RADIOACTIVE INVESTIGATIONS GUN CREEK AREA, 1948

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Gem — LITTLE GEM?

I visited the Gem on three occasions. First with Johnson, Lorntzsen and Hubbard, when the intensity of radioactivity of the Gem "ore" was demonstrated by Geiger counters owned by Johnson and Hubbard; a second time when I spent 3 days with J.M. Taylor (the owner) and one assistant, and geologized and sampled the showings: and a third time by myself and one assistant, to check some details of the geology, surveying and collecting more specimens.

On the Gem, radioactive material occurs erratically distributed within lenses of mineralization that consist of abundant sulfarsenides of cobalt and iron and lesser amounts of hornblende. The deposit consists of lenses of sulfarsenide rich pegmatite that occur sporadically as the "plums in a pudding", along an easterly trending zone of altered granodiorite 40 feet wide and 130 feet long. Individual lenses of pegmatite range from a few inches wide by a foot long to the largest with a maximum width of 7 feet and length of 16 feet. Most of the lenses are arranged in 2 roughly parallel sub-zones, a northerly, above and north of the upper adit, and a southerly, just above the partal of addin the upper adit. Two other possible sub-zones may be defined by a lens on the surface 10 feet south of the upper adit-portal, and by material found in the lower adit.

A disseminated type of mineralization, characterized by small amounts of sulfarsenides disseminated in altered granodiorite, extends between the lenses and makes up the bulk of the surrounding material.

Small amounts of high-grade material occur with sulfarsenide lenses, a few inches wide by a few feet long in 3 small open-cuts, near the top of the ridge about 700 feet easterly from and 400 feet above the upper adit.

The uraninite occurs principally in the sulfarsenide lenses but small amounts occur in the slightly mineralized granodiorite. It does not occur in equal concentration in all the lenses. The highest concentration occurs along a 25-foot section (Blocks A, B and C in Assay plan) in the upper adit, between points 85 and 110 feet from the portal. This section shows a marked increase in radioactivity over even the usually strong radioactivity in other sections of this adit.

The distribution of the uraninite material is extremely erratic. This is similar to the erratic distribution of visible gold in a free-gold-quartz vein. Even where the radioactivity is relatively intense, as in the 25-foot, "high-grade" section of the upper adit, it is difficult to obtain individual hand specimens that are comparably radioactive; and individual hand specimen can be very strongly radioactive, indicating that mass alone is not necessary for strong radioactivity. In my experience, about one out of every ten hand specimens broken from the back along the "high-grade" section, proved to be radioactive, and many may show no radioactivity at all.

An approximation of the radioactive material present was made by sampling all the well-mineralized and much of the partly mineralized material, or the disseminated type of mineralization, in the two adits, and on the surface. Twenty-eight samples were taken in the upper adit, four in the lower adit, twelve from the surface around the upper adit, seven from upen-cuts 700 feet easterly and

400 feet above the upper adit, and two from the dump at the portal of the upper adit, making 53 samples in all. Of these, 42 were channel samples, and 11 were selected, specimen material. Only the channel samples were used in the calculation of tonnages present.

In the calculation of probable amounts of radioactive material present, I grouped the various U_3O_8 assays within certain limits, partly arbitrarily chosen limits but partly chosen by the natural distribution of values in the workings. The groups are as follows:

"A" groups: Assays greater than 0.1% U_3O_8 - blocks A, B, C, D, on assay-plan, and pp. 1-3 of the calculations (note: values greater than 1.06 tentative, subject to correction).

I group: Assay less than 0.1% but greater than .0094% U_3O_8 blocks I, II, III, IV, and V on assay-plan.

I group: Assays less then .0094%, but greater than .001%, blocks 1 2 3 on assay-plan. The significance of values around .001% is questionable, some of the least likely material will give assays around .001%; I think you could take a good, fresh granodiorite, concentrate the "heavies" with heavy liquids and get a fair assay just from the allanite in the heavy fraction.

The amount of proven "ore" available is only that contained in the several ore dumps. As set forth on p. 8 of the calculations, I estimate this at 96 tons of 0.26% U_3O_8. The mineralization underground is exposed on one suface only, no raises and no bounding drifts have been driven on any of the lenses and therefore none of the material in place can be considered proven.

The amount of probable ore is set forth in the calculations and a summary contained below. The tonnage given in the greater than 0.1% U_3O_8 groups is small, but this amount has a relatively high degree of probability. It must be remembered that this grade of material is

confined to the lenses, and as these occur as the "plums in the pudding", the extent and continuity of any one lens is not great. The tonnages given in the .0094 to 0.1 group is larger, but less definite. The material of group .001 to .0094 is of questionable value but as this represents slightly mineralized material, tonnages have been calculated.

As this report is concerned only with the probable amount of radioactive material present, no consideration has been given to the amounts of gold and cobalt present. The amounts of these metals present, their obtainability and marketability, plus the uranium content, should certainly be considered in any study of the economics of property as a whole.

No estimate of possible "ore" is given, as no pertinent information is obtainable from present development.

"ORE SUMMARY"

Proven "Ore"

Ore dumps only: estimated 96 tons of 0.26% U_3O_8 (it is possible the past management has actual figures on amount of "ore" piled in these dumps)

Probable "Ore"

Grade range	Estimated Tons	Weighted average % U_3O_8
Greater than 0.1% U_3O_8	232	0.71
Less than 0.1% and greater than .0094%	658	0.026
TOTAL (including broken ore)	986	0.21
Less than .0094 and greater than .001%	609	0.004

Small amounts of "high-grade" have been found in the upper cuts, 400 feet above the adit. The mineralization is similar to that in the adits, but much less in amount. The lenses, three in number, are up to 15 inches thick by up to 6 feet long, and contain relatively "high-grade" material. Selected material from the cuts and nearby dumps assayed as follows: 0.375%, 2.80, 2.30, 0.01, 2.45, 0.27 and 0.75%. The material was too small in amount and too widely scattered to estimate tonnage.

I think the possibility of finding more material on the Gem similar to that in the adits is relatively good. The vertical range over which radioactive material has been found is 460 feet approximately and the horizontal range 700 feet, however, of this distance only that near the two adits, is of immediate interest for further prospecting. Here several lenses have been found in the upper adit and on the surface for 50 feet above; and one in the lower adit 48 feet below the upper. The lenses occur in a zone approximately 130 feet long by 40 feet wide. As they are of erratic or sporadic distribution governed only by a general easterly trend of a zone 40 feet wide, additional lenses could best be sought for by closely spaced diamond-drill holes. This was done successfully at the Little Billy, on similarly disposed, but not genetically similar, "ore-bodies". I think the ground both ahead of the face of the upper adit, where a good width of disseminated mineralization is still found, and between the upper adit and the lens found in the lower could be thus diamond-drilled to advantage, if desired. If extension of the highly radioactive material were more desirable, then the ground immediately above and below the 25-foot "high-grade" section (Blocks A, B, and C) in the upper adit could be drilled by up and down holes.

Jewel

I visited the Jewel on two occasions; once with Johnson et al, when we went over the property with their Geiger counters and detected moderate radioactivity here and there, and a second time when I took our own Geiger counter and didn't get a thing. The second time I was careful to seek out as high grade "ore" as I could, and I found some heavy arsenopyrite in the middle adit, and some heavy chalcopyrite ore in the lower adit - no radioactivity detected.

Other Properties

In addition to the Gem and the Jewel the following properties were visited and all the mineralization tested for radioactivity: none was found on any of these properties:

1 - The Pilot on Gun Lake.

2 - Eldorado, or Lucky Jim (Grant White's) at headwaters of Eldorado Creek.

3 - Lucky Strike, at headwaters of Taylor Creek.

4 - Arsenopyrite showings of Jack O'Shaughnessy at headwaters of Trapper Creek, a southerly flowing tributary of Gun Creek.

I have no further information, either from my own observation, or by hearsay, about the existence or not of other radioactive material in the district.

concentrate averaging 1·1 ounces of gold, 1·1 per cent copper, 0·6-0·8 per cent cobalt, 30 per cent arsenic, and 20 per cent sulphur, the balance being iron, silica and insolubles. The flotation concentrate is shipped to the Tacoma, Washington smelter of the American Smelting and Refining Company. The company receives payment for the gold and copper content of the concentrate, but the cobalt is not recovered. It is estimated that about 70,000 pounds of cobalt is lost yearly.

The ore deposits lie in the upper portion of Nickel Plate Mountain where basic igneous rock has intruded inclined sedimentary beds of Triassic age. The ore is of the contact metamorphic type and replacement has played an important part in determining the position and size of the ore shoots.

Cobalt in the Nickel Plate ore occurs as cobaltite and safflorite.

A considerable amount of work was done in the laboratories of the University of British Columbia at Vancouver during the war in an endeavour to recover this cobalt. A process of roasting and leaching the flotation concentrates was devised whereby up to 90 per cent of the cobalt and 95 per cent of the copper could be abstracted, with the acid-leached residue going to the cyanide circuit to recover the gold.

However a problem was raised by the effect which the fumes from the roaster would have on the fruit districts near the mine and also the disposition of a sizeable quantity of arsenic, plus capital cost of equipment.

During 1950 an investigation was carried out in the Mines Branch Laboratories, Ottawa to check the chemistry of the process used in the laboratories of the University of British Columbia. The recoveries of copper, cobalt and gold claimed for the process were substantiated.

Cobalt occurs in a similar manner at the Hedley Mascot mine adjoining the Nickel Plate Mine. This also is not recovered.

Western Nickel Mines Limited (20)

This property was formerly known as B.C. Nickel Mines Limited and also as Pacific Nickel Mines, Limited and is now controlled jointly by Pacific Nickel Mines Limited and Newmont Mining Corporation. It is situated 7 miles from Choate on the C.P.R., 95 miles east of Vancouver.

The property was developed during the early 1930's. During 1936 and 1937, about 5,000 tons of development ore plus concentrates were shipped to Japan. In 1940 ore reserves were estimated to be 1,000,000 tons averaging 1·39 per cent nickel and 0·5 per cent copper.

The property is now being developed for large scale mining, and production is expected to begin in the early part of 1955 with concentrates being shipped to the Fort Saskatchewan refinery.

A shipment of 2,500 pounds of ore was tested at the Mines Branch Laboratories, Ottawa during 1940 and it was found that the amount of cobalt in the feed was 0·20 per cent.

Little Gem Mine (1) 92JNE068

The Little Gem prospect is situated close to the top of a 7,000 foot ridge near Roxy Creek, a tributary of Gun Creek, in the Lillooet Mining Division.

The ore occurs as rich sulphide lenses in a shear zone and consists of a mixture of arsenopyrite, danaite, and lollingite-safflorite, with a little gold, uraninite and molybdenite in a gangue of quartz, feldspar, and altered country rock.

Cobalt in Canada No 849 Dept. of Mines & Tech. Surveys 1953

Cobalt Price 1953 $2.60
1947 $1.50
1921 $9.00
1977 $6.00

92JNE068 LITTLE GEM

Samples of ore from the prospect analyzed at the University of British Columbia Laboratories during World War II, ran as follows:

cobalt	6·8%
nickel	0·5%
iron	22·1%
arsenic	39·0%
sulphur	14·1%
insolubles	11·4%
gold	1·43 oz. per ton

A considerable amount of work was carried out in developing a treatment process for this ore in order to recover both gold and a cobalt residue high enough in grade to be shipped to a refinery. It was found that by sintering the crude ore, and smelting the sinter with the addition of some crude ore plus silica in an electric furnace, a speiss was formed which was then roasted at 875°C. in a small hand-rabbled furnace. An analysis of the roasted speiss was as follows:

cobalt	30-35%
iron	35-40%
arsenic	3-5 %
gold	5-8 oz. per ton

It was claimed that this process would recover about 90 per cent of the cobalt and 98 to 99 per cent of the gold.

Estella Mine (14)

The mill site is at Wasa, 11 miles north of Fort Steele, and the mine is about 5 miles to the east, in a basin at the head of Tracy Creek in the Rocky Mountains. The property was first staked in the 1890's. Milling commenced on November 1st, 1951 by Estella Mines, Limited. The ore is a replacement by sphalerite, galena, and pyrite containing a relatively high percentage of cobalt, and for that reason was not acceptable at the Trail smelter. The British Columbia Department of Mines assayed over 100 samples of mine ore and the soluble cobalt in each ranged from 0·0007 to 0·06 per cent. The arithmetical mean of the samples was 0·0153 per cent soluble cobalt. The lead concentrate only was shipped to the Trail smelter during 1951 while the zinc concentrate was smelted at Bartlesville, Oklahoma.

There are small amounts of cobalt present in other British Columbia zinc ores but the amount is insufficient to make recovery worthwhile at the Trail smelter.

Victoria Mine (15)

The Victoria group of claims are 5 miles south of Hazelton, on the northwest slope of Rocher Déboulé Mountain. Between 1916 and 1928 a vein was developed and several lots of gold-molybdenum-cobalt ore were shipped in the period 1918-28 and in 1940 and 1941. Data on the analysis of some of the shipments are based on information obtained from the Annual Reports of the Minister of Mines of British Columbia. The analyses are shown in the following table: