URANINITE FROM HENVEY TOWNSHIP, PARRY SOUND DISTRICT, ONTARIO

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The occurrence of uraninite with thucholite, cyrtolite, oily hydrocarbons, etc., at the Besner mine, lot 5, conc. B, Henvey township, Parry Sound district, has been described in detail by H. S. Spence.[1] The writer's thanks are tendered Mr. Spence for contributing much of the material used in this study.

The Besner dike is not fully exposed, being almost wholly covered by overburden except for the actual opening which is about 100 ft. long, by 35 ft. wide, by 20 ft. deep. It strikes slightly north of east and cuts a coarse porphyritic granite gneiss named by T. T. Quirke the Dunlop porphyry, which covers a considerable area in this locality. The middle portion of the dike consists chiefly of pink, more or less perthitic microcline with masses of white quartz. Several carloads of commercial feldspar were shipped. Plagioclase feldspar, possibly albite, occurs along the south wall to a width of 2 or 3 feet in places. Large, thin, books or crystals up to 18 inches in diameter of more or less altered black mica are rather common.

The uraninite is very intimately associated with thucholite which appears to have partly replaced the uraninite in some instances. Even the best of the uraninite is more or less penetrated by microscopic veins or cracks filled with thucholite. In order to obtain material suitable for analysis about 50 grams of the best looking uraninite was selected for minimum thucholite content from five or six favorable crystals or masses. This was crushed on a steel plate to pass 20 mesh and any 80 mesh siftings were rejected. The 20 mesh lot (38 g.) was very lightly ground in an agate mortar and frequently sifted through 40 mesh until all was through. The material through 40 and caught on 80 was panned down to 18 g. and air dried. The specific gravity of this lot was 7.939 at 20.97°C. The minus 80 product was panned down to 4.6 g. and after air drying had a Sp. Gr. = 8.129 at 20.77°C. The 18 g. of $-40 +80$ product was further panned to 6.8 g. and after air drying had a Sp. Gr. = 8.173 at 20.67°C. This 6.8 g. lot was used for the analysis under I. The remainder of the 18 g. lot (about 11 g.) with Sp. Gr. = 7.827 at 23.55°C. was analyzed for lead, uranium and thorium with re-

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[1] This Journal, November, 1930.

sults given under II. The material of analysis III was about 5 g. from a single crystal completely enclosed in feldspar, but containing traces of thucholite. This was crushed and panned down to a heavy fraction of about 2 grams with Sp. Gr. = 7.809 at 18.5°C. which was used for the analysis. Clean aluminum pans and watch glasses were used to avoid contamination.

The object of the foregoing operations was to get rid of as much as possible of the small amount of thucholite present and to obtain a concentrate of the freshest material by taking advantage of the fact that uraninite is harder, heavier and less friable, the less altered it is.

The analyses, carried out on 2 g. portions, yielded the following:

HENVEY TOWNSHIP URANINITE
H. V. Ellsworth, Analyst

	I	II	III
	Concentrate Sp. Gr. = 8.173	Concentrate Sp. Gr. = 7.827	Heavy fract. of single crystal Sp. Gr. = 7.809
PbO	8.66	8.09	8.16
(Pb)	(8.04)	(7.51)	(7.57)
UO_2	49.35*		
UO_3	29.76*		
(U_3O_8)	80.51	79.30	79.35
(U)	(68.29)	(67.26)	(67.30)
ThO_2	1.78	1.73	2.11
(Th)	(1.56)	(1.52)	(1.85)
(Th×0.38)	(0.59)	(0.58)	(0.70)
(Ce, La, Di)$_2O_3$	1.47	2.87	3.48
(Yt, Er)$_2O_3$	1.48		
Fe_2O_3	0.88		
MnO	0.02		0.02
Al_2O_3, etc.	0.17		
CaO	2.69	2.82	1.97
MgO	0.03		
CuO†	0.03	0.03	0.03
SiO_2	1.36	1.76	2.12
H_2O	1.44		
	99.12		
$\frac{Pb}{U+0.38\ Th}$	0.117	0.111	0.111

*Owing to the presence of traces of thucholite carbon, UO_2 could not be determined by the usual method. The results cited were obtained by allowing the powdered uraninite to stand for 175 hours in HF at room temperature. Uranous fluoride

Character of the Uraninite

The physical properties of the Henvey uraninite, such as its low specific gravity, its pitch-black color, conchoidal fracture, relative softness (H = 5.5) and friability, all indicate that the mineral is in the second stage of alteration as described in an article[2] on the Villeneuve uraninite in which the mineral has altered from its original steel gray color with irregular fracture to a pitch black form with conchoidal fracture and lower density.

The comparatively easy solubility of the Henvey uraninite in hydrochloric acid confirms this physical evidence of alteration from the chemical side. It is probable that the analytical determination of UO_2 is in error and that the percentage found is too high.

Age Relationships

Fortunately, if the evidence of the work cited on the alteration of the Villeneuve uraninite may be accepted as applying to uraninites in general, the alteration of the Henvey uraninite apparently has not gone far enough to render the lead ratio unreliable and it would presumably need reduction only in the third place of decimals. Considerable evidence has accumulated that altered uraninites in general do give slightly higher results than the freshest material from the same sources. On the other hand it is always possible that an exceptional type of alteration may occur in some instances. Nothing is known exactly as to the effect of the sort of alteration accompanying replacement by thucholite. It may be noted, however, that thucholite itself from the original Parry Sound occurrence[3] yields an extremely small and entirely erroneous lead ratio, from which it may be inferred that thucholitic alteration would possibly tend to diminish the lead ratio of uraninite. The re-

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is insoluble and is almost unaffected by air at ordinary temperature when present in the bottom of a dish with supernatant HF solution while uranic fluoride is soluble and can thus be separated. Decomposition appeared to be complete but the figure for UO_2 seems high considering the physical properties of the mineral. The presence of undecomposed mineral particles would increase the apparent percentage of UO_2.

† Copper was found in all the samples in about the same amount, and is certainly not an accidental impurity. This is the first uraninite in which the writer has detected this element.

[2] Four Stages in the Alteration of the Villeneuve Uraninite. This Journal, Oct. 1930.

[3] This Journal, Aug. 1928.

sults for the three Henvey samples analyzed seem at first sight to give some slight confirmation of this idea, as the heaviest fraction No. I yields a slightly higher lead ratio than the others. No. I contained scarcely more than traces of thucholite, but Nos. II and III contained small though appreciable amounts of thucholite, which because of its own low lead ratio would tend to lower slightly the lead ratios of the uraninite with which it is associated. However, the differences in the lead ratio of the three samples are small after all and the concordance of results from the two fractions of a 50 gram average lot and a single crystal is reassuring. It seems reasonable to assume that the true age of the uraninite is indicated by some value between 0.11 and 0.12 for the lead ratio, and for the present the highest value 0.117, which was derived from the best material, may be assumed to be most nearly correct.

Dr. W. H. Collins has very kindly contributed the following summary of the latest geological data relating to the area in which the Henvey pegmatite occurs:

"The Henvey uraninite-bearing pegmatite lies in the Key Harbour quadrangle, recently mapped for the Geological Survey by T. T. Quirke (see *Key Harbour Sheet*, No. **239A**). This area is underlain by paragneisses intruded by batholithic bodies of granite from which the pegmatite is believed to be a magmatic differentiate and therefore of practically the same age. The granites are placed in the Killarnean (the latest known Precambrian batholithic intrusion) by Quirke on the ground that the paragneisses which they intrude are metamorphosed Huronian sediments. On the other hand, all the granites of proven Killarnean age are characterized by a higher percentage of potash than of soda, whereas the granite at Henvey contains more soda than potash. In this respect the Henvey granite is more like the batholithic rocks of the Grenville sub-province, from which the uraninites have uniformly yielded lead ratios of 0.15 to 0.16. It is therefore not certain that the Henvey granite is Killarnean. Efforts have failed so far to obtain uraninite from pegmatite of undoubted Killarnean age, from which a reliable lead-uranium ratio could be obtained."