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GEOLOGICAL SURVEY

AN OCCURRENCE OF PARSONITE, A SECONDARY URANIUM MINERAL, IN ALASKITE OF THE WHEELER CREEK PLUTON, ALASKA

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An occurrence of parsonite, a secondary uranium mineral, in alaskite of the Wheeler Creek pluton

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Reconnaissance investigations in the Purcell Mountains of west-central Alaska (fig. 1) in 1977 revealed the presence of parsonite, a hydrous phosphate of lead and uranium with the formula $Pb_2UO_2(PO_4)_2 \cdot 2H_2O$. This is the first reported occurrence of parsonite in Alaska although other uranium phosphate minerals have been reported elsewhere, for example at Bokan Mountain in southeastern Alaska (MacKevett, 1963). Parsonite has previously been reported (Rich and others, 1977) at such hydrothermal uranium deposits as those in the two-mica granites of central Portugal, and the Shinkolobwe deposit of Zaire.

The parsonite occurs as a soft, yellow to chocolate brown coating closely associated with green muscovite on fracture surfaces in a shear zone in alaskite of the Wheeler Creek pluton (fig. 1). Thin magnetite veinlets are also present. The identification of parsonite was confirmed by X-ray diffraction. Intensive frost action has reduced much of the alaskite outcrops to rubble so the true width of the parsonite-bearing material is uncertain but strongly radioactive material occurs scattered over an area about 3 m wide by 20 m long. Radioactivity readings of up to 10,000 cps (counts per second) were obtained in this area.

The parsonite locality noted in this report was the only one

encountered during the present reconnaissance study. Because of the narrowness of the noted parsonite-bearing zone, however, detailed and close-spaced traversing would be necessary to determine whether similar zones exist elsewhere in the alaskite.

Coarse-grained alaskite underlies the west end of the Wheeler Creek pluton and intrudes Lower Cretaceous andesitic volcanic rocks, Upper Cretaceous rhyodacite hypabyssal rocks, and the Upper Cretaceous quartz monzonite of the Wheeler Creek pluton (Miller, 1970). The area underlain by alaskite (approximately 100 km^2) is characterized by rounded pink-colored hills covered with a thick mantle of grus-like material through which scattered outcrops protrude. The alaskite itself is a massive rock characterized by large (up to 1 cm) black smoky quartz anhedra in a setting of pink feldspar anhedra. The abundance of black smoky quartz give the rock the superficial appearance of being quite mafic but it is a "true" alaskite with generally less than 1 percent mafic minerals although locally near the contacts the mafic mineral content may be as high as 8 percent. Large clusters of black smoky quartz and purple amythyst crystals (individual crystals up to 10 cm in length) and white quartz crystals (up to 25 cm) are found locally in the grus mantle and probably represent the weathered remnants of large quartz-filled vugs and miarolitic cavities.

The alaskite is composed essentially of K-feldspar, chiefly "patch" perthite with minor amounts of albite and abundant quartz. Biotite is the principal mafic mineral but hornblende occurs locally near the contact with country rock; magnetite and less commonly

allanite are accessory minerals. A K-Ar age measurement of 77.9± 2.3 m.y. (Late Cretaceous) has been obtained on biotite from the alaskite (Miller, 1970).

High radioactivity readings ranging from 400 to 600 cps on a hand-held scintillometer were obtained over the alaskite. Delayed neutron analysis of 2 samples of typical alaskite show 14.4 ppm and 13.4 ppm uranium and 52.3 and 45.2 ppm thorium respectively (table 1). Eakins (1977) reported anomalous amounts of uranium in stream sediment samples collected from streams south and east of the parsonite locality.

Delayed neutron analyses were also run on two samples of altered alaskite from the parsonite-bearing zone. A fist-sized grab sample of altered alaskite with a visible coating of parsonite along one side yielded 4459 ppm uranium (no. 3, table 1); laboratory radioactivity readings of 1600 cps were obtained from a hand-held scintillometer on the side containing parsonite. A similarly-sized sample containing little or no visible parsonite (no. 4, table 1) yielded 881 ppm uranium. It is uncertain whether other uranium-bearing minerals besides parsonite are present; however, those samples containing visible parsonite emitted by far the highest radioactivity. Uranium analysis of individual grab samples therefore probably are a reflection of the parsonite content and should be viewed accordingly.

The original source of the uranium in the parsonite is unknown. The occurrence of an oxidized uranium mineral associated with a shear zone in the uraniferous alaskite certainly indicates the secondary

concentration of uranium. The significance of the parsonite therefore lies in its indicating the possible occurrence of primary uranium minerals elsewhere in the alaskite and/or indicating the possibility of more widespread secondary enrichment of the uraniferous alaskite.

References Cited

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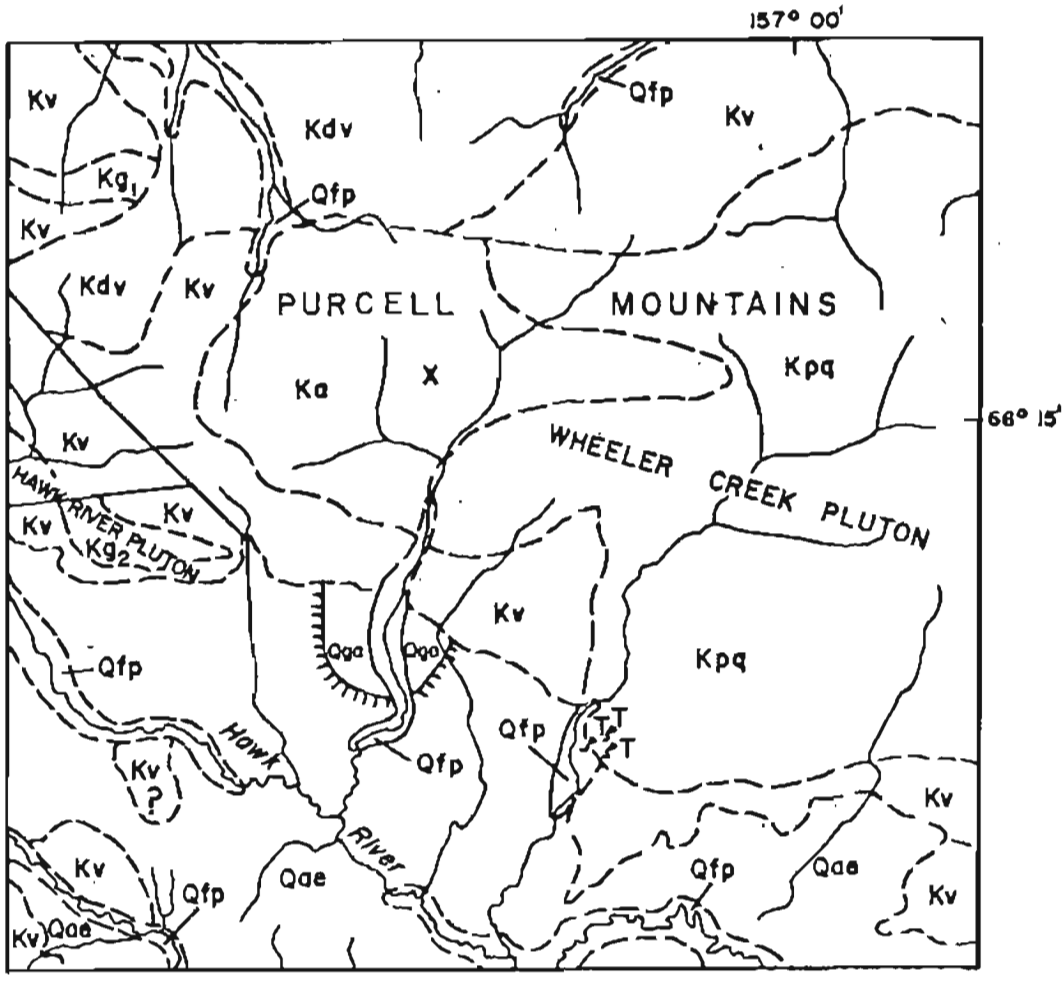
Table 1. Uranium and thorium analyses in parts per million (ppm) of selected grab samples from the Wheeler Creek alaskite. Map number refers to Figure 1.

Map No.	Lab No.	U ppm	cv	Th ppm	cv	Th/U	Description
1	D186403	14.4	1	52.3	4	3.6	Selected grab sample of typical alaskite
2	D186404	13.4	2	45.2	4	3.4	Selected grab sample of typical alaskite
3	D195038	4459	1	566	(64)	--	Selected grab sample of altered alaskite with abundant readily visible parsonite
4	D195039	881	1	0	(50)	--	Selected grab sample of altered alaskite with little or no readily visible parsonite

Analysis done by delated neutron determination. C. M. Ellis, analyst.
cv = Coefficient of variation = 1 standard deviation, based on counting statistics, expressed as percentage of concentration. Concentrations with cv >30 percent are enclosed in parentheses and should not be considered reliable.



EXPLANATION

Qfp	Floodplain deposits	QUATERNARY
Qae	Alluvial and eolian deposits	QUATERNARY
Qga	Glacial drift and alluvium	QUATERNARY
Ka	Alaskite of the Wheeler Creek pluton	CRETACEOUS
Kpq	Porphyritic quartz monzonite of the Wheeler Creek pluton	CRETACEOUS
Kdv	Hypabyssal felsic volcanic rocks	CRETACEOUS
Kg_1	Quartz monzonite of Purcell Mountain pluton	CRETACEOUS
Kg_2	Monzonite of Hawk River pluton	CRETACEOUS
Kv	Andesitic volcanic rocks	CRETACEOUS

X Parsonite locality

Thermal springs

Glacial morraine

Fault

0 5 10 miles

0 5 10 kilometers

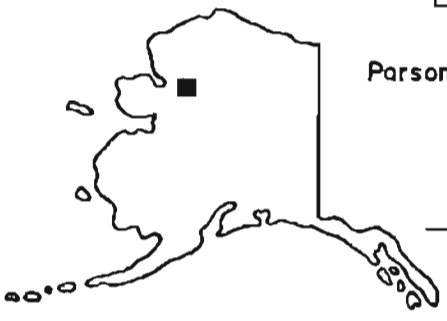


Figure 1. Generalized geologic map of the western Purcell Mountains. Modified slightly from Patton, Miller, and Tailleur, 1968.