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DEPARTMENT OF MINES AND TECHNICAL SURVEYS

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MINES BRANCH INVESTIGATION REPORT IR 58-54

MINERALOGICAL REPORT ON A URANIUM ORE SAMPLE ("K-2") FROM BRITISH NEWFOUNDLAND EXPLORATION LIMITED, KITTS PROJECT, MAKKOVIK AREA, LABRADOR, NEWFOUNDLAND, Ref. No. 2/58-14

by

M. R. HUGHSON

RADIOACTIVITY DIVISION

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ABSTRACT

This is a dark, fine-grained, siliceous rock containing finely disseminated pitchblende. Individual grains of pitchblende, only a few microns in diameter, are commonly segregated in bands in foliated parts of the rock. Secondary radioactive minerals are rare.

* Scientific Officer, Radioactivity Division, Mines Branch, Department of Mines and Technical Surveys, Ottawa, Canada.

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INTRODUCTION

In connection with a uranium ore treatment investigation undertaken following discussions with Dr. A. P. Beavan, general manager of the British Newfoundland Exploration Limited, at the Mines Branch, Ottawa, on December 11, 1957, three bags of drill core, weighing approximately 70 lb, were received at the Ottawa laboratories on February 20, 1958.

The sample was reported to be from the Kitts Uranium project of this company, in the Makkovik area of Labrador, Newfoundland, and was given by them the designation "K-2".

The present report covers the mineralogical phase of this investigation. The ore treatment results will be reported later.

SAMPLING AND ASSAYS

Randomly selected hand specimens and a -10 mesh prepared head sample were used in this mineralogical study.

Chemical assays of the prepared head sample gave the following results:

TABLE 1 - Chemical Analysis
(Analytical Ref. RD-4465)

U_3O_8	-	0.74%
ThO_2	-	<0.003
Probable secondary U_3O_8	-	0.086
CO_2 (evolution)	-	2.94
CO_2 (combustion)	-	7.08
Sulphur (total)	-	2.18
Iron	-	8.87

		%
Fluorine	-	0.08
Arsenic	-	0.047
P_2O_5	-	0.08
V_2O_5	-	<0.02
Zinc	-	0.0045

ROCK COMPOSITION

Hand specimens of this rock usually are dark grey and fine-grained, showing a wavy, foliated texture. Table 2 gives a summary of the overall mineral composition.

TABLE 2

Heavy Liquid Separation of the -100+150 Mesh Fraction of Drill Core

Specific Gravity	Wt %	Minerals
<2.96	71	Feldspar and quartz, with minor calcite, graphite, and chlorite.
2.96 to 3.86	23	Amphibole plus traces of epidote.
>3.86	6	Pyrrhotite with pitchblende, pyrite, and molybdenite plus traces of chalcopyrite and secondary uranium-bearing mineral or minerals.

In thin section some specimens consist of fine-grained feldspar and quartz, with lesser amounts of amphibole and grey fine-

grained graphite giving the rock the wavy, foliated appearance. Other specimens, almost entirely feldspar and quartz, contain only small amounts of amphibole. A few rather weathered, schist-like specimens contain abundant chlorite and, occasionally, epidote. Occasional medium-sized grains of feldspar, quartz, or calcite are present, usually where ferromagnesium minerals are not abundant. Metallic minerals such as pyrrhotite, pitchblende, pyrite, molybdenite, and chalcopyrite are usually found in the foliated, dark-coloured rock.

The analysis for CO_2 (evolution), 2.94%, indicates that the rock contains approximately 6%, by weight, of calcite. Comparing this CO_2 analysis with the CO_2 analysis by combustion, 7.08%, indicates that there is approximately 1%, by weight, of graphite. The chlorite, which examination of drill core chips and thin sections shows as occurring chiefly in fracture slips and in the occasional weathered specimen, is of lesser abundance than the graphite. Hand-magnet tests of the fraction (see Table 1) greater than specific gravity of 3.86 indicate that pyrrhotite makes up approximately 4 1/2% of the weight of the rock.

URANIUM MINERALOGY

Pitchblende, the uranium-bearing mineral, occurs in irregular, wavy bands (Figure 1) in foliated parts of the rock which are abundant with amphibole and/or graphite. The pitchblende is usually very finely disseminated (Figure 2). A greatly enlarged view of these grains shows their generally rounded to sub-rounded shape (Figure 3).

Some of the pitchblende occurs in larger, irregular or lath-like grains scattered among finely disseminated pitchblende (Figure 4). Pyrite may be closely associated with the pitchblende (Figures 5 and 6), but pyrrhotite, which is more common in the rock, was not observed in such close association with it.

The almost complete lack of thorium in this rock indicates that pitchblende, rather than uraninite, is the proper name for the uranium-bearing mineral. Evidence for uraninite is less definite, and consists of the occasional subhedral grain, as shown in Figure 3, and the quite high cell edge of 5.47 Å.

Only one of approximately 40 pieces of drill core examined contained any secondary radioactive minerals. This was a thin orange band of soft, uranium-bearing material which gave an unidentifiable x-ray diffraction pattern.

A higher-grade sample* (our reference No. 12/57-20) from surface trenches, which had been received from the same property in December 1957, was given a preliminary examination before work was started on the more representative drill core sample discussed in this report. In the high grade sample, the pitchblende occurs in rather large, irregular, brecciated masses (Figure 7) up to approximately 4 mm by 3 mm in size; more common are wavy bands or veinlets of finely disseminated pitchblende (Figure 8).

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* This sample was not given a designation by the company in its own "K" series of sample identifications.

CONCLUSIONS

1. Finely disseminated pitchblende occurs in a siliceous gangue of feldspar and quartz, with accessory amphibole. Although the individual grains of pitchblende are very small, they are usually segregated into fairly dense bands (Figure 1).

2. Calcite, pyrrhotite, and chlorite compose approximately 10 to 15 percent of the weight of the sample. With the possible exception of the pyrrhotite, they do not appear to be closely associated with the pitchblende.

3. Fine graphite is interbanded in places with the pitchblende.

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(Figures 1 to 8 follow,)
(on pages 6 to 9.)

AUTORADIOGRAPHS:

(a) X1. (b) X1.

Fig. 1. - Autoradiographs of three chips of drill core. Approximately actual size.

PHOTOMICROGRAPHS:

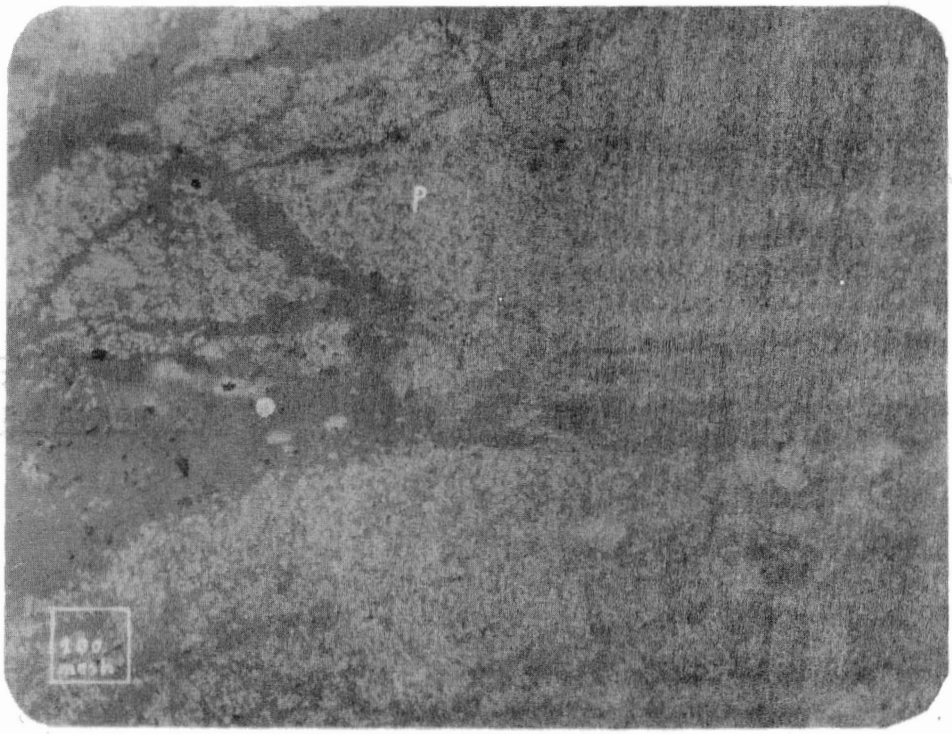

Fig. 2. - Finely disseminated pitchblende (p) in a siliceous gangue. X 120.

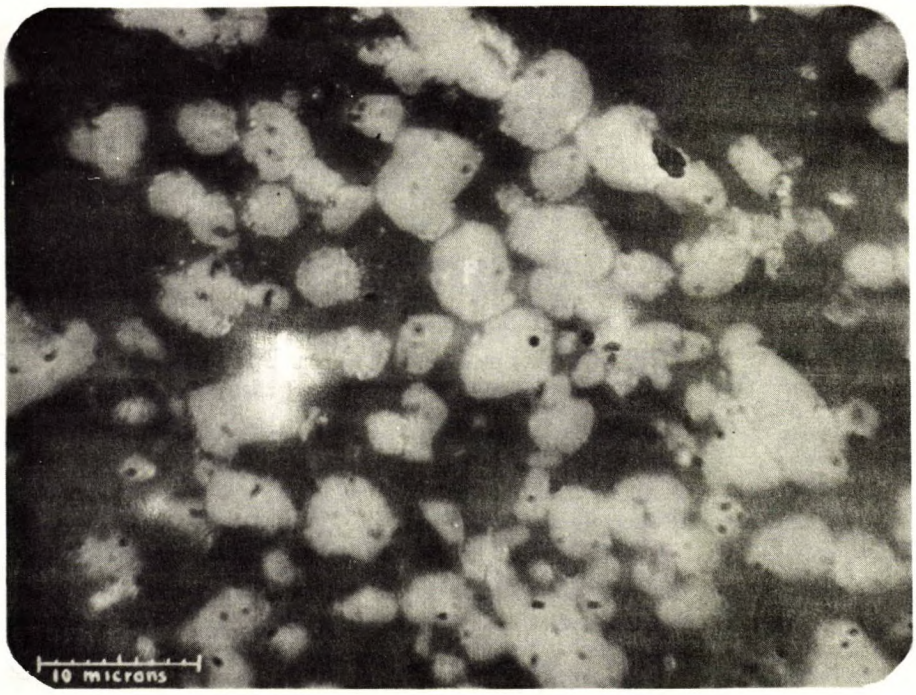

Fig. 3. - A greatly enlarged area from Figure 2, showing the rounded to sub-rounded shape of the pitchblende (p) grains. X2000.

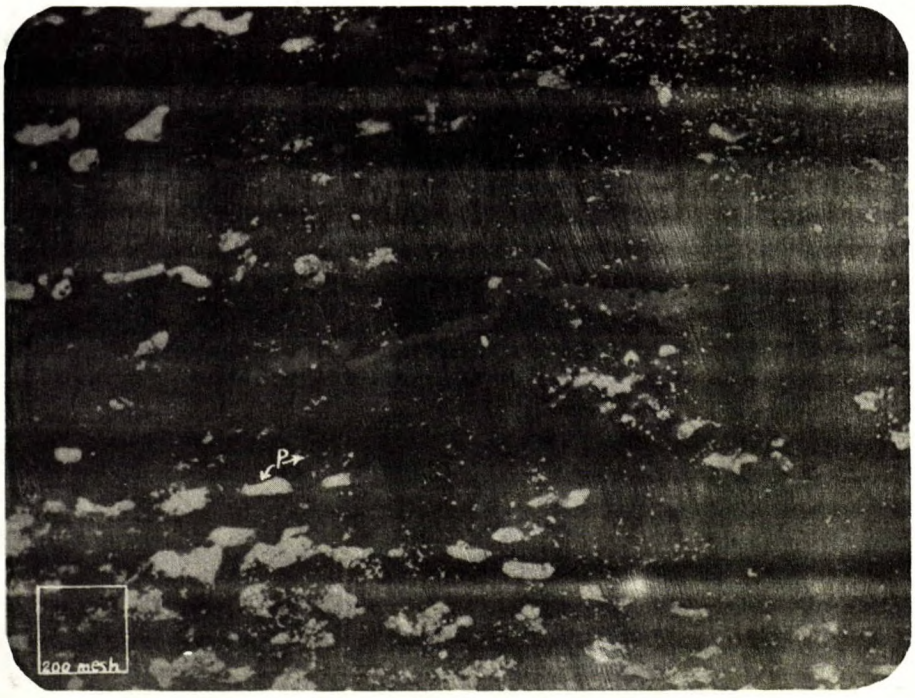

Fig. 4. - Coarse, irregular or lath-like grains of pitchblende (p) scattered among finely disseminated pitchblende. X150.

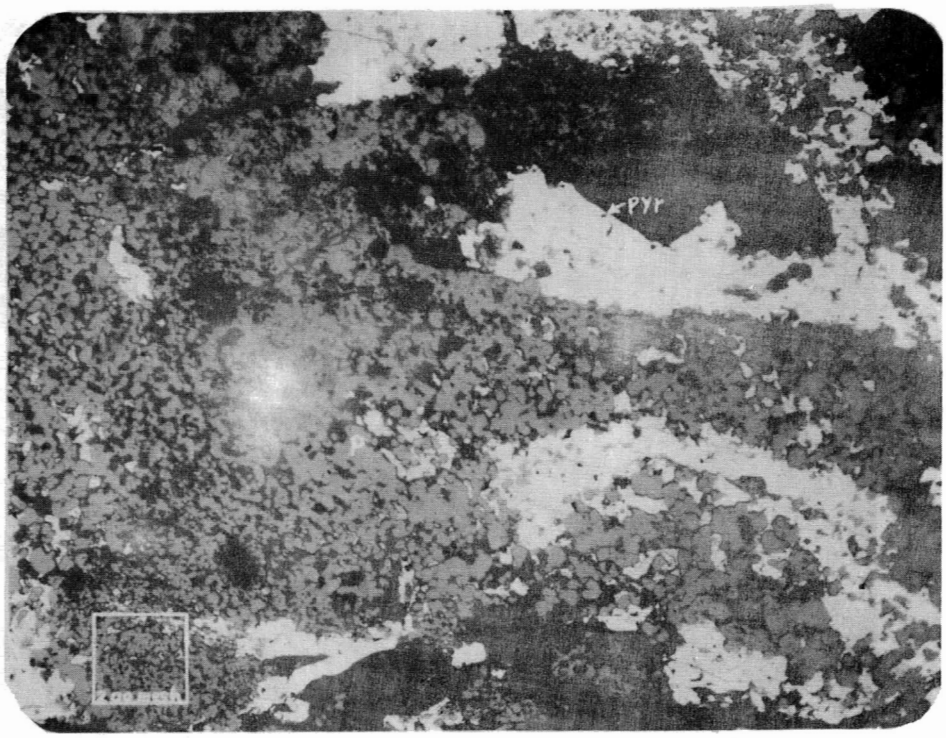

Fig. 5. - Disseminated pitchblende (p) associated with pyrite (pyr). X150.

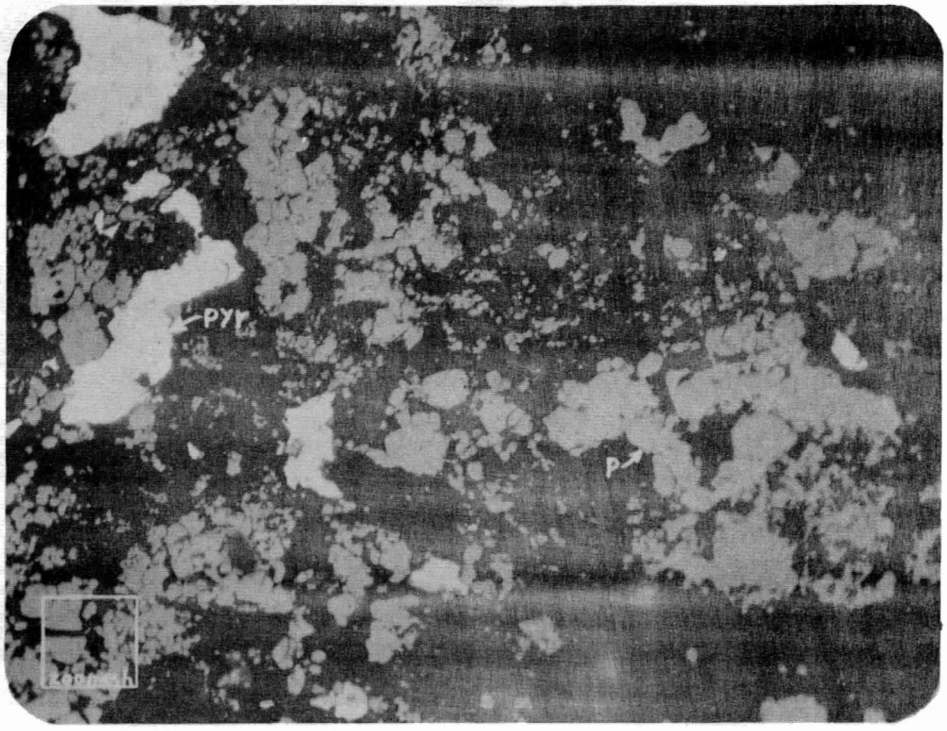

Fig. 6. - Coarser areas of pitchblende (p) also associated with pyrite (pyr). X150.

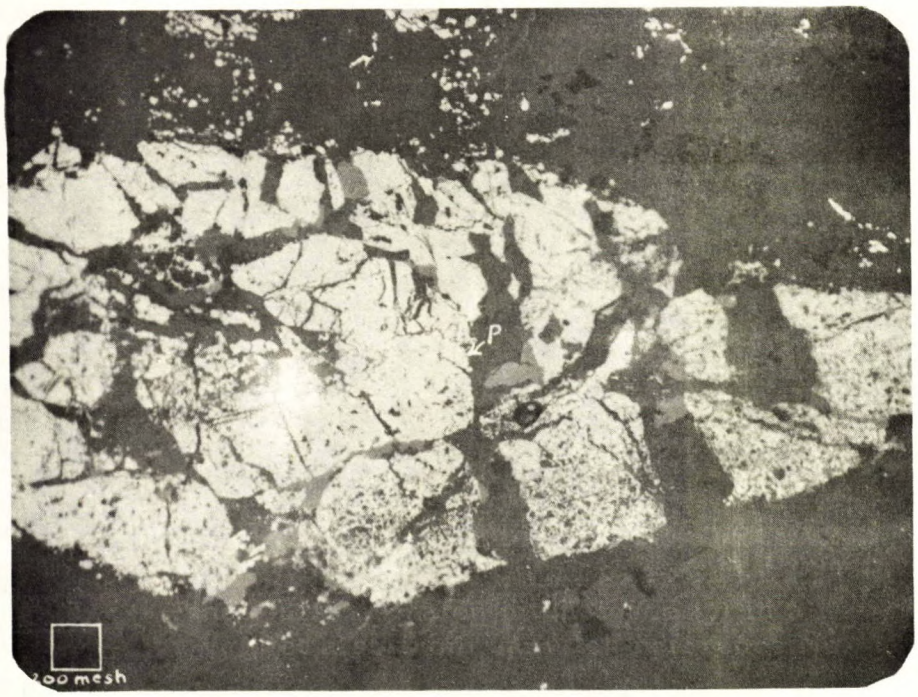

Fig. 7. - A large area of brecciated pitchblende (p) from sample, reference No. 12/57-20. X80.

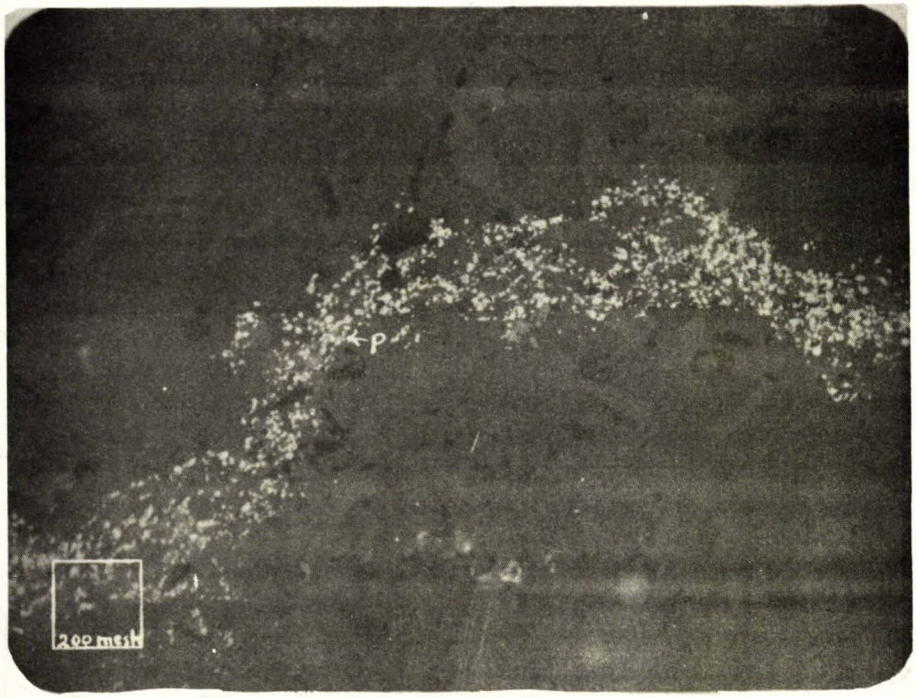

Fig. 8. - Finely disseminated pitchblende (p) in a wavy band or veinlet also from sample, reference No. 12/57-20. X150.

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