals of 400 feet and stations were marked with pickets at intervals of 100 feet along all lines.

The field program was carried out under the immediate supervision of Mr. D. R. Kasian, a geologist employed by Arrow Inter-America Corporation. Mr. Kasian was also responsible for the geological mapping and is the author of the report on the property which was submitted to the writer by Arrow Inter-America. Other members of the field party were G. Mitchell, K. Grother, C. S. Weir, and S. Presunke, all of 535 Thurlow St., Vancouver, B. C.

The report by Mr. Kasian gives a detailed account of his observations concerning the geology, geochemistry, and geophysics of the area and is included below in full.
1. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS:

In the summer of 1968, a detailed study was made of the CAM group of mineral claims in the Tincup Lake area, Southwestern Yukon Territory. Line-cutting, claim staking, property boundary and magnetometer surveys, geological mapping, soil-sampling and test-pitting were done with the aim of finding either an exploitable deposit of asbestos or concentrations of copper-nickel sulfides. An electromagnetic survey was run to further assist in finding the latter type of deposit.

All economically reasonable exploration methods have been used in the study and further outlay appears unjustified. It is recommended that no further expenditures be made on the property and that the option be terminated.

2. SCOPE:

This report is based on information gathered by the writer who was the project geologist from June 19 to September 27, 1969. During this time, the crew working on the property varied from two to eight men and averaged six. The magnetometer survey was organized by G. Mitchell and completed by K. Grothen, both students. The claims survey was done by C. S. Weir, and the electromagnetic survey by S. Presunka.

3. LOCATION AND ACCESSIBILITY:

The CAM claim group is situated east of the Kluane River, eight miles north of Mile 1118 on the Alaska Highway. It is 160 air miles west north-west of Whitehorse, at 61° 42' N and 139° 21' W. (see Fig. 1)

Helicopters, either from Burwash Landing on the Alaska Highway or Whitehorse, were used to reach the property for investigation and transportation. The Highway passes within 8 miles of the claim group, but since the Kluane River separates the two and no bridge crosses the river at any point, wheeled vehicles could not be used as transportation to and from the project. Dec. 12, 1969 - since the summer field season, a Bailey bridge has been constructed across the Kluane River a short distance north of Kluane Lake. A winter road leads from this point to the property of Casino Silver Mines, 90 air miles to the north, and passes a few miles east of the CAM property.
PROPERTY AND OWNERSHIP:

The CAM group consists of the following 48, full-size, contiguous mineral claims:

<table>
<thead>
<tr>
<th>Claim Name</th>
<th>Grant Numbers</th>
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<tbody>
<tr>
<td>CAM # 1 - 24</td>
<td>Y 25761 - Y 25804</td>
</tr>
<tr>
<td>CAM # 25 - 40</td>
<td>Y 30415 - Y 30430</td>
</tr>
<tr>
<td>CAM # 41 - 48</td>
<td>Y 35726 - Y 35733</td>
</tr>
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</table>

The entire group is located within the Whitehorse Mining Division and included on Yukon Mineral Claim Sheet No. 115-G-11. (See Fig. 2)

CAM # 1 - 24 are owned by Messrs. T. Sadlier-Brown and E. Chisholm and were under option to Arrow Inter-America Corp. during the 1969 field season. CAM # 25 - 32 and CAM # 33 - 40 were staked in February of 1969 by H.S. Lazenby, a geologist for Arrow, and R. Conant, a helicopter pilot. Each transferred full interest in his respective group to Arrow. CAM # 41 - 48 were staked in June 1969 by G. Mitchell, a student employee of Arrow, who also transferred his full interest to the company.

HISTORY:

The property was first examined by a Mr. A. Rosen for Northwestern Explorations Ltd. in 1954. A small block of mineral claims, the Kluane group, was staked in 1953 and examined the following year by that company, but the only apparent assessment work done was minor blasting at the main asbestos showing. The claims were allowed to lapse, and the ground was next staked in August of 1968 by T. Sadlier-Brown and E. Chisholm, Vancouver geologists, who entered into an option agreement with Arrow in February of 1969. The ground had been briefly visited and examined by H.S. Lazenby, an Arrow geologist, in the autumn of 1968 and revisited by the same in February of 1969 for the purpose of additional staking.

PHYSICAL FEATURES:

The claim group covers a small east-west trending valley, entirely on the east side of the Kluane River. It also straddles a few steep ridges to the north-west. The lowest regions are swampy and fairly open while drier ground has a fairly thick cover of small spruce and balsam which quickly thins out and disappears above the tree-line at 4,000 feet. Outcrops are scarce, found most commonly on the steep northern slopes and occupying two to three percent of the area of the claim group. (See Fig. 3)
Creeks on the property are small and may dry up or disappear underground in hotter summer weather. However, the Kluane River lies only one mile west of the central part of the property and provides a large volume of water year-around. No supply of electrical power can be purchased in this part of the Yukon. Electricity would have to be generated by building a dam on the Kluane River or by building a diesel generating plant on or near the property.

Long, extremely cold winters with minimal snowfall and short warm summers are the rule in the Kluane area. Permafrost is found throughout the region and over most of the claim group.

7. GENERAL GEOLOGY:

The Cam property covers an ultrabasic intrusion which appears to lie conformably within the Yukon Complex metamorphic rocks. The Complex rocks are bedded metasediments of Pre-cambrian age or later and, in the vicinity of the property, consist of slates, quartzites, schists and re-crystallized limestones which strike roughly east-west and dip from 40 to 50 degrees to the south. The Ruby Range batholith, a large acidic intrusive of Mesozoic age, lies within a half-mile of the southwest corner of the ultrabasic. (See Fig. 4)

A strong northwest-southeast trend, running parallel to sub-parallel with other major faults and lineaments in the region, can be seen in the ultrabasic. Another prominent feature of the Cam ultrabasic is a gradational differentiation from an ultrabasic peridotite through to a less basic family of alkaline gabbroic rocks.

The aeromagnetic map of the area issued by the Geological Survey of Canada shows a strong magnetic anomaly also trending northwest-southeast across the property. This trend is parallel to the Shakwak and Tintina Trenches, major structural features of the Yukon along which are located several large mineral deposits, one of which is the producing asbestos mine at Clinton Creek.

8. MINERAL DEPOSITS:

It was felt that either of two different types of deposit could exist within such an ultrabasic body as is present at Cam:—asbestos fibre and/or copper-nickel sulfides. The geological environment is similar enough to that of other large deposits in the Yukon so that conditions appear favorable for ore deposition. To quote Dr. L.H. Green in his G.S.C. Paper "Lode Mining Potential of Yukon Territory", 1968:
"Ultrabasic rocks, the host for asbestos deposits are widespread and many contain traces of asbestos fibre. Many remain to be explored and the chances of finding additional economic deposits are excellent".

also:

"Two nickel deposits, Wellgreen and Canalask, occur in the Kluse area, a few miles southwest of Shakwak Trench. Both are associated with ultrabasic sills, now altered to serpentine, that occur in sedimentary and volcanic rocks of the Cache Creek Group of Permian age".

The Cam property is located only seven miles northeast of the Shakwak Trench. The Rex asbestos deposit, lying 100 miles to the southeast, is within the Trench but its full potential is not yet known. The Canalask and Wellgreen properties occur in basic rocks similar to those of Cam but lie on the opposite side of the Trench in a geologically different terrain of younger rocks.

The Cam ultrabasic is similar in size and petrology to other economically important ultrabasics in the Yukon. The Clinton Creek mine, now an important producer of asbestos fiber, has reserves of 26 million tons averaging 8 percent recoverable fiber. An orebody of similar grade at Cam, mined as an open pit to even 400 feet in depth, need only measure 1000 feet by 650 feet to contain a tonnage similar to that at Clinton Creek.

The main showing on the property, although containing only low-grade fiber of short length, was considered to indicate that the ultrabasic had been subjected to chrysotile-forming processes. Considering the size of the mass and the low percentage of bedrock exposures, it was thought that a body of asbestos of exploitable size and grade could occur somewhere on the property, and that a combined program of mapping, prospecting and magnetometer work could provide clues to its existence and location. It was also felt that a body of copper-nickel sulfides might be present, and if so, could be found by geochemical, geophysical and geological surveys.

9. EXPLORATION DURING 1969:

Exploration during the 1969 field season consisted of a program of geological mapping by the writer and geophysical, geochemical and claims surveys, as well as prospecting, done under his supervision. Work was started in the first days of June and by June 10, four men had been taken into the site and a tent camp was set up. The work was conducted as follows:

A program of line-cutting was begun immediately to establish a grid for geological, geophysical and geochemical mapping. Over 40 miles of grid lines were run in a north-south direction from an east-west baseling. Lines were put in at 400-foot intervals; only every third line was cut out, chained and flagged with 100-foot stations while the remaining two-thirds were only chained and flagged. Later in the summer some 200-foot lines were chained and flagged with 100-foot stations in the rugged north-west corner of the property to facilitate geological mapping and magnetometer surveying.
While the grid was being marked, preliminary geological prospecting was done on the property and on the surrounding area. Once the grid was well under way, geological mapping at a scale of 200 ft./inch was begun and lasted from early July to late August. The entire ultrabasic was mapped in plan as were the bordering rocks of the Yukon Complex. A company prospector also checked a large surrounding area for mineralization.

In early July a magnetometer survey was begun, using a Sharpe MF-1 magnetometer. This survey was run on the same grid used for geological mapping, and extra chain-and-compass lines were put in where greater detail was desired. By late August this survey was completed.

During the last two weeks of July, and again for one week in early September, a program of geochemical soil-sampling was used to look for areas with anomalously high copper and nickel values, both within the ultrabasic and in surrounding areas. Samples were taken at 100 foot intervals along the grid lines and covered the entire ultrabasic except the extreme western edge. The sampling also was extended 1000' feet into the surrounding metasediments.

In the month of August a surveyor made a property survey to tie in all claim boundaries, grid lines and the principal mineral occurrences.

From mid-August to mid-September pits were dug by pick and shovel at 12 sites coinciding with magnetic high anomalies, thought possibly to indicate occurrences of asbestos fiber. (See Fig. 3) This was followed in mid-September by a week of sluicing at an asbestos fiber occurrence at the main showing upstream from the base camp.

A program of bulldozer trenching to expose bedrock in the most interesting areas would have been very helpful in assessing the property, but since there is no bridge across the Kluane River and no barge on Kluane Lake, ground access to the property was impossible for a bulldozer in summer.

During the third week of September, an electromagnetic survey utilizing a RONKA E.M.-16 unit was run on the property to help determine the presence of any sulfide bodies.

For the magnetometer survey, test lines were run to determine a background reading for the area. This done, an arbitrary value of +2000 gammas was chosen for the base stations at the camp. This setting gave a maximum number of positive readings on the property for convenience, and also allowed the most accurate scales on the instrument to be used. Master stations were then set up on the base lines by averaging at least
two readings obtained at each station on the base-line loops. Closed loops were then run along the cross-lines, taking readings at 100 foot intervals, and starting and closing each loop at a master station with a maximum elapsed time of one hour per loop. The survey outlined the edges of the ultrabasic covered by overburden and indicated serpentinized areas within the body. The surface area of the ultrabasic mass was outlined and it was determined to be about 15,000 feet long and 4,000 to 5,000 feet wide with its long axis running northwest-southeast. (See Fig. 5)

The soil sampling program was hindered by permafrost to the extent that samples could only be taken from about 60 percent of the planned sites. Barringer Research in Whitehorse assayed the soils for copper and nickel by the hot perchloric acid method of extraction. Only every other sample was assayed as it was felt that representative coverage could be obtained most economically in this way. If more details were required in any sector, the intervening samples could then be assayed. The assays averaged about 34 ppm for Cu and 52 ppm for Ni. These values are not anomalously high for an ultrabasic, but nevertheless more detailed sampling was done in two areas of interest: the southwest corner of the property, an area of suspected fracture intersections and therefore possible sulfide formation, and a hillside west of camp where initial assay values were slightly higher than the rest of the property. The assay results from these two regions (sampled at 50-foot intervals on the grid lines) were similar to earlier results in that values were not anomalously high for an ultrabasic body.

The purpose of the test-pitting was to locate bedrock or an area of float with significant asbestos mineralization. In several of the pits, permafrost was present and, as it thawed, they filled with the meltwater which would not drain. In others, no rock was encountered to the maximum possible depth obtainable by pick and shovel methods. In only one pit was bedrock exposed, a poorly serpentinized peridotite bearing one percent chrysotile of 1/16" or less in length. In the other pits, barren ultrabasic boulders were found which appear to be of local origin, and so suggest that no useful quantities of chrysotile exist nearby.

The electromagnetic survey, utilizing a RONKA E.M.-16 unit, covered a 2000-foot square area in the southwest corner of the claim group, a region of possible fracture intersections. Several conductors were found and were interpreted to be shears, small shears, and the ultrabasic-metasediment contact.

In the opinion of the writer, the mapping showed the Cam ultrabasic body to be a concordant, sill-like mass which appears to have differentiated by the method of fractional crystallization. The various rock types within it show a gradational
relationship and surface evidence shows the lowest rock type within the body to be a peridotite, overlain by a thin layer of pyroxenite, which is in turn overlain by a much greater thickness of various gabbroic rocks. Evidence in the southern portion of the property indicates, however, that this differentiation continued after the first three rock types were laid down and that probably several were then layers crystallized in various orders. The intrusive itself strikes roughly east-west and dips from 40° to 50° to the south. The thickness of the sill, perpendicular to its walls, is about 5000 feet.

No copper-nickel sulfides were found within the mapped area, and only minor scattered pyrite was found in the Yukon Complex metasediments to the south.

All asbestos fiber found in the ultrabasic is in peridotite. Actual fiber occurrences are rare, but run in a scattered band along the northern contact of the intrusive for about 5000 feet. The average fiber length is 1/16" to 1/8" and any exposure seldom carries more than two to three percent of such fiber. Being restricted to the peridotite, nearly all the fiber if found within 200 to 300 feet of the metasediments which border the ultrabasic on the north. A few occurrences of fiber are found in a band of peridotite at the southern edge of the property but these are of even shorter length and poorer grade, averaging less than 1/16" and less than one percent.

The best asbestos values seen on the property are in a 275-foot exposure of peridotite along the main creek just above camp (See Fig. 8). A width of about 50 feet in this showing is moderately to highly serpentinized and carries fiber of 1/8" average length and 7 to 8 percent average grade, determined as total veinlet thickness per measured foot of rock face. A 12-foot shear within the 50-foot band averages 12 percent chrysotile fiber over its width. It could only be followed a few feet before disappearing beneath overburden, so sluicing was used to further expose it. It was traced for a total of 30 feet to the east. Narrow widths of 3 to 4 feet were found to contain up to 25% chrysotile of up to 1" in length but averaging 1". After exposing it for 30 feet to the east, the shear was seen to narrow quickly and pinch out. The remainder of the showing is poorly serpentinized and averages less than one percent fiber.

Nearly all asbestos fiber found on the property is a cross-fiber chrysotile. In the same exposures there are many veinlets containing a chalky, white, non-fibrous filling of no economic value. There are also a few scattered occurrences of the brittle slip-fiber picrolite, also of no value.
Attempts at correlating the highest magnetometer anomalies with asbestos fiber are inconsistent and cannot be relied upon, so that no clues were obtained suggesting the presence of larger hidden deposits.

The writer feels, after detailed examination of the property, that the expense of bulldozing and for diamond drilling is not warranted and that the option with the owners should therefore, be terminated.

Doug Kasian  
November 10, 1969

Bibliography:

G.S.C. Memoir 340, "Kluane Lake Map-Area, Yukon Territory"  
-J.E. Muller, 1967.

Discussion:

Geochemical Survey.

A description of the geochemical survey is included on page 6 of Kasian's report and little more can be added.

Intended to test the claims for copper-nickel mineralization, it outlined one moderately interesting area in the north central part of the grid. Follow up prospecting, however, failed to turn up any sulphides and it is now felt that the high nickel values can be explained by the the normal rather high nickel content of ultrabasic rocks.

No additional geochemical work is warranted.

Geophysical Survey.

During September 1969 S. Presunka carried out an EM survey on the part of the Cam grid located between 20W and 40W and between 0 and 20+00 N. Six lines totalling 18,000 line feet were covered using the Ronka EM 16 unit which is a receiver equipped for utilizing low frequency radio transmitting stations as transmitters. Two such stations were used in the preparation of sheet a. They are 17.8 mc and 21.4 mc located in Maine and Maryland, U.S.A. and they are suited for the location of east-west striking conductors. In addition Station 23.4 mc located in Hawaii was used in the preparation of sheet b. This transmitter is best situated for detecting north-south trending conductors.

Four conductors were located using 17.8 mc and 21.4 mc. They are shown on sheet a and are lettered A B C and D. Brief descriptions taken from a report submitted by S. Presunka are as follows:

A) Striking at 280° and open at both ends of the grid this conductor is the strongest detected. It parallels the magnetic anomaly in the area quite closely which suggests that it may be caused by a contact between the ultrabasic body and country rock.

B) Parallel to A but roughly 1000 feet north of it, this conductor is thought to be a shear zone.

C) Also parallel to A but about 200 feet south, conductor C is probably the expression of a shear zone as well.

D) A very weak conductor most likely the expression of weak shearing or fracturing.

Results from the survey done using the 23.4 mc (Hawaii) transmitter were plotted on sheet b. Three conductors, A B and C, were located and are marked on the map.
A) Striking at 50° across the southeast corner of the grid this conductor coincides reasonably well with a magnetic low and is probably caused by a fault. 

B & C) Both are very weak and likely due to northeasterly striking shears.

In addition to the above two very weak anomalies just east of line 20W at about 10+00 N and another on line 32W at 16+00 N are typical of geological contacts.

None of the anomalous zones on sheets 1 or 2 have characteristics that suggest they have a sulphide origin.

Geology.

The report by Mr. Kasian on the preceding pages gives a complete description of the regional setting. The following table may, however, serve to clarify the general sequence in the claim area.

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<tr>
<td>Mesozoic Ruby Range Batholith</td>
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<tr>
<td>Pre-Mesozoic Yukon Complex</td>
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Chrysotile asbestos occurs on the Can claim group in a northwest-southeast trending zone near the north limit of a large body of ultrabasic rock. The ultrabasic body, which appears to be a differentiated sill, intrudes the metamorphic rocks of the Yukon Complex near their contact with the Ruby Range granites and conforms roughly with the general northwest-southeast trend in the area. Differentiation within the sill has produced rock types ranging from gabbro to dunite with serpentinized peridotite being the host for the fibre. Where exposed in the gully of a south flowing creek on claim #2 the mineralized zone is about 50 feet wide and grades 7 to 8 percent 1/8 inch fibre with narrow widths grading up to 25% of 1/4 to 1/2 inch fibre.
South of the showing area in the creek bank, the rocks are largely covered with overburden and only spotty outcrops occur to the east and west. Small hand dug test pits proved inconclusive in locating additional mineralization and no correlation could be established between magnetometer readings and chrysotile mineralization. Nor did the geochemical or EM work give any indication of the presence of economically interesting sulphides. Consequently only additional physical work on the asbestos occurrences themselves are thought to be worthwhile in any immediate further attempts to develop the property.

Recommendations:

Diamond drilling for geological information or bulldozer trenching would be the most likely methods of obtaining meaningful results in the main showing area. Drilling could be done from setups at intervals along a line trending southeast (160°) from 11E, 11+00N on the grid. Holes should dip at 45° towards the northeast (70°) and extend to a depth of about 500 feet. At least four such holes at intervals of 200 feet along the line should be put in to test the zone. The initial setup should be at 11E, 11N with hole 2 located 200 feet southeast, etc. In addition, two holes paralleling hole 2 (tentatively) and collared 400 feet north and 400 feet south of it, should be provided for to test for both up and down dip extension.

Bulldozer trenches would be most effective if put in along northeast-southwest trending lines about 200 feet apart roughly along the surface traces of the above described drill holes east of the creek, 4 trenches each at least 300 feet long should be provided for. West of the creek stripping parallel to the above is suggested to test for extensions in that direction.

The above recommendations provide for 3000 feet of drilling and about 25,000 cubic yards of trenching.
August 24, 1970

STATUTORY DECLARATION

In the matter of the Cam Claim Group, Whitehorse Mining Division, Yukon Territory, I, Josiah Thomas, representing Arrow Inter-America Corporation of 304-535 Thurlow Street, Vancouver, B.C., do solemnly declare that between August 28 and September 27, 1969, Arrow Inter-America Corporation did expend the sum of $8,100.96 on geological, geochemical and geophysical survey work on the Cam Claim Group (1 to 48) and that this work was done on behalf of E. O. Chisholm and T. L. Sadlier-Brown.

Sworn and Subscribed to at Vancouver, B.C., August 24, 1970

Josiah Thomas

Witness.