

RADIOACTIVE PROSPECTS

by

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Bureau of Mineral ResourcesStorey's Creek Area

The two prospects inspected in this area occur in the Storey's Creek Granite which outcrops in a dissected table-land a few miles north of Avoca. The granite intrudes slate and quartzite of the Mathinna Group (Lower Palaeozoic?) and, in places, remnants of this sedimentary cover still remains. In some areas, granite or intruded sediments are overlain unconformably by Permian sediments.

The Storey's Creek Granite normally shows noticeably increased radioactivity compared to that of sediments and dolerite in the Avoca area and counts ranged from two to five times this normal background. The granite mass contains a number of related but distinct phases, - pegmatite, aplite, greisen and quartz veins, - but the most common type is a porphyritic granite with large phenocrysts of soda orthoclase and with subordinate mica. The geology and tin deposits of the area have been described in detail by Reid and Henderson (1929).

Both prospects visited are close to Storey's Creek in fairly rugged country along the dissected edge of the table-land and are about two miles south of Rossarden, a village on the road from Avoca to Aberfoyle. Access from Rossarden is by foot.

The area in which the prospects lie consists mainly of granitic rocks, dissected to about 300 feet by Storey Creek and its tributaries but remnants of roof pendants occur on some of the ridges. Old tin workings indicate that some of the granite contains tin.

Hughes Prospect

This is situated on the right bank of the Storey's Creek about one mile downstream from Chwalczyk Prospect in the same geological environment except that in this prospect radioactivity accompanies sulphide mineralisation in a silicified greisen body which has been described by T.D. Hughes and G. Everard of the Mines Department. The outcrop occurs about 40 feet above creek level where an apparent vein-like body of greisen strikes southward along the contour of the valley sides. Greisen has been exposed at 3 points over a total distance of 35 feet. It is exposed for about 8 feet along the strike in the main exposure where a granite footwall indicates steep easterly dip. The maximum horizontal width of greisen observed was 4 ft. 6 ins. but no defined hanging wall had been reached. The hard mineralised rock has been described by Everard as a greisen showing "alteration, silicification, and recrystallisation". The rock is grey in colour with prominent galena and sphalerite crystals with some chalcopyrite and pyrite and

rare specks of gold. Much of the rock resembles siliceous lead-zinc ore rather than greisen.

Maximum radioactivity was found on the main exposure and was clearly restricted to the greisen rock. Examination by the probe indicated patchy and rather low concentrations except for one large specimen showing prominent sulphides which gave a beta plus gamma count of about 5000 per minute. However, this was little more than half of the maximum activity obtained at Chwalczyk's Prospect. Some activity seemed concentrated along a prominent joint running with the strike of the deposit but no secondary uranium minerals were found. The tough greisen is very little effected by weathering and this activity is more likely related to adjacent rock rather than to the fracture itself.

A sample of this rock assayed radiometrically by the Department of Mines, South Australia indicated a grade of 0.03% eU_3O_8 and a chip sample taken across 4 ft 6 ins by the writer gave .08% eU_3O_8 and a ratio of 1.14 by field assay at Canberra. A specimen containing much sulphide mineralisation and a portion of the rock which showed maximum radioactivity gave .19% eU_3O_8 and a ratio of 1.2. These ratios indicate that activity is due to uranium approximately in equilibrium and it was hoped that the source minerals would be identified from the richer specimen by micro-slide and autoradiograph.

However, petrological and mineragraphic work carried out by W.M.B. Roberts and R.S. Stevens (see Appendix I) shows that the uranium present in the rock is not associated with sulphide minerals but accompanies sericite and is in such small quantities as to defy identification.

The investigation, therefore, does not indicate any possible source of radioactive ore in the greisen and this, together with the sporadic character of radioactivity and the environment of the deposit suggests that no further development is warranted.

Uranium mineralisation in sulphide ore at Hughes Prospect held some promise until investigation showed no identifiable ore mineral. Similar sulphide bodies in the Storey's Creek Granite, are described by Reid and Henderson (1928), and if any of these prove to be notably radioactive they might provide useful confirmation of the laboratory work done on Hughes Prospect.

RECOMMENDATION

1. Until more encouraging evidence is found, prospectors on Hughes' claim should be advised against drilling or major development.

APPENDIX I

SULPHIDE ORE - HUGHES PROSPECT

STOREY'S CREEK

TASMANIA

PETROLOGY

by

R. S. Stevens

HOST ROCK

A very strongly altered granite in which the feldspar has been completely replaced by sericite and the original mafic minerals entirely removed. The coarsely crystalline quartz of the original rock has a striking micropegmatitic texture with small blebs and stringers of quartz in optical continuity included in poikilitic fashion and in great abundance in the large quartz anhedral. The texture is, in fact, almost micrographic. The quartz is also crowded with flaky green sericite inclusions and abundant opaque dust of indeterminate nature.

The micropegmatitic quartz has been coarsely recrystallised after alteration of the rock to form large clear subhedral and euhedral crystals free from pegmatitic texture and inclusions apart from occasional relict stringers of fine sericite. That these euhedral quartz crystals are secondary is shown not only by their prismatic form, but also by included lines of powdery opaque dust marking the outline of an earlier but still euhedral stage of their growth.

At the time of formation of the secondary quartz crystals the rock contained numerous rather large cavities into which the growing crystals extended and developed perfect terminations. The remaining space left in the cavities after the growth of quartz ceased was filled by a deep red, semi-opaque (?) hematite.

Large irregular areas of fine, green sericite probably represent original feldspar and often contain inclusions of an opaque amorphous, granular, or fine columnar euhedral prismatic, deep red-brown (?) hematite. The identification of this opaque mineral in thin-section is not definitive and W.M.B. Roberts indicates that it may well be sphalerite.

Small secondary quartz veins cut through the quartz, sericite and (?) hematite, and carry grains of a semitransparent, isotropic (?) sphene with very high refractive index.

THE VEIN

The specimen is transected by a large vein-like body of composite structure. In thin-section the structure of the vein presents a perplexing problem in that it consists of an outer zone of fine cryptocrystalline silica passing abruptly into a zone of coarsely crystalline bladed euhedral quartz crystals standing out at right angles to the vein walls with their free, perfectly terminated ends projecting towards the centre of the vein giving rise to a distinct comb-structure. The central part of the vein is filled by distinctly fragmental material consisting of small angular chips of the host rock, pieces of quartz and sericite aggregate, and grains, crystals and amorphous masses of several species of opaque minerals, all set in a dominant matrix of very fine sericitic clay minerals and carbonate (? siderite) with abundant dusty opaque grains.

One narrow quartz vein cuts across this in-filling material and carries a highly lustrous, silvery opaque mineral with "ladder" structure. This small vein cannot be traced through the quartz walls of the main veins nor the host rock.

There is a distinct concentration of opaque minerals at the interface between the sideritic vein-filling material and the euhedral quartz terminations. There are also patches of a greenish brown, slightly pleochroic very fine flaky sericitic mineral in the same region and the same mineral fills fine cracks at the base of the bladed quartz of the main vein.

MINERAGRAPY

by

W. M. B. Roberts

MINERAGRAPY

In polished section the principal opaque mineral is shown to be sphalerite, which constitutes 90% of the total opaque mineralisation. It occurs as irregular areas which range up to 1.00 mm. across which are composed of grains measuring 1.2 mm. across, all of which show a distinct lamellar twinning.

Enclosed within these sphalerite areas are the subordinate opaque minerals which are: pyrite, chalcopyrite, galena and pyrrhotite.

Pyrite and galena form irregular areas ranging up to 0.33 mm. across, galena also fills small fissures which cut the sphalerite bodies.

Chalcopyrite has unmixed from solid solution with sphalerite to form small rounded "blebs" in the mineral, the largest of which measures 0.1 mm. across. In places these are strung out into fine spindles which have a roughly parallel arrangement.

Marcasite occurred in only one of the polished sections examined, occurring in a vein of indurated sedimentary material, where it forms subhedral crystals and is intergrown with pyrite as irregular areas, the largest of which is 0.35 mm. across.

Lamellar twinning is well developed in most of the grains.

Pyrrhotite is replacing chalcopyrite throughout the ore, and forms rounded areas which measure up to 0.15 mm. across.

RADIOACTIVITY

Autoradiographs prepared from sawn sections of the ore showed the major areas of alpha-particle emission to be located parallel to the vein of sedimentary material which cuts one of the sections.

Tests with the sodium fluoride bead showed conclusively that there was no radioactivity associated with the opaque minerals. Tests on a thin vein of sericite-like material gave weak positive results for uranium. No separate radioactive mineral could be determined, and it seems probable that the uranium mineral has been deposited either with this sericitic material or in the interstices between the grains at a later date, possibly derived from the host rock and concentrated by the metamorphic processes which have been operative in the genesis of this rock.

APPENDIX II

by

L. C. Noakes

The results of radiometric assays carried out by the Geophysical Section of the Bureau on samples from the three prospects inspected came to hand after the report was written. The samples assayed were those on which field assays were previously carried out at Canberra and quoted in the report and the results of both field and laboratory assay are shown below for comparison.

Hughes Deposit

<u>Field Assay</u>			<u>Laboratory Assay (Geophysical Section)</u>			
eU ₃ O ₈						
U _b %	U _g %	Ratio	No.	U _b %	U _g %	Ratio
.08	.07	1.14	TR55/135	.059	.053	1.0