Vidler Creek Radioactive Prospect 1982

Study of U-Th in Guichon Creek Batholith / Uranium in Granites Workshop Nov. 18/81
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The Riddle Creek Uranium-Thorium Prospect (82E/12W) Published about now.

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~~Geology~~ Summit Lake Batholith - Preliminary Map + Notes (studied for U potential).

The Riddle Creek uranium-thorium prospect, 15 kilometres west of Summerland, B.C., was discovered in 1977 and acquired the same year by British Newfoundland Exploration Ltd. Work on the property to date includes line cutting, mapping, soil geochemistry, and several short drill holes.

The present report is based on recent geological and scintillometer surveys and a lithogeochemical study sponsored by the Ministry.

Geological Setting

A large radioactive anomaly coincides with an Eocene volcanic centre near the headwaters of Riddle Creek (Figure 1). The principal radioactive rocks include trachytes and mafic phonolites of the Marron Formation and consanguineous igneous intrusions of the Coryell-type.

~~Non~~Low-radioactive Country Rocks

At the base of the Tertiary section and north of the zone of anomalous radioactivity are poorly exposed polymictic boulder conglomerate beds tentatively assigned to the Springbrook Formation. These rocks appear to be unconformably underlain by granitic phases of the Okanagan Batholith (Jurassic-Cretaceous) and overlain by unnamed andesites. The andesites form a significant formation in the northeast part of the area comprising a thickness of about 250 metres of lava and breccia. This is mainly an alkaline variety of andesite (No. 1, Table 1) characterized by scattered microphenocrysts of plagioclase and hornblende usually less than 1 millimetre in diameter. Scintillometer readings on these rocks and other basal and basement units range from 40 to 80 counts per second.

Radioactive Rocks

The principal rocks that show anomalous radioactivity are mafic phonolites and trachyte lavas and breccias (Nos. 2 and 4, Table 1). These overlie the andesites and onlap parts of the Okanagan Batholith. They are dated 52.7 1.8 Ma (K/Ar on biotite) and correlate with the Yellow Lake Member of the Marron Formation near Penticton.

Mafic phonolites, which form the base of the Yellow Lake Member, are exposed on the ridges north and northeast of Riddle Creek where interlayered lava flows and lahar deposits attain a thickness of about 75 metres. Petrographic examination shows conspicuous rhomb-shaped anorthoclase phenocrysts to 2 centimetres in length and smaller subhedral and euhedral phenocrysts of green diopsidic augite, biotite, apatite, and magnetite set in a devitrified glassy or fine grained feldspathic matrix. Scintillometer readings are in the range 140 to 180 counts per second.

The most radioactive rocks are thick trachyte lava flows forming the upper part of the Yellow Lake Member in this area. This unit is estimated to be 150 to 200 metres thick and underlies the ridges and slopes immediately northeast and south of the confluence of the forks of Riddle Creek. The trachyte contains large rectangular or platy mixed feldspar phenocrysts of anorthoclase, sanidine, and plagioclase; otherwise the rock is petrographically similar to the mafic phonolite (rhomb porphyry) suite. Scintillometer measurements are in the high range of 300 to 420 counts per second.

Coryell plutonic rocks are viewed on the hillsides north and south of the westerly source of Riddle Creek. These are high level myrolitic syenomonzonite and monzodiorite phases (No. 5, Table 1) mineralogically akin, and feeders to the overlying Yellow Lake volcanic pile into which the Coryell pluton has evidently stopped. The rock is composed of about 80 per cent alkali feldspar, mostly orthoclase with rhomb-shaped anorthoclase cores, and 20 per cent smaller phenocrysts and interstitial grains of amphibole and pyroxene with poikilitic inclusions of biotite, magnetite, apatite, and sphene. The average scintillometer reading is 250 counts per seconds.

Scintillometer Survey

In the course of routine geological investigation of the Riddle Creek area, rock outcrops were tested in a manner outlined by McDermott (1977) using a portable gamma ray scintillometer (GeoMetrics/Exploranium Model GRS-101). Quantitative control was obtained for uranium from neutron activation of 24 samples, courtesy of D.R. Boyle of the Geological Survey of Canada, and for thorium from spectrometer analysis performed by the Analytical Division of the Ministry. The relationship between counts per second and uranium/thorium composition can be reduced to two equations:

$$U = C.P.S.\ (0.072) - 0.538$$

$$Th = C.P.S.\ (0.231) + 6.913$$

Accordingly, the following averages are calculated for uranium and thorium levels for the main rock types, based on c.p.s. values at 93 stations:

Rock Unit	U (ppm)	Th (ppm)
Trachyte (Yellow Lake Member)	27	94
Mafic phonolite (Yellow Lake Member)	11	45
Coryell Intrusions	18	66
Andesite Unit (unnamed)	5	23
Springbrook Formation	4	22
Okanagan Batholith	4	22

A synthesis of scintillometer results (Figure 1) is achieved employing a method outlined in Geological Fieldwork, Paper 81-1, p. 27. A bull's-eye arrangement of contours lies immediately south of the main course of Riddle Creek in an area underlain by trachyte lavas and a volcanic centre. Thoroughly altered rocks are exposed below the trachyte on Riddle Creek and more distally on the slopes to the west. Pervasive hydrothermal alteration of the trachyte and vent (?) breccia has produced cream and white kaolinized rocks of variable radioactive response.

The Prospect

A diamond drill program consisting of approximately 270 metres in seven holes was completed in 1978. Six holes were sited south of Riddle Creek near the west boundary of the trachyte and one hole sited north of the creek. The purpose of the drilling was to test bedrock near geochemical soil anomalies and projected structural traps for uranium-bearing solutions.

North of Riddle Creek, drill hole no. 7 was directed at a prime structural target. This is a northeast dipping section of strata +30 metres thick of coarse clastic sedimentary rocks overlain by partly welded ash flow breccia at the base of the trachyte unit. (This geological setting is strikingly similar to the occurrence of radioactive trachyte ash and breccia in clastic sedimentary beds in the vicinity of Farleigh Lake and Skaha Creek, 15 to 20 kilometres to the southeast (No. 3, Table 1) - unit 1b on Preliminary Map 35). Although no significant uranium was found, the drilling proved good porosity of the beds below the ash flow and thus potential for further exploration.

Most of the drilling south of Riddle Creek intersected Coryell intrusive rocks in the area of soil anomalies. However, hole no. 1 near the west boundary of the trachyte cut altered rocks showing vestiges of conglomerate and breccia similar to the rocks at site no. 7.

A few prominent radioactive high spots were not tested by the drilling. The most important of these is an easterly-trending felsic dyke about 4 metres wide exposed 450 metres north of the confluence of the forks of Riddle Creek. This is thought to be a feeder to the trachyte lavas of the Marron Formation (No. 6, Table 1). Scintillometer readings here averaging 1500 c.p.s. correspond to rock analyses showing 121 ppm U and 342 ppm Th. Radiographs of slabbed samples indicate concentration of radioactive elements on manganese pitch and dendritic growths on numerous small cracks. A similar dyke with scintillometer readings in the range of 600 to 900 c.p.s. was found at the contact between Coryell plutonic rocks and mafic phonolite lavas in the northwest part of the map area between Isintok Creek and the western headwaters of Riddle Creek.

Discussion

The Riddle Creek Tertiary outlier lies near the western extremity of a belt of Eocene alkaline volcanic rocks characterized by anomalous uranium and thorium composition (Church and Johnson, 1978). It is suggested that these rocks are the source of relatively high uranium levels in streams of the Okanagan-Boundary area as indicated by the 1976 URP survey. The possibilities of secondary uranium deposition and enrichment in this setting are numerous, including dykes, pervious sedimentary rocks and alteration zones associated with volcanic vents, etc. (Culbert and Leighton, 1978).

High radioactive response near the headwaters of Riddle Creek coincides with what appears to be a trachyte volcanic centre (Figure 1). A program of short diamond drill holes in 1978 peripheral to this centre has yielded low uranium values, however, there are clues for possible future studies. A section of poorly cemented sedimentary rocks capped by a trachyte ash flow offers a prime target as does the volcanic centre itself and associated intrusions.

References

Assessment Reports Nos. 7362 and 6750.

B.C. Ministry of Energy, Mines and Pet. Res., Geological Branch, Mineral Resources Division, Geological Fieldwork, Paper 81-1, p. 27, and Preliminary Map 35 (Revised 1980).

Boyle, D.R. and Ballantyne, S.B., 1980, Geochemical studies of uranium dispersion in south-central British Columbia, C.I.M. Bull., Vol. 73, No. 820, pp. 89-108.

Church, B.N. and Johnson, W.M., 1978, Uranium and thorium in Tertiary alkaline volcanic rocks in south-central British Columbia, Western Miner, Vol. 51, No. 5, pp. 33-34.

Culbert, R.R. and Leighton, D.G., 1978, Uranium in alkaline waters, Okanagan area, British Columbia, C.I.M. Bull., Vol. 71, No. 783, pp. 103-110.

McDermott, M., 1977, Field surveys using a portable gamma ray scintillometer, Western Miner, Vol. 50, No. 8, pp. 16-20.

Table of Chemical Analyses

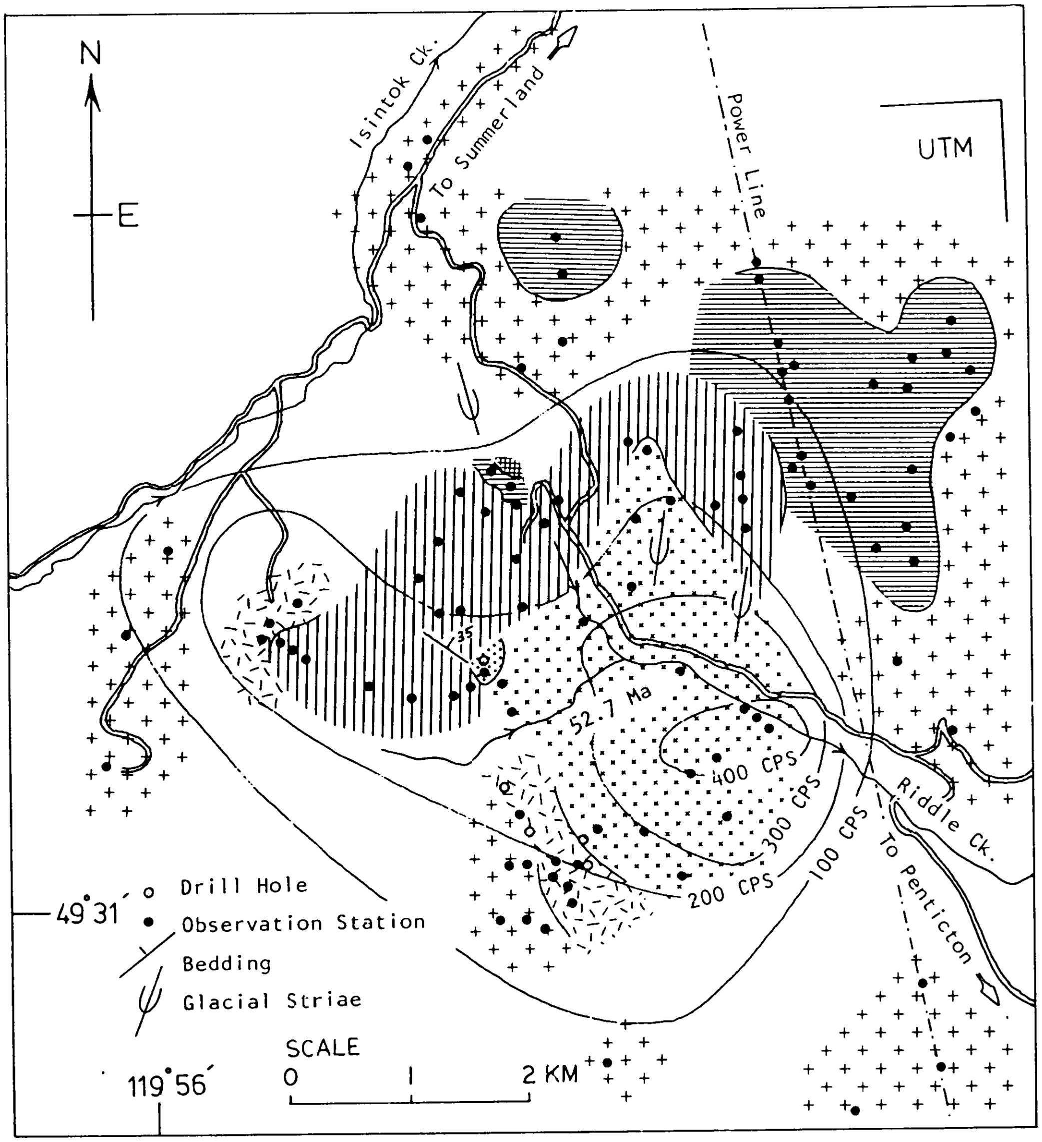
	1	2	3	4	5	6
Oxides recalculated to 100						
SiO_2	57.89	57.37	63.87	61.39	57.58	66.51
TiO_2	0.96	0.93	0.64	0.84	0.87	0.49
Al_2O_3	16.38	19.16	17.92	17.05	16.21	17.01
Fe_2O_3	4.43	3.01	3.14	3.43	3.83	2.58
FeO	1.03	1.77	0.73	1.07	2.48	0.24
MnO	0.08	0.09	0.11	0.09	0.12	0.14
MgO	4.33	2.40	1.10	1.99	3.73	0.28
CaO	6.90	4.05	0.64	3.34	5.22	0.84
Na_2O	4.12	5.83	4.71	5.47	4.71	6.05
K_2O	3.88	5.39	7.14	5.33	5.25	5.86
	100.00	100.00	100.00	100.00	100.00	100.00
Oxides and elements as determined						
$+H_2O$	0.56	2.02	0.90	0.20	1.14	0.70
$-H_2O$	0.58	0.35	0.75	0.18	0.41	0.70
CO_2	0.25	0.25	$<$0.11	0.25	0.25	0.25
S	0.02	$<$0.01	$<$0.005	0.01	0.02	0.01
P_2O_5	0.82	0.46	0.25	0.32	0.68	$<$0.15
BaO	0.21	0.30	0.10	0.20	0.23	0.013
SrO	0.30	0.42	0.07	0.21	0.31	0.02

Molecular Norm

	1	2	3	4	5	6
Quartz	2.0	-	5.7	1.3	-	6.6
Orthoclase	22.7	31.1	41.8	31.0	30.6	34.0
Albite	36.7	38.8	41.8	48.3	41.8	53.0
Nepheline	-	7.3	-	-	-	-
Anorthite	14.6	10.0	3.1	6.1	7.5	1.9
Wollastonite	7.7	3.9	-	4.1	7.2	0.9
Enstatite	11.8	-	3.0	5.4	0.6	0.8
Ferrosilite	-	-	-	-	-	-
Forsterite	-	4.9	-	-	7.2	-
Fayalite	-	-	-	-	-	-
Ilmenite	1.3	1.3	0.9	1.2	1.2	0.7
Magnetite	0.4	2.1	0.4	0.7	3.9	-
Hematite	2.8	0.6	1.9	1.9	-	2.1
Corundum	-	-	1.4	-	-	-

Key to Analyses

1. Alkaline andesite, basal volcanic assemblage
2. Mafic phonolite lava (rhomb porphyry), Yellow Lake Member, Marron Formation
3. Trachyte ash flow, Yellow Lake Member, Marron Formation (Skaha Creek area)
4. Trachyte lava (rectangular porphyry), Yellow Lake Member, Marron Formation
5. Coryell-type monzodiorite intrusion
6. Trachyte dyke, on north fork of Riddle Creek



LEGEND

BEDDED ROCKS

MARRON FORMATION (Eocene)

- Trachyte lava and breccia
- Ash flow and conglomerate beds
- Mafic phonolite lava, breccia

- Andesite lava and breccia

SPRINGBROOK FORMATION ?

- Polymictic conglomerate

IGNEOUS INTRUSIONS

CORYELL INTRUSIONS (Eocene)

- Syenite and monzonite

BASEMENT ROCKS

- Mostly granitiod bodies