

NOTES ON THE KING ISLAND
SCHEELITE DEPOSITS.

The scheelite deposits on King Island were discovered by the well known prospector, Mr. T. Farrell, a few years prior to 1910. They occur in the vicinity of Grassy, on the sea-coast in the south-eastern part of the Island.

Access is gained by motor-road from either Currie (16 miles) the port on the West Coast, or Naracoopa (17 miles) the port on the east coast. These ports are visited by vessels trading between Melbourne and ports on the north coast of Tasmania.

Previous Literature.

Debenham, F., Notes on the Geology of King Island, Bass Straits. Proc. Roy. Soc. N.S.W. Vol. XLIV, pt. IV, 1910.

Waterhouse, L.L., Tungsten and Molybdenum, Part III, King Island, Tas. Geol. Survey, Mineral Resources, No. 1, pt. III, 1916.

Lavers, Herbert, Notes on Tungsten with particular reference to King Island Scheelite Treatment and Assays of Low-grade Material, Proc. Aust. Inst. Min. & Met., New Series No. 43, 1921.

History and Development.

The scheelite was discovered prior to 1910 and the earliest attempt to open up the deposits was unsuccessful owing apparently to lack of capital. Following the rise in price of tungsten during the early years of the Great War, another attempt was made. This consisted of driving a number of adits, the work being in progress during Waterhouse's visit in 1916. At this time one shaft had been sunk and five adits had been or were being driven, but of these two (probably the older ones) had already collapsed. This development work continued during 1916 and early 1917 until the King Island Scheelite Company was formed and started operations in 1917.

This company planned to mine the deposits by Glory-hole methods and as the prospecting adits were of little use for this purpose two new ones were driven at a lower level (No. 3) and became known as the North and West adits. The workings which developed above these adits became the North and West opencuts. Open cut workings became superimposed on the Glory-hole methods. Particularly when the removal of overburden and country rock became necessary, for which purpose a steam navvy was employed.

The opencuts have removed all the upper prospecting adits, but the bottoms when work ceased were still about 20 feet above the North and West adits.

In addition to its mining operations the company carried out prospecting operations by means of shafts to the west of the opencuts and proved the extension of ore in that direction.

The company ceased active operations in 1920.

Topography.

King Island has a remarkably low-lying and level surface representing a former peneplain. The highest land is in the south-eastern part where it rises to 600 feet above the sea. In the vicinity of Grassy there is a moderately steep to steep slope to the sea-coast, which near the mine amounts to 250 to 300 feet.

Geology.

The surface is largely covered by sand and is otherwise well soiled. Exposures are therefore, few and most information as to the rocks is obtainable from the mine workings. Gravels &c. are found at heights of 120' to 150' above sea-level and represent either valley fillings or an old shore line.

The country rocks adjacent to the mine consist of quartzites and slates. The quartzites occur to the north and north-east, while the slates occur with the ore bodies and to the south thereof. Near the mine these rocks have a general east-west strike with a low dip (20° to 40°) to the south. Along the coast and elsewhere the strikes and dips have a considerable range. These rocks probably belong to the Cambro-Ordovician system.

An aplite dyke and numerous small veins exist in the open cut and are intrusive into the slates &c. Aplite also occurs some 20 chains to the west, while loose pieces at the surface indicate other veins and dykes. It is reported that granite occurs to the south and the aplite is without doubt connected with the granitic intrusions.

Economic Geology.

The ore that has been mined consists of garnet rock, the garnet having been proved by analysis to be andradite. As a general rule scheelite cannot be seen by eye in the garnet rock, but coarse patches can be seen in some of the narrow quartz veins in the ore-bodies.

The garnet rock is for the most part coarse grained the crystals being up to $\frac{1}{2}$ " diam. and apparently free from gangue. In some of the finer-grained types quartz is present between the garnet crystals. It was found in the treatment that the ore contained 66% of garnet, so that other gangue minerals (probably including some country rock) are present to the extent of at least 33% (allowing 1% scheelite).

Associated with the garnet rock there are bands of fine-grained garnetiferous rocks some of which were found by L.L. Waterhouse to be pyroxene-garnet types.

The aplite is also reported to contain scheelite.

Waterhouse reported the presence of quartz, epidote, calcite, pyroxene and actinolite in the ore and quartz, albite, sericite, chlorite, biotite and magnetite in the country rocks.

The garnet ore-bodies are associated with and occur as bands in a series of slatey and shaly rocks. They appear to agree in strike and dip with these rocks and therefore apparently represent replacements of certain beds. The mine reports refer to limestone in some of the underground workings and it is possible

that the ores are replacements of limestone beds although no limestone beds were observed during a recent examination. However, garnet bodies can be formed by alteration of shale as well as of limestone, and so the ore bodies may have been formed by alteration of such rocks. Further it is certain that the iron content of the garnets was introduced by the mineralizing solutions and so also may have been the calcium content, so that a local source of calcium is not necessary for the formation of the garnet.

The ore-bodies occur in a mineralized zone about 400 feet wide. The zone is bounded on the north by quartzites, the boundary corresponding generally with the northern edge of the Northern open-cut. The actual junction is probably a faulted one and it appears to have a strike of 345° . It was probably cut in the old Nos. 1, 2, and 3 adits and had a similar strike but the dip ranged from vertical to 60° to the south-west.

The zone has a general E-W strike in agreement with the slates &c. existing in it. The southern boundary is not so well-defined, but dark quartzites and slates occur to the south of the most southern ore-body. There is no evidence of any fault at this boundary, but the rocks appear to conformably overlie the mineralized zone. The extension of the ore-bodies at depth should be found beneath these slates and quartzites.

The principal extension will be found to the west of the open cuts in the region partly tested by the prospecting shafts.

The mineralizing solutions responsible for the formation of the ore-bodies represent the final differentiates from the granite magma. The aplite dykes and veins were also derived from the granite but at a slightly earlier stage. It is probable that the presence of aplite dykes and veins will serve as a general indication for places (outside the open cuts) favourable for prospecting for scheelite.

The Ore-bodies.

The open cuts are the only workings in which the ore-bodies can be examined, the upper adits having been excavated and the lower ones being inaccessible. It is therefore, somewhat difficult to determine the strike, dip, number, width &c. of the ore-bodies, but using all available information a general idea of these is possible.

The ore-bodies (garnet rock) are intercalated with the slates, shales and quartzites and appear to agree with them in strike and dip. The strike is a general east-west one with a low dip (20° to 40°) to the south. The number appears to be five, and will be numbered from south to north.

No. 1 has been cut in the West adit, but not mined. Its relation with No. 2 body has not been established.

Nos. 2 and 3 bodies are exposed on both sides (south and north) of the West open cut in which they were mined. One or both of these were probably intersected in Nos. 4 and 9 prospecting shafts.

No. 4 body is exposed along the south side of the North open-cut and rises along the western end. Its relation with and distance from No. 3 body are not definitely established. Its westerly extension has been cut in Vaudeau shaft and probably in No. 5 prospecting shaft. This body may consist of several bands of ore with intervening country as exposed in the crosscut from Vaudeau shaft.

No. 5 body occurs along the northern side of the North open cut and abuts against the quartzite from which it extends in a westerly direction. Much country rock occurs in the floor of the open cut and apparently between Nos. 4 and 5 ore-bodies whose dip may be steeper than that of Nos. 2 and 3. The extension of No. 5 was probably cut in No. 2 (?) shaft.

Production &c.

The company carried out active mining and treatment operations from the middle of 1917 until 28th July, 1920 with the following results:-

Year	Tons of Ore Treated	Tons of Concentrates Produced	Approximate Value of Concentrates
1917	4937	69	£12,130
1918	21088	216	39,352
1919	27832	199	43,181
1920	13853	105	17,903
	67,710	589	112,566
	Percentage Yield of Concentrates	Dividends.	
	1.40	5,000	
	1.02	10,000	
	0.71	5,000	
	0.76	5,000	
		25,000.	

The decrease in the percentage yield of scheelite concentrates was apparently caused largely by:

- (1) Difficulty of keeping the ore free from overburden and country in the open cuts during larger scale operations.
- (2) Mining of the ore in the North Open-cut which was reported to be of lower grade than that in the Western open cut.

Operations ceased in 1920 owing to the fall which occurred in the price of tungsten ores after the war period. Ore was still showing in the open cuts, while westerly extensions of the ore had been proved in trial shafts.

On 30th September, 1919, the mine manager

reported ore reserves of 69,200 tons with an average value of 0.85% WO_3 , and allowing for later extraction at least 50,000 tons can be considered to remain with ofcourse larger quantities that have not yet been proved.

Treatment.

The ore to be treated comprised 66% garnet (sp.gr. 3.7 and hardness 6.5), 33% gangue minerals and country rock) and 1% scheelite (sp. gr. 5.9 and hardness 5).

The treatment consisted of crushing and concentration on Wilfley tables, which yielded a garnet-scheelite concentrate. The concentrate was dried and treated in an electro-magnetic separator to remove the garnet and leave the scheelite as a marketable product.

P.B. Nye (Sgd)

GOVERNMENT GEOLOGIST.

Mines Department,
Hobart.

10/7/34.