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Preliminary Geological Report

over the area of the mineral claims known as Buck nos. 1, 2 and 3, record no. 9006, 9007, and 9008, held in the name of K.A. Butler of Osoyoos, British Columbia and the adjacent group of claims known as Cal nos. 1 to 24 inclusive, record nos. 9767 to 9790 inclusive, held in the name of R.E. Addinell of Calgary, Alberta.

All the mineral claims are located in the Osoyoos Mining Division, four miles west of the town of Osoyoos, British Columbia, in the southwest quadrant of the 1-degree quadrilateral, the southeastern corner of which is located at latitude 49 degrees, longitude 119 degrees.

By. R. Alan Rudkin P. Geol. (Alberta)
For R.E. Addinell of Calgary, Alberta.

The field work was carried out by the author during the period June 22 to June 26, 1965 inclusive. In addition considerable laboratory and office time prior to and after the field work were involved (see methods).

The value of the work here reported is $ 1000.00 plus $ 240.00 travelling and living expenses.

R. Alan Rudkin P. Geol.

August 1965.

Qualifications

Graduate, University of Alberta, Edmonton, Alberta
B. Sc. in Geology, 1950

Member, The association of Professional Engineers of Alberta. Registered as a Professional Geologist under the terms of the Engineering and related professions act.

Costs

5 days field work @	$125.00 a day	625.00
3 days lab. & report @	125.00 a day	375.00
Travelling expenses, (motel & meals)		90.00
Car, 1250 miles @ 12¢/mile		150.00
	Total	$1,240.00

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Illustrations

Location and Geologic Setting

The area dealt with in this report lies on the western part of Kruger Mountain (on some maps the name Kruger Mountain refers only to a summit lying east of the report area) in southern British Columbia, about four miles west of the town of Osoyoos and about two miles north of the international boundary.

It lies within an alkaline phase of the Nelson batholithic complex. These rocks, which are of probable Cretaceous age have here intruded a metamorphosed sedimentary series of late Paleozoic age which marks the eastern edge of the batholith.

Access to the area is provided by a narrow dirt and gravel road (figure 1), passable in dry seasons to an automobile. This road meets the Richter Pass highway near Osoyoos.

Object of Geological Examination

The object of this preliminary study was to map the extent of the nepheline syenite which comprises part of the alkaline phase of the batholith and to delineate any zones that might have economic possibilities. The claims over the area were all staked for nepheline syenite.

Methods

The position of the outcrops examined and geologic contacts were plotted in the field on air photos obtained from the British Columbia Department of Lands, Forests and Water Resources, they were flown in July 1963.

Because of the lack of detailed maps in this area, a topographic map on a scale of 4 inches to 1 mile was constructed by the author from stereo-pairs utilizing elevations from the Keremeos map sheet, British Columbia Department of Lands. This topographic map forms the base for figures 1 and 2.

Traverses were controlled by Brunton compass. Periodic chaining provided a check on the air photo scale which varies in areas of high relief.

While syenite is fairly easy to recognize in the field, the presence of nepheline, which lacks diagnostic physical properties, is nearly impossible to detect through visual examination. However this mineral is soluble in hot hydrochloric acid and forms a gel on cooling. After considerable experimentation the following qualitative field testing method for the presence of nepheline was devised. Subsequent thin section analyses corroborated the field-test results.

Approximately one c.c. of the rock was finely powdered and added to a test tube containing four to five c.c. of a mixture of 1 part 37% hydrochloric acid to 1 part water. This was gently heated over a propane blow torch, for one minute to dissolve the nepheline. The presence of nepheline is indicated by the gelling of the liquid upon cooling. The speed with which the liquid gels and the viscosity of the gel appears to be a function of the amount of nepheline present. This test is therefore somewhat quantitative and can be roughly calibrated by a comparison of the nepheline content as determined from thin sections.

This test also provides a field check for the presence of carbonates, which, if present, are a serious detriment to the industrial use of nepheline syenite. It was also noted that the presence of iron compounds colors the liquid yellow, the color becoming deeper with a corresponding increase in iron. It was found during experimentation, that using pure nepheline in this test, the liquid remained clear or turned slightly milky, no yellow coloration was observed.

The extent of the nepheline syenite body defined in this report was established mainly by running the above described field test on most of the igneous outcrop localities shown on figure 2.

Geology (Figure 2)

Nepheline syenite occurs over an area a little over a mile long and approximately three quarters of a mile wide across the summit and on the south and north flanks of the western part of Kruger Mountain.

On the east side the nepheline syenite is in intrusive contact with metamorphosed sediments of probable upper Paleozoic age. These rocks are mostly fine-grained clastics of a predominantly green color. An apophysis of the nepheline syenite was observed within the altered sediments on the eastern flank, near the summit of the mountain, further corroborating the intrusive nature of the contact.

The nepheline syenite is a grey to dark grey, medium to fine grained rock showing little alteration. Along its eastern margin the rock is porphyritic, containing tabular crystals of orthoclase up to three quarters of an inch long.

To the south and west the nepheline content decreases and grades to a non-nepheline bearing syenite, (no. 4 on figure 2) which is coarser grained and contains a higher percentage of ferromagnesian minerals than the nepheline syenite. Small amounts of quartz were noted in this syenite along the extreme western edge of the map area, indicating that the rock is here grading to granodiorite.

The nepheline content of the nepheline syenite varies from 5% to 20%. The ferromagnesian content over most of the body is in the order of 35%. The highest ferromagnesian and lowest nepheline content occurs in the southern and western parts of the body. Here the greatest mineralogical and textural variations also occur.

The mineralogical composition of the nepheline syenite is shown by the following results of thin section analyses. Mineral determinations were often difficult due to the fine grained character of the rock.

Sample localities are shown on figure 2.

Locality 1

Dark grey, fine-grained nepheline syenite.

Orthoclase and microcline	55 %
Nepheline	10 %
Augite	15 %
Biotite	10 %
Magnetite and Metallics	5 %
Garnet, titanite, apatite	5 %
	100 %

Total ferromagnesians 35 %

Locality 2

Grey, fine-grained, porphyritic nepheline syenite

Orthoclase and microcline	55 %
Nepheline, partly altered to cancrinite	15 %
Biotite	15 %
Pyroxene	5 %
Garnet, magnetite, titanite, apatite	10 %
	100 %

Total ferromagnesians 30 %

Locality 3

Dark grey, fine to medium-grained nepheline syenite

Orthoclase and microcline	60 %
Nepheline	5 %
Pyroxene, augite	30 %
Garnet, titanite, magnetite	5 %
	100 %

Total ferromagnesians 35%

Locality 4

Dark grey, fine-grained, porphyritic nepheline syenite

Orthoclase and microcline	45 %
Nepheline, partly altered to cancrinite	20 %
Pyroxene, biotite, titanite, garnet	35 %
	100 %

Total ferromagnesians 35 %

Within the nepheline syenite mass, a small mineralogically and texturally uniform phase was delineated. This phase forms a ridge along the crest of the summit (number 3 on figure 2). The nepheline content of this phase is estimated at about 20% and the ferromagnesian content at between 15% and 20%. This phase, which is approximately 1500 feet long and averages about 300 feet wide is therefore the "purest" nepheline syenite observed in the area.

Although the ferromagnesian content of this phase is still too high to suggest economic value, the homogeneity of this rock is such that some further investigation is warranted.

Except for a few northwesterly trending faults running parallel to the long axis of this uniform body, the rock is not crushed, altered or mineralized, all of which are points of economic favor.

Conclusions and Recommendations

The nepheline syenite in this report area does not appear promising as an ore of commercial glass-grade material such as is produced from the Blue Mountain deposit in Ontario. The ferromagnesian content is too high and the rock appears too fine-grained to permit full removal of the ferromagnesians even if they are all magnetically susceptible.

However considering the uniformity of the deposit and the fact that it is ideally located for quarrying operations, consideration should be given to the possibility of low-grade nepheline syenite production.

In the past few years there has been a marked increase in glass fibre production. This industry will accept nepheline syenite with an iron content (Fe_2O_3) of 0.4% compared to glass grade material which requires an iron content less than 0.1%. The coarse or pottery grade ceramic industry (eg. sewer pipe) and colored glass manufacturers will also accept nepheline syenite with a relatively high iron content. In addition there are other possible uses for nepheline syenite where the iron content is not particularly critical such as in the manufacture of structural clay products.

A supply of nepheline syenite in British Columbia will have a great freighting cost advantage over Ontario material for supplying manufacturers based in the west. This factor alone could conceivably result in making low-grade nepheline syenite production an economic venture.

It is therefore recommended that some additional work be done on the low-ferromagnesian phase of the Kruger Mountain nepheline syenite. This body should be examined in more detail to better establish its extent and possible tonnage. However before any expensive assessment such as core drilling be carried out it will be necessary to know if the raw material is amenable to beneficiation. The rock should therefore be subjected to high-intensity magnetic separation to remove the iron compounds (ferromagnesian minerals). Chemical analyses should be run on representative samples, particularly for the SiO_2, Al_2O_3, Na_2O, K_2O, and Fe_2O_3 content as well as for the presence of other compounds such as phosphates, sulphur and carbon which are detrimental to the ore. These analyses should be run both on the raw rock and the processed ore to determine the amount of material removed by the magnetic separation. Experimentation relative to the degree to which the material must be crushed will probably be necessary to establish the maximum mesh size at which the ferromagnesian components will be broken free. Mesh size is often an important factor in marketing industrial minerals.

If the iron content can be reduced below 1% (preferably below 0.5%), samples should be submitted to the various manufacturers mentioned above to determine whether the ore meets their specifications.

The processes of ore beneficiation, interpretation of chemical analyses etc. are highly technical matters and should only be dealt with through competent professional personnel. It is therefore suggested that the opinion of a metallurgical or mining engineer be sought in considering these matters before any work along these lines is undertaken.

R. Alan Rudkin

R. Alan Rudkin P. Geol.

Edmonton Alberta,
August 1965
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TOPOGRAPHIC MAP OF PART OF KRUGER MOUNTAIN, BRITISH COLUMBIA

(Preliminary map, compiled mainly from air photos. Subject to revision).

FIG. 1

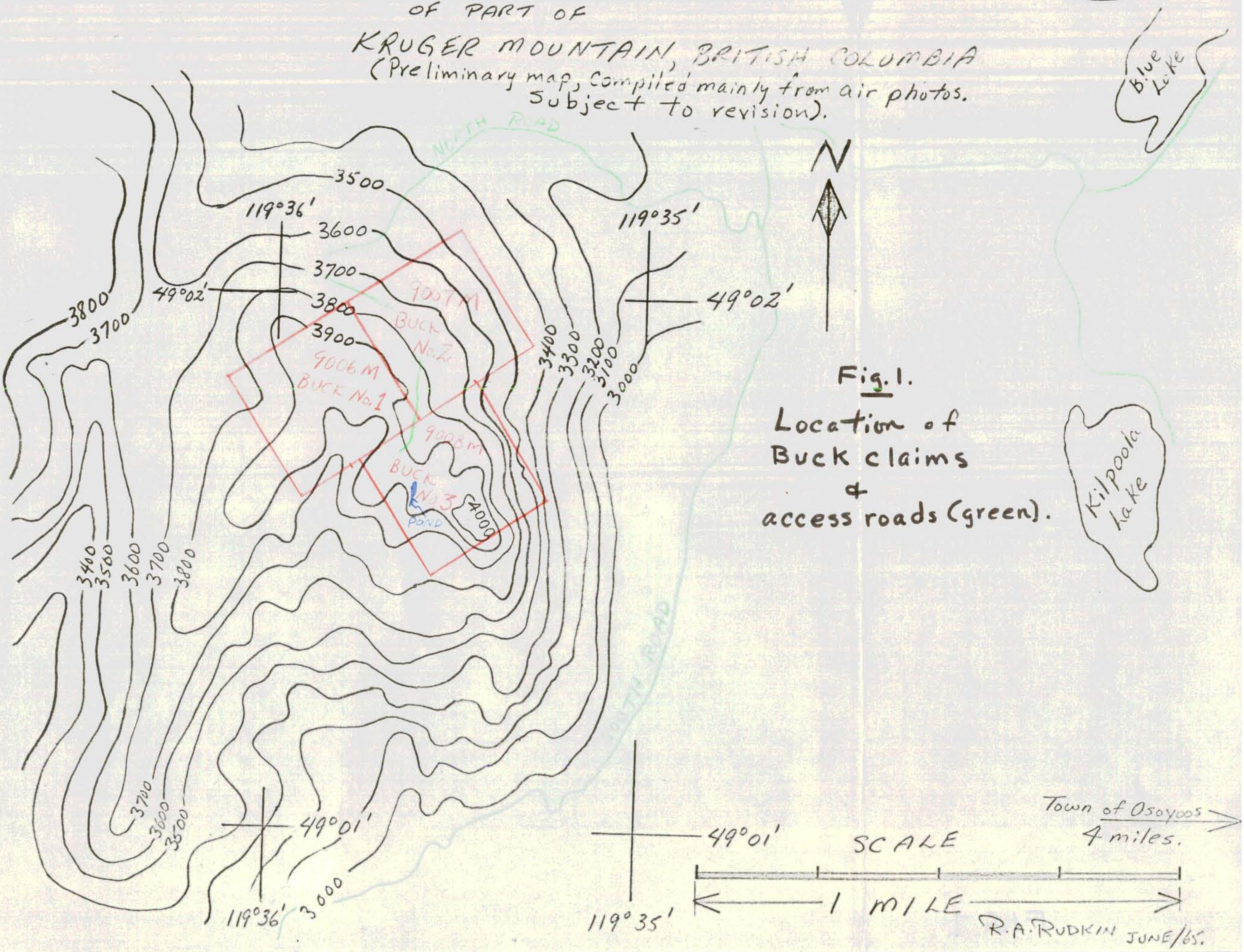

Fig. 1. Location of Buck claims & access roads (green).

R. A. RUDKIN JUNE/65.

FIG. 2.

TOPOGRAPHIC MAP