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SUMMARY

→ (1) The Gotcha Claim Group, owned by United Mineral Services Ltd., covers an area of tungsten mineralization which was discovered and preliminarily explored by Union Carbide of Canada Mining Ltd. in 1972-1973, further delineated by NCA Minerals Corporation during January 1978 and by United Mineral Services Ltd. during the summer of 1978.

(2) The claims are located approximately 20 miles northeast of Clearwater, B. C. and are serviced by a year round logging road.

→ (3) ^{Two} ~~The~~ scheelite mineralized skarn bands, the Upper Band and the Lower Band, have been the focus of most exploration activity. A third scheelite mineralized skarn band was discovered during development stripping undertaken during the 1978 field season.

(4) Using exploration data obtained from work programs on the property tonnages of the Upper and Lower Bands can be stated as:

INDICATED TONNAGE

Upper Band	6000 tons @ 2.0%	or	12,000 s.t.u.
Lower Band	6100 tons		11,900 s.t.u.

PROBABLE TONNAGE

Lower Band	900 tons @ 2.0%	or	1,800 s.t.u.
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POSSIBLE TONNAGE

Lower Band	1100 tons @ 2.0%	or	2,200 s.t.u.
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The total estimated reserves excluding float ore is 14,100 tons with an estimated total content of 27,900 s.t.u. WO₃.

(5) Increased reserves are likely to be found on the property.

Extensions for the Upper and Lower Bands exist both down-dip and to the southwest. Extension for the Lower Band also exists to the north-east. Additional ore may be found within the untested ~~thick~~^{THIRD} scheelite skarn band that was discovered in 1978.

(6) Metallurgical testing has shown that the ore ^{is} ammenable to gravity or flotation concentration techniques. Recoveries in the 80% range can be expected.

(7) A program consisting of structural mapping, surveying, 4000 feet of diamond drilling followed by feasibility studies is proposed.

INTRODUCTION

- The Gotcha Claim Group is comprised of the Gotcha and Gotcha 2 mineral claims containing 1 and 9 units respectively. The ~~mineral~~ claims were staked by United Mineral Services Ltd. during March 1977 to cover an area of tungsten mineralization outlined and partially delineated in 1972 and 1973 by Union Carbide Canada Mining Ltd. ^{During July 1977} United Mineral Services undertook limited trenching on the property and made a preliminary economic evaluation from data available ~~during July 1977~~.
- On September 1977, United Mineral Services Ltd. entered into an option agreement with NCA Minerals Corporation. A percussion drilling program was carried out during January 1978 and a preliminary cost study was performed by Mr. J. P. Elwell, P.Eng. on behalf of NCA Mineral Corporation. The option agreement between NCA Mineral Corporation and United Mineral Services Ltd. was terminated in March 1978.

United Mineral Services Ltd. undertook a program of development between the months of May and November, 1978. This program consisted of upgrading road access for heavy equipment use, stripping, rock trenching and preliminary metallurgical testing of two hundred tons of ore.

The results of work performed on the Gotcha Property are outlined in this report.

LOCATION AND ACCESS

The Gotcha and Gotcha 2 Mineral Claims are situated in the Kamloops Mining District with the main area of economic interest located approxi-

mately 30 meters above Maxwell Creek and 4.8 kilometres northwest of the confluence of Maxwell Creek with the Raft River. The property lies at the 4000 foot elevation at latitude $51^{\circ}51.3'$ and longitude $119^{\circ}42.1'$.

Year round access to the property is by logging road which leaves the Yellowhead Highway (No. 5) 6.5 kilometres east of Clearwater and follows first the Raft River for 35.4 kilometres and then Maxwell Creek for the final 4.8 kilometres.

RESULTS OF PREVIOUS EXPLORATION

(A) During the summer of 1972, Union Carbide Exploration Corporation undertook a program of geological mapping, sampling and a total of 1769.3 feet of diamond drilling (diamond drill holes 1 to 8). This program was followed by an additional 1436 feet of diamond drilling during the 1973 field season (diamond drill holes 9 to 11). With the information available Mr. D. L. Cook, P.Eng. postulated that there were two distinct scheelite bearing skarn bands present on the property with a tonnage possibility of 10,000 tons with a content of 15,000 short ton units of WO_3 . Union Carbide's work is described in detail in a report by D. L. Cook, P.Eng. included in this report as Appendix A.

→ (B) During the summer of 1977, United Mineral Services Ltd. undertook a trenching program which substantiated the two band hypothesis presented by Mr. Cook and revealed that the Upper Band of skarn ^{has} ~~had~~ sections which grade in excess of 3% WO_3 . United Mineral Services Ltd. wrote a report entitled "A Geological Evaluation and Preliminary Economic Evaluation of the Gotcha Mineral Claim" using the results obtained from their trenching

program. With the information available at that time United Mineral Services Ltd. confirmed that at least two scheelite bearing skarn zones were present on the property and it was estimated that an overall tonnage of 9000 tons with a content of 14,000 stu of WO_3 was indicated. The report prepared by United Mineral Services Ltd. is included as Appendix B.

(C) During January 1978, NCA Minerals Corporation undertook a percussion drilling program in order to establish a greater degree of certainty for the tonnage and grade of a portion of the scheelite bearing skarn in the Upper and Lower Bands. The results of this program are reported in Progress Report - Exploration of the Gotcha Claims by Mr. J. P. Elwell, P.Eng. and included as Appendix C. From the percussion drill hole results it was estimated that the Upper and Lower Bands contained 14,000 s.t.u. as drill indicated ore with an additional 3700 s.t.u. as probable and possible.

With the results obtained from the percussion drill program a Preliminary Cost Study was carried out by Mr. J. P. Elwell, P.Eng. for NCA Minerals Corporation in March 1978. It was recommended that metallurgical tests should be made to determine the actual recovery and grade of concentrate that could be expected from production. It was also recommended that development drifts be driven over both the Upper and Lower bands to open up the part of the ore zones which would be mined by underground methods and also provide access for further exploration of the mineral zones beyond the limits delineated by drilling. Mr. Elwell's report is included as Appendix D.

Following the report submitted by Mr. J. P. Elwell, P.Eng. and independent review of the data available and an examination of the property was carried out by Mr. B. Hicks, P.Eng. of Brodie Hicks Engineering Ltd. The results of his findings are included as Appendix E. Mr. Hicks recommended that additional development should be carried out to up-grade the reserves and that a better understanding of the metallurgy of the ore be obtained.

(D) From the period of May 1978 to August 1978, United Mineral Services Ltd. had three separate metallurgical tests carried out by Bacon, Donaldson & Associates Ltd. as well as a semi-quantitative spectrographic analysis carried out by the Department of Mines and Petroleum Resources. The results of these tests are found as Appendix F.

The scheelite ore was found to respond well on bench scale tests using tabling and flotation techniques. Tabling of the ore was found to yield a 71% recovery and a 50% WO_3 concentrate. Flotation tests indicated a 80% recovery and a 11% to 36% WO_3 concentrate. A jig used in conjunction with a flotation circuit yielded a 16% concentrate and recovered 35% of the total 85.6% WO_3 recovered.

The semi-quantitative analysis of the ore showed that there are no deleterious impurities.

In order to obtain an indication of ore grades after dilution from mining and the response of the ore to a larger scale mill test, United Mineral Services Ltd. processed 200 tons of ore through a flotation mill located at Lumby, B. C. Results of this test are found in Appendix G. Head

grades varied from .97% to 2.99% and it is reasonably justified to assume an overall average grade of 1.5% for the ore with an assumed dilution of 25%. Concentrate grades varied between 20.8 and 43.4% WO_3 . Recoveries were low (in ~~the neighbourhood of~~ ^{approximately} 50%) due to problems of controlling the grind.

The results of the tests show that the ore is easily amenable to concentration by gravity or flotation methods.

The development work undertaken by United Mineral Services Ltd. during the 1978 field season established a greater understanding of the nature of the distribution of the scheelite mineralization within the skarn zones and the established grade of mineralization after dilution due to open pit mining methods. An overall grade of approximately 2% WO_3 can be assigned to the Upper Band and it appears that a tonnage greater than the original 3000 tons estimate given to the Upper Band can be reasoned. The work performed has also established additional areas in which ore can be obtained by open pit mining methods.

REGIONAL GEOLOGY AND STRUCTURE

The Gotcha and Gotcha 2 claims are located in an area in which metasedimentary rocks of the Shuswap Metamorphic Complex have been intruded by a variety of granitic dykes, stocks and sills. The metasedimentary assemblage consists of quartz-mica schist, garnet-mica schist, marble, muscovite-chlorite (biotite) schist, amphibolite, quartzite and metasedimentary gneisses. These rocks have undergone polyphase deformation and the metamorphic assemblage belongs to the upper amphibolite or hornblende

hornfels facies.

Principal deformation and metamorphism of the Complex occurred in a time interval between Upper Triassic and Upper Jurassic. A general north to northwesterly trend of major and minor structures, including fold axes, lineations and compositional layering exists in the metasedimentary rocks in the northern portion of the Maxwell Creek area. A change to a predominately northeasterly trend of major and minor structures is found on the Gotcha Claim group. Large scale anticlinoria and synclinoria as well as smaller scale isoclinal folds and angular folds are recognized structural features of the Shuswap Metamorphic Complex and it is evident that such folding can be expected to be found within the Maxwell Creek area.

The metasedimentary rocks have a sequence that is lithologically similar to the Lower Cambrian Hamill quartzite - Badshot limestone succession and are tentatively assigned as correlatives of these formations.

Granitic rocks that intruded the rocks of the Shuswap Metamorphic Complex include medium-grained biotite granodiorite, alaskite, quartz monzonite, quartz diorite and biotite granodiorite. Pegmatites represent a late stage intrusive event and intrude all other granitic rocks. These intrusives have been assigned an Upper Cretaceous age and a K/Ar age date from an alaskite located in the Upper Skarn Band yielded an age of 64 m.y. (accuracy 3%) placing the time of intrusion on the Gotcha claims as Lower Tertiary. The emplacement of the intrusives within the metasedimentary rocks has resulted in the formation of contact metamorphic aureoles that contain large masses of tactite. It is within portions of these tactite zones that scheelite mineralization is found.

Faulting post-dates skarn and intrusive formation and these faults trend northeast and northwest and may be accomplished by strongly developed gouge zones.

A general summary of the geological events that occurred within the Maxwell Creek area are as follows:

- (1) Lower Cambrian (?)
Deposition of a series of interbedded quartzites, limestones, and pelites.
- (2) Upper Triassic to Upper Jurassic
Polyphase deformation and the formation of an amphibolite grade metamorphism of the sedimentary succession.
- (3) Upper Cretaceous and Lower Tertiary
Intrusion of a variety of intermediate to acid intrusive rocks.
- (4) Lower Tertiary
The formation of tactite bodies within calcareous beds of the sedimentary succession.
- (5) Post Lower Tertiary
Disruption of the lithologies by northeasterly and northwesterly low to high angle faulting.

GEOLOGY OF THE GOTCHA CLAIM

The work carried out on the Gotcha property since 1972 has established a series of northeasterly trending areas of metasedimentary rocks that

occur as pendants of generally west to northwesterly dips. The area in which these pendants are found has been traced for approximately 400 metres (1200 feet) to the southwest of Maxwell Creek and the width of this area is approximately 200 metres (600 feet). At the southwesterly portion of this area the metasedimentary rocks are bounded on both sides by granitic rocks. The pendants lie within and are separated by intrusive rocks and are cut by numerous sills. Contact metamorphism has occurred along this northeasterly trend and a variety of contact metamorphic mineral assemblages have been produced. The calcareous rocks show stages of development from original marble to a coarsely crystalline quartz-garnet-epidote-vesuvianite rock.

Of the variety of skarn assemblages that occur on the property three important assemblages predominate.

(1) Massive garnet-quartz-epidote-vesuvianite skarn.

This skarn type consists of coarsely crystalline garnet, quartz and vesuvianite with varying amounts of accompanying epidote, sphene and apatite. This assemblage is widespread on the property as evidenced in both outcrop and diamond drill hole interests.

(2) Diopside-clinozoisite-tremolite quartz skarn.

This skarn type is generally fine grained and can display a banded texture. It appears that this skarn type attains a continuity of composition and can be correlated in outcrop exposures and between diamond drill holes.

(3) Wollastonite-garnet-calcite skarn.

This skarn type is medium to coarse grained and appears to have a variable distribution throughout the property. The presence of wollastonite indicates formation at low pressure (1 to 2 kilobars) and high temperatures (500 to 700 degrees Centigrade) with the availability of SiO_2 . Wollastonite-garnet-calcite skarn occur along the northeasterly edge of the area of metasedimentary rocks.

Scheelite Mineralization

Tactite zones that have been delineated on the property are commonly composed of varying proportions of the three skarn assemblages described. The tactite has a widespread horizontal and vertical distribution as seen in both surface outcrop and diamond drill hole intercepts.

Within these tactite zones varying amounts of scheelite mineralization can be observed. Skarn types (1) and (2) host the most significant concentrations of scheelite while skarn type (3) has not been found to contain any appreciable amounts of scheelite. Skarn type (1) hosts pervasive late-stage silification that is accompanied by coarse grained scheelite. Quartz segregations frequently are noted to occur as irregular veinlike masses within and bordering the skarn. The quartz bodies yield no scheelite but nearby in other parts of the same zone scheelite may be concentrated. In areas of skarn type (1), it has been noted that the most abundant concentration of scheelite are frequently found where quartz is abundant. The garnet-quartz-scheelite association of skarn type (1) appears to be the most productive and widespread skarn assemblage, however,

the diopside-epidote-quartz-scheelite association of skarn type (2) contains unusually high grade concentrations of scheelite as noted in the area of the Lower Band.

Within in the tungsten-bearing zones of tactite there are areas in which no scheelite occurs, and the nature of the distribution of zones in which scheelite deposition occurred must be appreciated in the evaluation of the tactite zones.

In general it appears that the formation of the various skarn assemblages found on the Gotcha Claim has been in progressive stages. At an advanced stage of contact metamorphism skarn types (1), (2) and (3) have been formed. The wollastonite stage of skarn formation has not been accompanied by tungsten deposition of any importance. The formation of the silicates of the garnet and epidote group when accompanied by abundant excess quartz represent a stage at which scheelite mineralization may be expected to form in greater abundance.

FORM OF SCHEELITE ZONES

The results from past exploration and development work have outlined two scheelite bearing zones that have been denoted as the Upper Band and the Lower Band. Scheelite mineralization is found to ^{swell} dilate and ^{pinch} constrict within the skarn assemblages to form irregular lensoid masses. The shapes of these mineralized zones are particularly well illustrated in the reports by Mr. J. P. Elwell, (Appendix D, Estimated Tonnage for the Lower Band) and Mr. D. Cook (Appendix A, Estimated Tonnage for the Upper Band, p.9). Determining the actual dimensions for the mineralized zones

has been done on a basis of grade and mineable widths, and the degree of confidence that can be assigned to the width given at any particular point. It should be noted that in the evaluation by United Mineral Services Ltd. (Appendix B, Figure 3B) that an estimated tonnage of 3000 tons with a grade of 1% WO_3 was calculated for the Upper Band. The tonnage estimate for the Upper Band was calculated for two sections - a frontal block of 2000 tons and a rear block of 1000 tons. After stripping off the overburden covered area it was found that the surface topography was more pronounced than that depicted in the original estimate. This can be seen in the fact that from the 3692' elevation, the rear of the frontal blocks extends up for a distance of approximately 75 feet and is mineralized over a width of 20 feet. The grade of the slope is not as pronounced as originally depicted and the estimated tonnage given originally as 2000 tons can reasonably be justified as being in the neighbourhood of 5000 tons. As previously mentioned the grade of the material tested was approximately 2% before dilution.

The rear portion of the tonnage estimate for the Upper Band has been shown to restrict and pinch down to a width of approximately 2 feet, however, scheelite mineralization has been noted over a length of 14 feet (Appendix H - Diamond Drill Logs - D.D.H. 2).

From the exploration and development work done up to date it has been shown that the scheelite bearing skarn zones have lensoidal geometry within larger zones of skarn assemblage minerals. The boundary to the limit of scheelite mineralization may be abrupt as in the case with the Lower Band or may be diffuse as in the case of the Upper Band.

POSSIBILITIES FOR ORE CONTINUATION

Tonnage calculations for the Upper Band have been made using the 3692 foot elevation as a cut-off. It is obvious from the results obtained from the percussion hole drilling performed in January 1978 that this is an arbitrary level and that scheelite mineralization is known to extend down at least to the 3676 level in the Lower Band. Extensions of the Lower Band are expected to be found to the northeast of the limited of percussion hole drilling and also at depth.

Extensions of both the Upper and Lower Band to the southwest are by no means eliminated and the possibilities of finding additional scheelite bearing skarn zones are good. This possibility has been shown by the discovery of an additional scheelite bearing skarn zone during the development work carried out during the 1978 field season. This zone is approximately 50 feet to the southeast of the Lower Band and is approximately 3 feet wide and contains greater than 2% WO_3 (visual estimate).

Diamond drilling performed by Union Carbide has indicated appreciable thicknesses of skarn assemblage minerals that are host to the scheelite mineralization in the Upper and Lower Bands. A more definitive geological model will help delineate those areas in the southwestern portion of the property where additional zones of scheelite mineralization can be expected to occur.

PROPOSED EXPLORATION PROGRAM

A program involving detailed geological mapping and surveying, taking into account the structural features that are evident on the property,

should be undertaken. The area involved in this mapping program would focus on the geology between Diamond Drill Holes, 9, 10, 11, in the southwest, 4 and 8 in the southern portion and 2, 7, 5, 3, and 1 in the northern portion of the area. Upon completion of the mapping program and a revised structural interpretation of the geology, a drilling program should be undertaken. The drill program would be designed to more fully delineate the scheelite mineralization in the Upper and Lower Bands and test the geological possibilities that exist for the occurrences of additional zones of scheelite mineralization that may occur in the southwestern portion of the property. This recommended program is envisioned to entail approximately one month of geological field work followed by approximately 4000 feet of diamond drilling.

In addition, previous soil sampling has been able to locate areas of scheelite mineralization and it is suggested that a more widespread soil sampling program may be useful in delineating areas of scheelite mineralization that are overburden covered. Such a program would likely entail close spaced sampling. An initial survey over the known mineralized zones at different sample intervals would determine the optimum soil sample interval required. Care would have to be taken in determining the type of soil sampled in order to ^{erate} ~~interpret~~ the results of such a survey.

A feasibility study should follow drilling to determine the approach to be taken to place the Gotcha property into commercial production.

APPENDIX A

