

REPORT
ON
VERITY
COLUMBIUM-URANIUM
PROPERTY

North Thompson River
B. C.

~~MINING DIVISION~~

Alex Smith
Geologist

~~ENGINEER~~

83-M

R E P O R T

ON

VERITY COLUMBIUM-URANIUM PROSPECT

NORTH THOMPSON RIVER, B. C.

by

ALEX SMITH, GEOLOGIST

Vancouver, B. C.

June 10th, 1954

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VERITY COLUMBIUM-URANIUM PROSPECT

NORTH THOMPSON RIVER, B. C.

MAPS & SECTIONS

<u>Map No.</u>	<u>Listed in order as in binder</u>	<u>Scale</u>
	- Index Map of B. C. showing location of Verity.	
V3	- Claim Map showing trend of dolomite and access trails <u>Sections:</u> A-B C-D & E-F	- 1" = 1000'
V5	- Bulldozer stripping Mill Area	- 1" = 100'
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V1	- Verity surface showings 1952 Geology and Uranium Assays	- 1" = 100'
V2	- Verity Bulldozer stripping 1953 and Columbian Assays <u>Sections:</u> Verity dolomite Sec. 300'-1500'E. Cut at Sta. 59 Map V2 - Sampling and Assays Trench T1 at Sta. 96 Map V2 - Sampling	- 1" = 100' - 1" = 10' - 1" = 40'
V6	- Paradise Area. Geology and Sampling	- 1" = 100'

R E P O R T
ON
VERITY COLUMBIUM-URANIUM PROSPECT
NORTH THOMPSON RIVER, B. C.
S U M M A R Y

The Verity property is well situated on the C.N.R. for low cost operation. The Uranium-Columbium mineral pyrochlore occurs in a dolomite horizon(?) which has been traced eastward for 3 miles from the railway. The mineralized portion of the Verity dolomite - the most accessible and the largest area tested to date - is 2000' long and 200' thick at the surface. In this section about 6,600,000 T. could be mined by open-pitting. Present indications are that the average grade of this would be Nb - 0.05% = \$4.00, U₃O₈ - 0.007% = \$1.00 and apatite 5% = \$0.50 - total \$5.50. Perhaps \$4.00 per T. could be recovered in concentrates at a cost of \$3. per T. Possible additional byproducts are - Vermiculite, zircon and ground dolomite.

Unknown factors are (1) The recovery, and (2) The worth of pyrochlore concentrates. Higher grade deposits now being tested in Africa and Ontario might make lower the price of Columbium and make the Verity definitely non-economic. On the other hand, there is a potential of 50,000,000 T. of pyrochlore-bearing dolomite; And there is the possibility of finding mineable thicknesses of better grade by short hole diamond drilling.

If there is a reasonable expectancy that the present price of Columbium will be maintained, then the expenditure this year of an additional \$10,000. on the Verity is warranted. This should be for diamond drilling and metallurgical tests.

The following report includes the field work of H.D. Hughes, Geologist in charge of the prospecting and trenching in 1952, and C. M. Campbell Jr. Mining Engineer, who supervised the Bulldozer stripping and sampling in 1953.

LOCATION:

The property is situated on the east side of the North Thompson River at Mile 109, C.N. Railway, Albreda Subdivision, about mid way between Pyramid and Lesprière Stations. The nearest settlement is the divisional point, Blue River, 23 miles to the south. The property is 165 miles from Kamloops, and 425 miles from Vancouver. To the east the nearest towns are Jasper, 110 miles, and Edmonton, 346 miles.

This section of the North Thompson River area is heavily timbered with hemlock, spruce, cedar and underbrush, including devil's club.

Climate and topography are much like that along the coast. Snowfall is heavy in this particular section of the North Thompson.

In 1953 the Trans-Mountain Pipe Line was laid through this North Thompson valley.

The only settlers in the country depend on lumbering, chiefly pole-cutting, for their livelihood. O. E. French and family live at Mile 109, and are the discoverers and owners of the property.

PROPERTY:

The original 21 claims located by the French family were known as the Verity, Counter and Paradise Groups.

The Verity was originally located as a vermiculite deposit. Later the family found radioactivity in the dolomite, and staked the Counter and Paradise Groups as an extension. These claims extended from the railway track, at elevation 2400',

eastward for 12 claim lengths to the Paradise Group, which is in alpine country above timber line at an elevation of over 6500'.

Since May, 1952, when the property was optioned by St. Eugene, additional claims have been located adjacent to the original holdings. At present property consists of 80 claims.

Being on the railroad, the property could be developed and operated economically. There is adequate timber for all construction and mining purposes. The North Thompson River would provide year round water supply. Local falls, such as those on Pyramid Creek, could produce 2000 or 3000 horse power, but the nearest large hydro-electric site is some 30 miles to the south at Little Hell's Gate.

DEAL:

St. Eugene holds an option to purchase a 95% interest in the property, for a total price of \$100,000. Purchase terms are as follows:

For the first 3 years of the option the Company is to spend a minimum of \$10,000., a year on the property, and to receive for such expenditure a 10% interest for every \$10,000., so spent. At the end of this time, that is, on June 30th, 1955, cash payments are to commence as follows:

\$20,000.	on or before the	1st of November,	1955
\$16,000.	do	1st of November,	1956
\$16,000.	do	1st of November,	1957
\$16,000.	do	1st of November,	1958
\$16,000.	do	1st of November,	1959
\$16,000.	do	1st of November,	1960

HISTORY:

The original showing of vermiculite was found by the family during the course of pole-cutting operations. The Zenolite Corporation have examined the showings. They decided the property did not have commercial possibilities in vermiculite.

In 1951 French found radioactivity in a dolomitic rock carrying magnetite, zircon, apatite, etc. B.C. Department of Mines determined that the radioactivity was due to the mineral pyrochlore, a sample sent in by French assaying 0.2% U_3O_8 and $(Cb_2O_5 + Ta_2O_5) = 1.7\%$.

The writer examined the property in May, 1952. The uranium content was found to be about 0.01% U_3O_8 , i.e. non-commercial. However, if the uranium and columbium were present in the proportions indicated for the mineral pyrochlore, then the deposits might have commercial possibilities.

During the summer of 1952, a five to seven man crew was put on the property prospecting. They traced the dolomite horizon to the east and north, so that the present 80 claims were required to cover the outcrops and their suspected down-dip extensions. In 1953 the Verity showings were further opened up by bulldozer stripping and trenching.

During the course of this work, and until February, 1954, we were unable to get reliable assays on the hundred or so samples submitted (over 1000 lb.). Values received were either unbelievably high or unreasonably low. During this period similar difficulties were being faced by others in assaying for columbium. The principal difficulty appeared to be that

the presence of titanium in considerable quantity made columbium determination unreliable.

During the past year the U.S.G.S. have developed, or re-vamped, the thiocyanite method of analysis for columbium. We are now getting results that check from Q.M.I. labs.

The present report will include or discuss only those assay returns that we believe at present are reliable.

GEOLOGIC SETTING:

The country rock in the area is a series of felspar, quartz, biotite, hornblende gneisses of sedimentary origin. These rocks are thought to be comparable to the Shuswap terrane to the south and the Wolverine complex to the North, I.E. perhaps in part Proterozoic.

Interbedded with the gneiss, and in general conformable with it, is the mineral-bearing dolomite horizon. This shows evidence of squeezing and lensing. Because of its peculiar mineral assemblage, it is not clear to date whether (a) it is an original carbonate horizon in the gneiss, or (b) injected into the gneiss, or (c) replacing gneiss along one particular horizon.

The dolomite and gneiss are cut by later simple quartz-felspar pegmatites. Some of the larger bodies are sill-like, others are narrow cross-cutting pegmatites. No uranium-columbite minerals have been found in these pegmatites on the Verity, but four miles to the south a complex zoned pegmatite carries uraninite and columbite. Perhaps the mineralization in the Verity dolomite originated in the now barren peg-

matites of that area.

The dolomite varies in thickness from 0' to 400'. In the thicker portions there is the tendency for the upper portion to be richer in uranium (pyrochlore) and to contain only occasional light green disseminated fogs, and for the lower portion to be richer in biotite, vermiculite and hornblende. Occasionally zircons are common. Apatite often makes up 5-10% of the rock. The geiger count is 2 or 3 times as great in the upper portion as in the lower portion.

Our assays to date indicate that the distribution of columbium is more regular than the distribution of uranium, as shown by the geiger counter.

The following more detailed description is from B.C. Minister of Mines Annual Report, 1952, p. A117:

"Basically the carbonate rock is dolomitized limestone with accessory vermiculite, apatite, magnetite, olivine, ilmenite, green amphibole, zircon, pyrrhotite, and pyrochlore. These accessory minerals are not all present in every exposure, and they vary in relative abundance. Olivine seems to be most abundant toward the bottom of the carbonate zone, while pyrochlore and green amphibole are concentrated nearer the top contact. The vermiculite content varies from less than 1 to more than 10 per cent. It occurs as books, with diameters ranging from one-sixteenth to 4 inches, scattered through the limestone and as solid lenses up to 4 feet wide and 25 feet long. Apatite occurs in smooth greenish-white tear-drop-shaped grains from one-sixteenth to three-sixteenths inch in diameter and makes up from 4.3 to 11.3 per cent of the rock. Magnetite is widely dispersed but in relatively small quantities. It is found as small grains and irregular lumps as much as 6 inches in diameter. The magnetite is peculiar in that it invariably exhibits well-developed octahedral parting. The olivine has a brown to green colour and varies in grain diameter from one-sixteenth to 1 inch or more. Ilmenite and green amphibole occur in small disseminated grains. Zircon is not common. It is found in irregular masses

and well-formed crystals up to half an inch long. Pyrrhotite is scarce. Difficulty was encountered recognizing pyrochlore in the field, and, as a result, its actual distribution is not too well known. It was assumed that all the pyrochlore was uraniferous, and samples were taken where Geiger counts proved greatest. Subsequent assaying of samples, however, showed that only three out of the eleven samples taken contained appreciable pyrochlore. Two of these samples were along the top contact of the carbonate zone, and the third was toward the centre of the zone. The pyrochlore occurs in three distinct forms; as small octahedral crystals, usually penetration twins; as irregular lumps as much as an inch in diameter; and as disseminated small grains. Its colour grades from dark brown to blackish, and the lustre is dull on weathered surfaces, to resinous and almost metallic on fresh surfaces. Frequently a tiny reddish halo surrounds the smaller grains and thus aids in locating them.

The surface of the carbonate rock is highly weathered, and to depths up to 8 or 10 feet it consists of a crumbly light-brownish material easily pulverized. The fresh rock below this layer has a light-grey-white background with the dark minerals standing out in sharp contrast. Usually there is a marked linear arrangement of the dark minerals paralleling the gneissosity of the country rock. The fresh rock is tough although relatively soft. It has a deceptively igneous appearance."

Garnet and kyanite-bearing varieties of the gneiss are common in the general area.

An outcrop of sodalite syenite has been found just north of the north-east corner of our claim area. Its extent is not yet known. The known columbium deposits of the world occur either in pegmatites or associated with such alkaline intrusives. Geochemically columbium travels with tantalum and titanium.

STRUCTURAL SETTING:

In the general area the gneiss dips at gentle

to medium angles. The suggestion is that the various dolomite areas are at about the same horizon in the gneiss, and might be connected in a gentle syncline or trough (see Map V3 and accompanying sections). The dolomite does not extend throughout this area as a uniform bed; rather it appears to occur as a series of squeezed or intruded lenses.

In places where the whole of a small lense is exposed, this squeezing or bowing of the gneiss beds is apparent. On the Counter No.5 such an outcrop has an undisturbed and regular gneiss footwall. The overlying rock is bent to conform with the whale-like outline of the dolomite.

DESCRIPTION OF THE DEPOSITS:

The two areas of most interest at present are the Verity and Mill showings. They are the largest and most accessible.

VERITY: The tested ground on the Verity (see Maps V1 and V2) covers an area about 600' wide and 2000' long. The owners had by 1952 done considerable work sinking prospect pits on the Verity dolomite. These pits were down into crumbly dolomite at a depth of 1 to 8 feet. Our original sampling of the deposit was mainly from this crumbly sandy dolomite. There was no place on the side hill of the Verity area where dolomite outcropped.

Additional pits put down by the Company, and our bulldozer stripping in 1953, outlined the dolomite fairly well for a length of 2000', with the dolomite angling up the hill at N76°E. Throughout this length the overlying gneiss

wall is fairly regular. The immediate eastward extension has not been stripped. Downhill to the west, dolomite appears to be narrowing or lensing out. Throughout most of the length explored, the section appeared to be as follows:

1. Overlying gneiss to the south.
2. Upper pyrochlore-bearing dolomite about 200' thick?
3. Gneiss interbed about 20' thick.
4. Pyrochlore-bearing dolomite similar to (2) above. 50' thick.
5. Lower dolomite horizon rich in vermiculite, forsterite and dark hornblendes. This horizon is not as regular. It appears to be squeezed to a maximum thickness of 300' in the central portion of the length exposed and to taper to 40' to east and west.
6. Underlying gneiss apparently similar to (1).

Note that Map VI shows a 25 foot thickness of dolomite-magnetite-vermiculite rock about 400' stratigraphically below Horizon 5.

Assaying and Sampling: The original 25 samples taken by the writer from the Verity cuts averaged about 0.01% U_3O_8 with a maximum of 0.04 U_3O_8 . Most of these samples were taken in crumbly material. As the highest values were obtained in fresher samples it was thought there might be some increase in U_3O_8 content on getting into fresh massive dolomite.

Late in 1952 a deep trench was put down on the eastern part of the Verity showing, extending from the gneiss footwall to as far stratigraphically down through the dolomite as we would reach bedrock. From this some 500 pounds of rela-

tively fresh dolomite (our samples 51-55) were sent for assaying and testing. Our most recent assay return from these samples is .06% Nb. (.085% Nb_2O_5).

To get better exposures bulldozer stripping and trenching in 1953 explored about the same section of the Verity dolomite. About 500 lbs. of samples (V series) have been sent out for sampling and testing. First results of composites of these samples assayed 0.11% Nb. We have recently received (April 5th) the detailed results of this sampling. Values are given on Map V2, and range from .01 to a maximum of .11% Nb.

During the past winter John French stripped an area about 55' long near the western end of the dolomite (Cut @ Sta. 59). This exposes a 15' stratigraphic(?) thickness. The workings were sampled systematically by the writer at 5' intervals, and the following ore section outlined -50' X 11.6' X .076% Nb. The phosphate content of this section is 5.2% expressed as apatite ($Ca_3(PO_4)_2$).

VERITY 5: Prospecting and trenching on this claim by St. Eugene Mining Corporation in 1952 located the dolomite at Elv. 4465' to 4510'. Samples H46, H47 and S7 represent the 50' or so thickness exposed. V133 and H58 are from the eastward extension traced on to the Counter 17 and 18 claims.

PARADISE: The Paradise #4 showings are 16,000' east of the lowest showing on the Verity. They lie in alpine country at elv. 6900-7200'. As shown on Map V6 the dolomite has a thickness of 50'-130' in the 800' length exposed.

Some 1850' to the south on the Paradise #3 (Elv. 6200'-6600') the dolomite has been traced for 900' along strike with a thickness of up to 150'. Gneiss bands within the dolomite are common in this area.

Samples H7 and H8 on the Paradise #4 and H10, H11 and H12 on Paradise #3 are the most significant.

The dolomite and bounding gneiss dips 30°-40° W suggesting that this area is on the east limb of an open synclinal structure (see Section C-D Map V3) with the Verity #1 - Counter 16 dolomite on the west limb.

MILL AREA: The Mill Area dolomite lies about 4500' north of the west end of the Verity. It is not known if the two bodies connect; they might do so in an open anticlinal nose. The attitude of the Mill dolomite is not known, but indications are that it may dip nearly parallel to the slope of the hill.

In appearance the Mill dolomite is similar to the upper portion of the Verity. Columbian values (see Map V5) average a little lower - Nb .04%, apatite 7.0%.

Metallurgical Tests: Preliminary tests by Quebec Metallurgical Industries, Ottawa Research labs show that gravity separation on a Wilfley Table does not give a good recovery although the concentrates are of good grade. (Nb = 6%±). Appended is a report by Mr. King outlining these tests.

OUTLOOK:

The tonnage of Nb₂O₅-U₃O₈ bearing dolomite is large - probably over 50,000,000 T. In the 2000' length of the Verity showing opened up to date there is indicated 6,600,000 T. that can be recovered readily by open-cut methods (see composite cross-sections Map V2).

For the Verity dolomite the average gross value of the contained metals is, judging from present limited assay returns, about -

Nb	- 0.05% @ \$2.80 per lb.	Nb ₂ O ₅	=	\$4.00
U ₃ O ₈	- 0.007% @ \$7.50 " "	U ₃ O ₈	=	1.00
Apatite	- 5.0% @ \$7.50 per T. of 75% concs.		=	<u>0.50</u>
		Total		\$5.50
		Estimated Recovery 75% (?)		\$4.10

The best mineable section opened to date in the Verity dolomite is an 11.6' thickness in cut @ Sta. 59, where Nb - 0.076%, apatite 5.2% -

Nb	- 0.076%	\$6.12
U ₃ O ₈	- 0.15% est.	2.25
Apatite	- 5.2%	<u>0.50</u>
		\$8.87
	Estimated Recovery 75% (?)	\$6.62

Other possible bi-products are; ground dolomite, magnetite, and zircon concentrates. The proximity of the Verity and Mill areas to the railroad should make for cheap operating costs.

To date we have not found any indication of mineable bodies of a grade higher than the above. Such may exist and they could best be prospected for by short-hole vertical drilling.

There is a reasonable expectancy that at a rate of 1000-3000 T. per day the Verity dolomite could be mined by open pitting and concentrates for a total of \$3.00 or less per ton. The gross recovered metal value at present prices is estimated to be about \$4.00 per ton. The unknown factor is the actual worth of a pyrochlore concentrate containing these values, i.e. - What will it cost to recover the columbium and uranium out of these concentrates? What is the true value per pound of niobium and uranium contained in a pyrochlore concentrate?

With a ratio of concentration of 200:1 it could cost up to \$200.00 to recover the values from a ton of concentrate before the \$1.00 per T. difference between \$3.00 operating cost and \$4.00 metal value per T. were used up.

Also what is likely to be the long term outlook and price for niobium? There are reportedly large tonnages of 0.25% Nb_2O_5 ore being developed in Uganda and at L. Nipissing and near Chapleau, Ont. If these were to bring the price of niobium down from the present \$2.80 per lb. Nb_2O_5 , it would lessen the possibility of making a profit on the 0.05% ore of the Verity.

RECOMMENDATIONS:

From present indications it appears warranted to spend a further \$10,000. on the property this season. This should include diamond drilling on the Verity to accurately determine the average grade. There is also the chance of finding higher grade ore sections. A bulk sample of fresh dolomite should be mined for needed metallurgical tests.

Six vertical holes 150-250' deep drilled from the hanging-wall contact through sections 300-1800 (map V2 and cross sections) should be the first stage. Access roads for this work are already in.

The cash payments starting with \$20,000., November 1st, 1955, are stiff unless there is a likelihood of production in the near future. Perhaps the \$20,000., payment could be changed to a commitment to pay \$3,333. annually for the period 1955-1961, and the other payments be deferred six years. If production started in the interim the annual payments of \$16,000., could be made.

Alex Smith

Alex Smith
Geologist

Vancouver, B. C.

June 10th, 1954

Laboratory Tests of
Niobium Samples from British Columbia

In December, 1953, samples from St. Eugene Mining Corporation, Vancouver, were tested to determine a suitable method of concentrating their content of niobium. In each case the feed was low in grade, and in no case did the concentrate show a good grade and good recovery.

The "M. & H" series of assay rejects (our sample No. 699) was combined and tabled, with results shown on the attached Lab. Test 184-1. Half the niobium was recovered in a concentrate containing 1.80% Cb.

Samples V-101 to V-133 (our sample No. 797) were combined and tabled. The concentrate analyzed 5.50% Cb with a recovery of 11.13%, to which might be added 6.47% of the niobium contained in the table middling making 18.60% overall recovery, as noted in Lab. Test 184-2.

Samples S-1 to S-7 and S-10 (our sample No. 678) were combined, passed over a Dings Magnetic Separator, and then tabled, as shown in Lab. Test 184-3. The table concentrate again was of a good grade, 6.60% Cb, but the recovery was poor at 11.87%, or 37.40% when the table middling is included. The magnetic concentrate at 0.31% Cb contained 5.17% of the niobium in the feed.

A sample of "bugaboo Placer Sand" was screened into three sizes and each size was passed over the Dings Magnetic Separator and then tabled. The table concentrate was then screened and the fractions were passed through an Electrostatic Separator. The results, shown in Lab. Test 184-4, give the niobium analyses as Cb_2O_5 . The magnetic separation, tabling, and electrostatic separation were not effective.

Lab. Test 184-1

December 8, 1953

Object: - To produce a concentrate from a combined lot of samples, marked "M & H" Series (our sample No. 699), St. Eugene Mining Corp., Vancouver, B. C.

Procedure:

- (1) A total of 14 samples marked "M & H" Series, our Lab. No. 699, (total weight 55 lbs.) were combined, and fed at a given rate to a Lab. size Wilfley table.
- (2) From the Wilfley table 3 products were obtained - concentrate, middlings, and a tailings.
- (3) All products were dried, weighed and analyzed.
- (4) Results are indicated in the table below.

Results:

<u>Product</u>	<u>Weight Percent</u>	<u>Analysis % Niobium</u>	<u>Distribution % Niobium</u>
Table Concentrate	3.27	1.80	49.38
Table Middlings	15.46	0.18	23.35
Table Tails	<u>81.27</u>	<u>0.04</u>	<u>27.27</u>
Heads (calc.)	<u>100.00</u>	<u>0.12</u>	<u>100.00</u>

Object: - To produce a concentrate from a combined lot of samples marked V-101 to V-133 (our sample No. 797), St. Eugene Mining Corp., Vancouver, B. C.

Procedure:

- (1) A total of 33 samples, marked V-101 to V-133 were combined and then ground in a laboratory ball mill (in batches of 2000 grams each) to minus 28 mesh. Total weight 280 lbs.
- (2) The ground pulp was then passed over a Dings Magnetic Separator which produced a magnetic concentrate.
- (3) The balance of the pulp was then fed at a given rate, to a laboratory Wilfley table.
- (4) From the Wilfley table 3 products were obtained - concentrate, middlings and a tailings. The concentrate was graded-up by re-tabling, the balance of the material from the second pass was designated, "cleaning table tails".
- (5) All products were dried, weighed and analyzed.
- (6) Results are indicated in the table below.

Results

<u>Product</u>	<u>Weight Percent</u>	<u>Analysis % Niobium</u>	<u>Distribution % Niobium</u>
Magnetic Concentrate	1.82	0.10	1.68
Table Concentrate	0.22	5.50	11.13
Table Middlings	0.44	1.60	6.47
Cleaner Table Tails	5.25	0.09	4.34
Primary Table Tails	<u>92.27</u>	<u>0.09</u>	<u>76.38</u>
Heads (calc.)	<u>100.00</u>	<u>0.11</u>	<u>100.00</u>

Lab. Test 184-3

December 8, 1953

Object: - To produce a concentrate from a combined lot of samples marked S-1 to S-7, and S-10 (our sample No. 678) from St. Eugene Mining Corp., Vancouver, B. C.

Procedure:

- (1) The total lot of samples were combined, and ground to -28 mesh. Total weight 315 lbs.
- (2) The ground ore was passed over a Dings Magnetic Separator, which produced a magnetic concentrate and a tailings.
- (3) The tailings, from the above step, were then fed to a standard size Wilfley table which produced a low grade concentrate, a middlings and a tailings.
- (4) The concentrate from step 3 was graded up on a laboratory size Wilfley table, with the remainder of the material from this cleaning being designated as cleaner tails.
- (5) All products were dried, weighed and analyzed.
- (6) Results are indicated in the table below.

Results:

<u>Product:</u>	<u>Weight % Niobium</u>	<u>Analysis % Niobium</u>	<u>Distribution % Niobium</u>
Magnetic Concentrate	1.02	0.31	5.17
Table Concentrate	0.11	6.60	11.87
Table Middlings	1.04	1.50	25.53
Cleaner Table Tails	8.24	0.10	13.47
Final Mill Tails	<u>89.59</u>	<u>0.01</u>	<u>43.96</u>
Heads (calc.)	<u>100.00</u>	<u>0.06</u>	<u>100.00</u>