MINERALOGY OF THE REXSPAR PROPERTY, NEAR BIRCH ISLAND, B.C.

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INTRODUCTION

The Rexspar property is located east of Foghorn creek on the summit of Red Ridge, two miles south of Birch Island, in the Kamloops Mining Division. Birch Island is a station on the Canadian National Railways, 81 miles north of Kamloops, on the south bank of the North Thompson River. The property is reached by a wide trail which originally provided access to the old Smuggler mine camp, which is about a mile north of the Rexspar claims. (See map, Appendix I)

Two claims, the Spar 1 and the Spar 2, were staked on this property in 1942 by O. Johnson of Chu Chua. In 1949 the claims were on lease to T.A.E. Sjoquist and associates of Kamloops, who held other claims surrounding the Spar 1 and Spar 2. In 1949 the author visited the property as student assistant to J.W. McCammon (1) of the B.C. Department of Mines, who made an examination of a fluorite showing on the property.

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(1) B.C. Dept. of Mines, Annual Report, 1949, pp. 250-254.

At this time, active prospecting for radioactive minerals was being done in the vicinity of the fluorite showing. No published information on the property is available since 1949. It is understood that the property has since come under the control of F. Joubin and associates, who have done extensive development work on the radioactive material.

The area was mapped by J.F. Walker in 1930. (2) Rocks in the vicinity of the Rexspar claims were mapped as metamorphosed Precambrian (?) sediments containing granodiorite bodies.

According to McCammon, the rock in the vicinity of the property is an altered, intrusive porphyry composed chiefly of feldspar. The fluorite occurs in massive form and as grains disseminated through the country rock. The massive fluorite occurs in irregular lenses up to a foot thick that strike generally northeast and dip to the northwest. These lenses are in the centre of a zone of disseminated fluorite which is roughly tabular in form, varies in width from 150 to 450 feet, and is traceable along strike for 1000 feet. The exact location of the ore samples used in this assignment is not known, but it seems probable that they came from one of the zones of massive fluorite mentioned above.

This assignment was undertaken primarily to determine the radioactive minerals in the ore and to study their mode of occurrence and associations.

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(2) Walker, J.F., Clearwater River and Foghorn Creek MapArea, Kamloops District, B.C. G.S.C. Summary Reports, 1930, pp. 125-153.

SUMMARY AND CONCLUSIONS

Thorianite was the only radioactive mineral found in the ore which has any economic signifance. This mineral occurs in grains averaging 30 microns in size, and is contained in both pyrite and fluorite. A radiometric assay of the ore indicated a content of 0.08% radioactive constituents. Radioactive zircon is present in the ore, and may contribute to the results shown by radiometric assaying of ore samples.

The main gangue minerals in the ore are fluorite and pyrite, with phlogopite, celestite, and feldspar present in varying amounts. Rutile and molybdenite are present in minor amounts, not in excess of 0.5%, associated with fluorite.

IDENTIFICATION OF RADIOACTIVE MINERALS

(1) Thorianite

Thorianite was identified by X-ray powder photograph of radioactive particles on a nuclear track plate (3). A concentration of the mineral was obtained by panning a sample of crushed ore on a Haultain superpanner. Details of the procedures used follow.

A sample consisting of several pieces of ore, about ten pounds in all, was crushed and pulverized. The ore was unaltered, and contained about 70% dark purple fluorite and 30% pyrite. The pyrite was present in grains up to 2 mm. in size disseminated through the fluorite.

An 813 gram sample of the pulverized ore was dry screened in 100 gram portions through Tyler Standard screens. Data from this screen analysis are given in Appendix II and a plot of distribution of particle sizes is given in Appendix III.

Weighed portions of the screen products were assayed for radioactive constituents. All assays mentioned in this report are radiometric assays, made on a Geiger-Mueller counter equipped with a counting circuit (4). Data from the assay of screen products are given in Appendix II and a plot of these assays is given in Appendix III. These data show that over

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(3) Kodak Nuclear Track Plates, Type NTA.

(4) Geiger counter supplied by Electronic Associates Ltd., Type EA-SC3T, Serial No. 1.

50% of the radioactive constituents contained in the original sample have gone into the -200 size fraction. This fact indicates that the radioactive minerals are either very easily crushed or are present in very small particles.

Unsuccessful attempts were made to obtain a concentration of radioactive minerals in the screened products. A ten gram sample of the -35 +48 size fraction was panned, and the tip was placed on a nuclear track plate. No tracks were observed on this plate. A ten gram sample of -65 +100 material was panned. Radiometric assay of the tip showed a content of 0.06% radioactive constituents. This tip was separated on a magnetic separator (5) into two products, one containing about 70% pyrite and 30% fluorite, and the other containing about 90% fluorite and 10% pyrite. The high pyrite product assayed 0.08% radioactive constituents, and the high fluorite product did not give a count which was significantly higher than the background count. A nuclear track plate made with the high pyrite product did not show any tracks. These attempts at separation were probably unsuccessful because the thorianite was not released at these relatively large particle sizes. At this point it was decided that in order to obtain a satisfactory concentration of the heavy minerals in this ore by using the superpanner, a larger sample should be used.

The separating action of the Haultain superpanner is similar to that of the Wilfley Table (6). Separation depends primarily on the size difference, due to differences in

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(5) Frantz Isodynamic Separator, Model L 1, Serial No. 30.
(6) "Concentrators with the separating surface in motion", Textbook of Ore Dressing, Richards and Locke, pp.211-231.

specific gravity, of particles with the same settling rate. Large, light particles are carried to the downstream end of the superpanner channel by the current of water flowing over the bed. Small, heavy particles work down to the bottom of the bed, where they are less easily moved by the current of water, and are more easily moved forward by the reciprocating action of the superpanner. For this reason, a feed containing particles with the same settling rate should be used for best results. Placer sands can be separated on the superpanner easily because they are a naturally classified product. For the best separation of crushed ores, however, a feed should be used that has been classified, either in air or in water.

To take advantage of this fact a feed for the superpanner was prepared by hydraulic classification of a sample of -65 mesh crushed ore. Classification was accomplished by placing the sample in a 1000 milliliter measuring cylinder and maintaining an upward current of water in the cylinder. Water was fed through a glass tube which reached to the bottom of the cylinder. Slimes were rejected first by a gentle current of water, then a stronger current was used to separate a product that weighed about 80 grams. This overflow product was superpanned. A one gram tip which was taken gave an assay value of 0.29% radioactive constituents. A nuclear track plate made with this tip showed abundant tracks. (See Fig. 1)

The radioactive particles on the track plate were small, rounded, and opaque, with a black colour and a sub-metallic lustre. The average size of these particles was 30 microns. The particles were identified as thorianite by X-ray powder photograph.

(2) Zircon

The only other radioactive mineral identified in the ore was zircon. This mineral was identified in a thin section of the ore. In the thin sections examined, the zircon occurred as subhedral crystals ranging from 50 to 200 microns in size. The radioactive property of this mineral is indicated by the dark purple halo which surrounds it where it occurs in fluorite. Bombardment by radioactive particles causes a colour change in the fluorite, in this case from a light rose colour in thin section to a deep purple colour.

The zircon has a pale greenish-yellow colour in thin section and high positive relief. The mineral is uniaxial positive, and gives an optic axis figure with three colour rings. Birefringence is very high; about 0.062 in this specimen. This property serves to distinquish the mineral from thorite, which has similar properties except for it's low birefringence.

MINERALOGRAPHIC DESCRIPTIONS

Two polished sections of the ore were made. Section 1 consists of massive, light to dark purple fluorite containing well crystallized pyrite in cubes up to 2 mm. in size. This section shows banding by fine-grained pyrite and a grey mica identified in thin section as phlogopite. Joints in the specimen are coated with yellowish, orange, and light green oxidation products. The pyrite in section 2 is finer grained than that in section 1, and the banding is not evident; otherwise the specimens are similar.

Rutile occurs in scattered grains ranging in size from 100 to 200 microns. This mineral is hard (Talmage hardness F+), well crystallized, and moderately anisotropic. Rectangular sections show brownish-grey to dark grey interference colours and four extinctions per revolution. No reactions were obtained with standard etch reagents: HCl, $HgCl_2$, KOH, KCN, $FeCl_3$, and HNO_3. Microchemical tests indicated that manganese and iron were not present. A tentative identification of this mineral as rutile was confirmed by X-ray powder photograph.

Occasional small grains of molybdenite were observed in the sections. The mineral is in thin flakes with an average width of 130 microns. The grains are soft(B+), sectile, and highly anisotropic, showing white to black interference colours and giving four extinctions per revolution. No etch reactions were obtained with standard etch reagents. The grains were too small and soft to yield sufficient material for a microchemical test, but an xanthate test on a bulk sample of the crushed ore gave a good positive reaction for molybdenum.

THIN SECTION DESCRIPTIONS

Thin sections of two specimens of ore were examined. Specimen A consists of dense, finely banded purple fluorite, containing fine-grained disseminated pyrite. In thin section the bands in fluorite were seen to consist of phlogopite, feldspar, and celestite.

Specimen B has a ground mass of fluorite containing coarse, crystalline pyrite and lighter patches of non-metallic minerals recognizable in thin section as phlogopite and feldspar. Two varieties of feldspar were noted. Small, subhedral grains of albite make up part of the ground mass, and occasional large grains of microcline are found in the albite. Fluorite is in places interstitial to the feldspar, and thus apparently younger than the feldspar.

In these sections fluorite contains many rounded grains of an opaque mineral which is surrounded by a purple halo in the fluorite. This mineral is probably thorianite. Large pyrite grains in section B contain inclusions of zircon and fluorite. In one of these inclusions of fluorite a grain of thorianite(?) with a purple halo was noticed. Oblique light from an arc lamp revealed the presence of similar black grains imbedded in the pyrite nearby. These observations indicate that thorianite is contained in both fluorite and pyrite, a feature worth noting in mineral dressing tests on this ore.

FORMATION AND PARAGENESIS

The fluorite in this occurrence has apparently been deposited by vein filling and partial replacement of a feldspathic country rock. Inclusions of fluorite and zircon in pyrite indicate that pyrite was late in forming. Thorianite may have been deposited throughout the process of deposition. This is indicated by the uniform distribution of thorianite in fluorite, and the occurrence of thorianite(?) in pyrite. Specimen A probably represents a marginal, and thus early, stage in mineralization. This is indicated by the small amounts of pyrite contained, and by the small size of the pyrite grains. Banding in specimen A may represent an original gneissic or schistose texture. The other specimens have banding that is coarser and less continuous, and the pyrite grains are much larger. These specimens probably represent a later stage of mineralization by replacement.

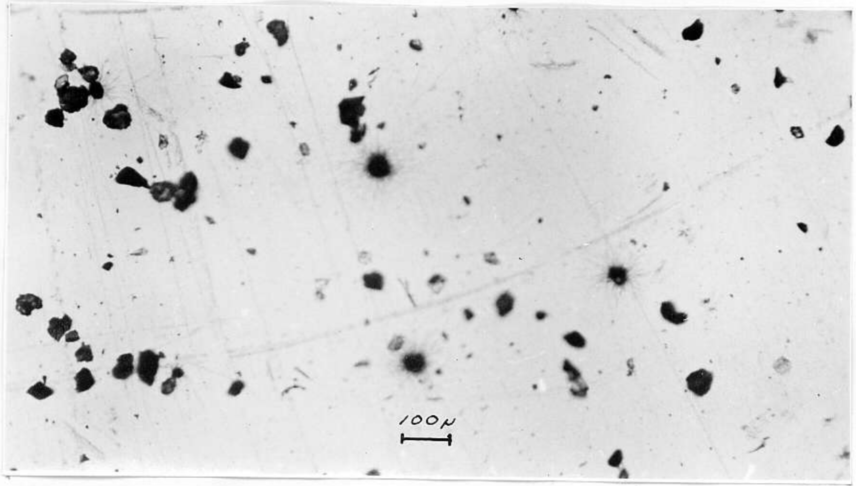


Fig. 1 (x60) Nuclear track plate, showing thorianite grains surrounded by haloes of tracks. Exposure time, five days.

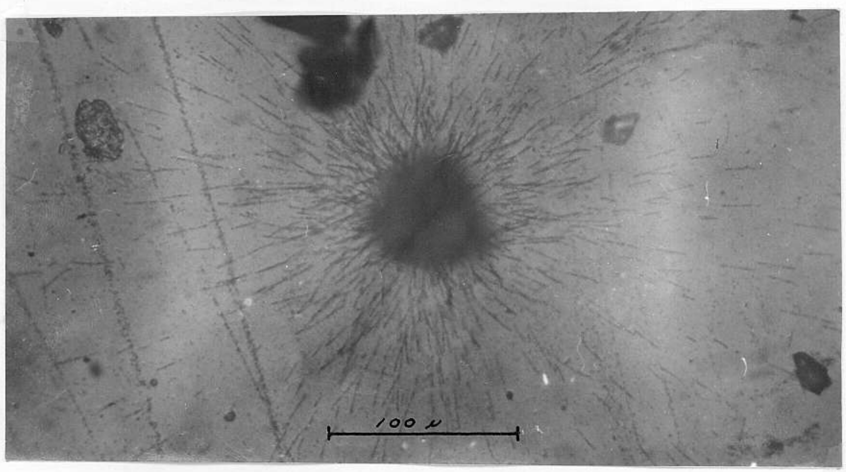


Fig. 2 (x250) Same as above, enlarged.

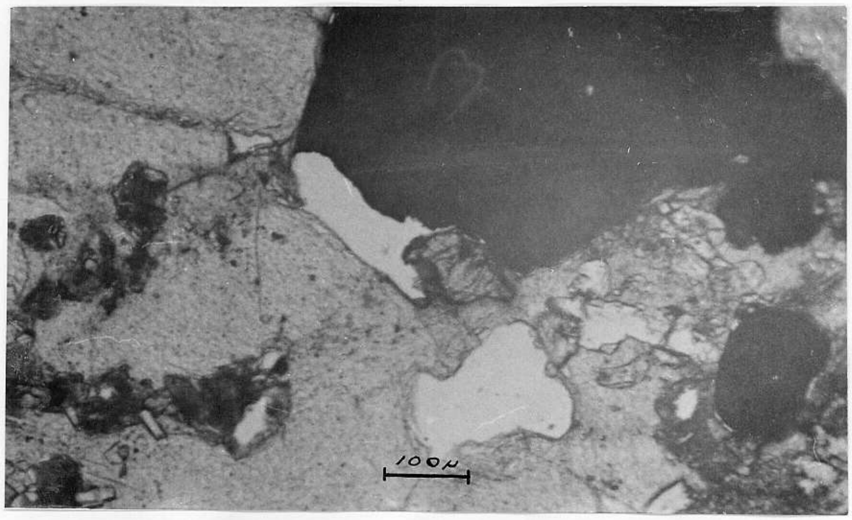
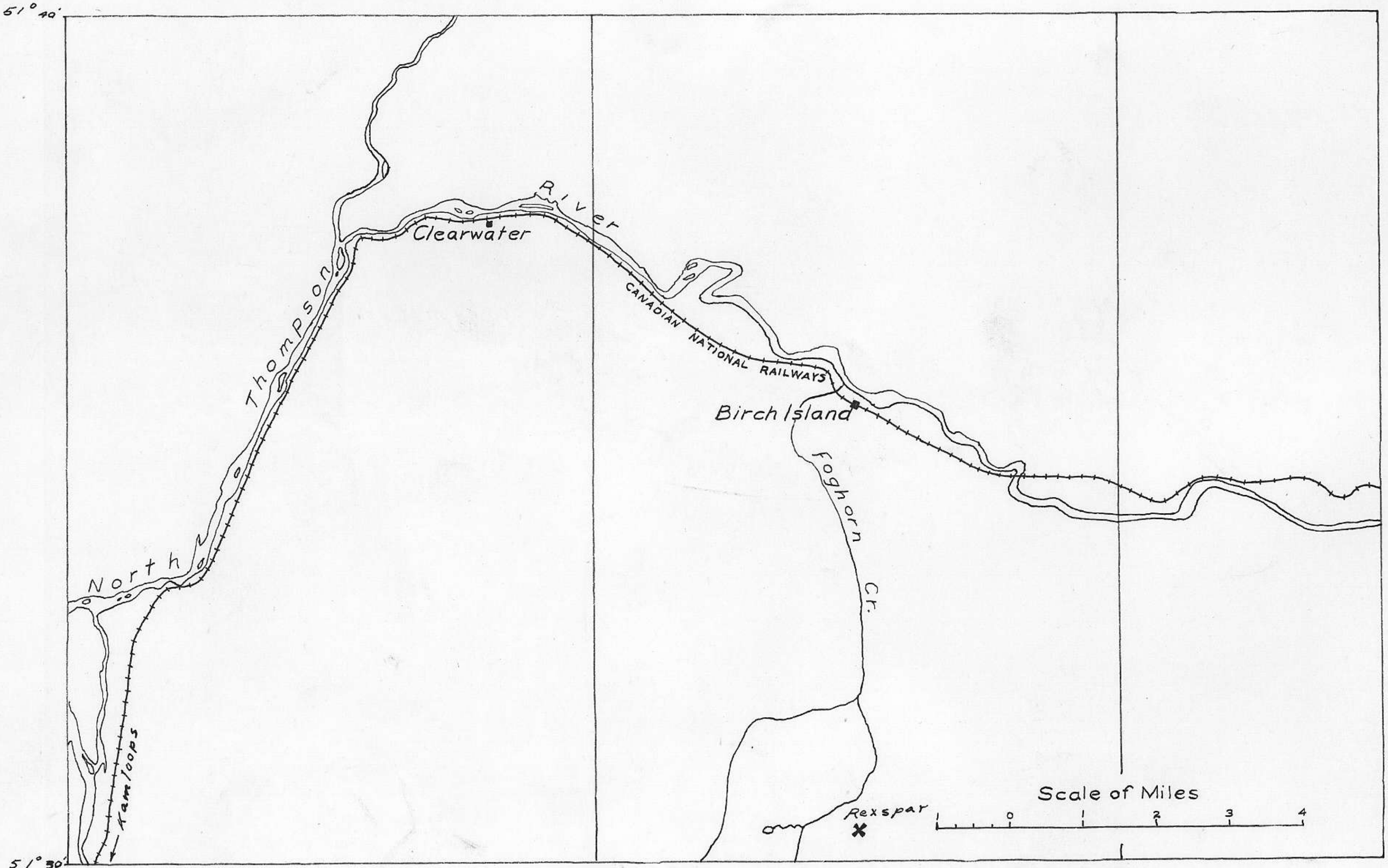


Fig. 3 (x100) Part of thin section (B), showing a grain of zircon (right centre) surrounded by a dark halo in fluorite.(medium grey colour). Large dark grains are pyrite. Some tabular phlogopite crystals are shown in the lower left of the photograph.

Appendix I


51° 40'
51° 30'
120° 00
119° 50'
North Thompson River
Clearwater
CANADIAN NATIONAL RAILWAYS
Birch Island
Foghorn Cr.
Kamloops
Rexspar
Scale of Miles
1 0 1 2 3 4

REXSPAR

Jan. 27/54

Screen Analysis

screen size	weight, grams.	weight percent retained	weight % retained, cumulative.
+28	0.5	0.1	0.1
-28 +35	5.1	0.6	0.7
-35 +48	10.7	1.3	2.0
-48 +65	82.2	10.1	12.1
-65 +100	158.0	19.4	31.5
-100+150	133.0	16.4	47.9
-150+200	98.0	12.0	59.9
-200	326.0	40.1	100.0
Totals	813.5	100.0	

Radiometric Assay of Screen Products

screen size	net counts per minute		percent radioactive constituents	percent of total radioactive constituents contained
	2 gms.	full tray		
bulk sample	8	40	.08	
-28 +35	6		.06	0.6
-35 +48	7		.07	1.5
-48 +65		19	.04	6.8
-65 +100		19	.04	13.0
-100 +150		24	.05	13.6
-150+200		25	.05	10.1
-200		38	.08	54.4

Appendix III

REXSPAR.

T.M. Allen
Jan. 27, 1954