COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

RECORDS:

1949/14

KYANITE NEAR YANMAH, WESTERN AUSTRALIA.

by

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REPORT NO. 1949/14.

(MINERAL ECONOMICS SERIES 1941/1.)

KYANITE NEAR YARAMIL, WESTERN AUSTRALIA.

This note concerns the request by the Midland Mining Co. Ltd. for financial assistance in the development of a deposit of kyanite to the north of Yarramil, in the Southern Division of Western Australia.

Mr. J. H. Lord, geologist, Western Australian Geological Survey, in his report dated 18th. October, 1948, suggested that, to demonstrate whether sufficient kyanite is present to justify further mining, £800 should be expended on the following development: shaft sinking 50 feet, cross-cutting 25 feet, winzing 50 feet, driving 200 feet.

Mr. Lord's proposals were based on the evidence available - his clear description of the operations and the deposit need not be repeated. A brief geological description of the deposit is, however, appended.

During Mr. Lord's visit, kyanite-rock was exposed in a cross-cut on the upper level over a width of 9 feet, averaging 62.66% Al_2O_3. Since then cross-cuts have been carried into the decomposed schists in the walls to the east and west, and conclusively demonstrate that the kyanite is confined to this one bed.

The shaft has now been carried down on the underlay for about 30 feet, following a thin band of kyanite-rock in clay, but as the shaft is timbered almost to the bottom it could not be examined. Kyanite-rock is exposed at the bottom of the shaft.

The following work should now be undertaken:

(a) A cross-cut should expose the width and grade of the kyanite-rock at the bottom of the shaft.

(b) The kyanite-rock should be followed north along the strike, by driving in the kyanite-rock. Thirty to forty feet of driving should demonstrate not only whether the rich kyanite segregation persists from the level above, but also whether it is worth while continuing operations.

(c) If high grade kyanite is exposed over the full width of say 6-9 feet for the entire length of 30 to 40 feet, then there is some justification for financial assistance being given to the Company for the following work already suggested by Mr. Lord: 200 feet of driving, 50 feet of winzing. A sum of £600 would be required.

The Company expect to have the funds (from recent sales of asbestos mined at Bindi Bindi) for operations (a) and (b) but not for (c), and could not continue without government assistance.

It is my opinion that, during the next 2-3 weeks, operations (a) and (b) will demonstrate that the high grade kyanite is not sufficiently persistent to justify further work. In the meantime a decision may be made to provide the £600 suggested so that (c) could be continued if (a) and (b) demonstrate that further work is justified - delay would mean

closing of the mine and flooding and probable collapse of the soft clays.

If financial assistance is provided and before operation (c) is commenced, the mine should be visited by a geologist (either Mr. Lord or Mr. Mathieson) to confirm that high-grade kyanite is exposed continuously along the drive and over a width of 6-8 feet. During operation (c) the geologist should remain at the mine to ensure that all development remains in kyanite. If, during progress of the work, the grade falls off and the kyanite thins out, the project should be stopped and the mine abandoned. Unless there is at least 200 feet of high grade kyanite, further expenditure on development is not justified.

The following remarks may also be of interest. The type of deposit is such that it never justified the large amount of capital which has been expended on it - however, I am fully appreciate the difficulty as there is little past experience of kyanite on which to base advice, and surface eluvial deposits of kyanite tend to give an erroneously magnified impression of the size of the parent in-situ deposit. Money was carelessly spent at first on lavish mining, but after a change in the directorate an attempt was made by the Directors and present management to straighten out the Company's affairs, but the indebtedness has been too heavy. Such occurrences as this do not in my opinion justify underground mining, but having taken development so far it would be injudicious not to continue with the small amount of further development necessary to prove the deposit finally one way or the other. The deposit is such that in the hands of two men they would have made rather more than wages, but is too small for a company. Even if operation (c) does disclose kyanite over the entire length of development, the shareholders are never likely to receive a full return of their investment.

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17/1/46

APPENDIX I.

BRIEF NOTE ON THE GEOLOGY OF THE

YAMMAH KYANITE DEPOSIT.

Below the surface crust of the laterite there is the typical sub-lateritic alteration to clay and lithomargic material, which affects all rocks in the area. In general this uniform decomposition makes it difficult to identify in detail the original rocks - the rocks down to the bottom of the present workings at Yammah have been almost completely altered.

Mining at Yammah has been mainly in two areas - on M.C. 386 H to the north-west, and on M.C. 387 H. to the south-east. Present activity is in the former area, but such scant information of the mode of occurrence of the kyanite as is available is best obtained on M.C. 387 H. Here, a bed of kyanite-quartz-schist has been exposed at the surface over a strike length of 400-450 feet. Its strike is N 80° E, dip 80°-90°S. Associated with the kyanite-quartz-schist is a clay-schist, a highly decomposed rock which commonly contains fine mica and fine kyanite - although in part this may have been a kyanite-mica-schist, it is not improbable that in part it was a kyanite-schist which was originally hydrothermally altered to mica, an alteration typical of kyanite.

Thin bands or stringers of kyanite follow the bedding, widening in places into segregation masses of kyanite in the kyanite-quartz-schist bed; they normally range from a fraction of an inch up to 6 inches in thickness, and from a few inches to a few feet in length. The kyanite crystals in the thin bands are commonly arranged in parallel, forming a kyanite-schist; in the larger segregations they normally form a mass of interlocking crystals. There is no one persistent segregation of kyanite. Lord records that a large mass was exposed at the south end of the bed, but a shaft and cross-cut demonstrated that it cut out at a shallow depth. Rutile is common throughout.

The bed of kyanite-quartz-schist is typical of such occurrences in general. The massive kyanite is much more resistant to weathering and surface decomposition than is the associated rocks, and as the latter decompose and are carried away the kyanite segregations remain more or less in situ as an accumulation of boulders. The massive kyanite, that is kyanite-rock consisting of interlocking crystals, is much more resistant than the schistose kyanite, so that the boulders consist almost invariably of the massive material. With denudation over a prolonged period, on a surface with only gentle gradient, the amount of kyanite eluvial may suggest to the layman the presence of a large kyanite body quite out of proportion to its actual size.

The deposit now being open up half a mile to the north-east may be expected to be similar. I would suspect that if the area could be geologically mapped in detail the two occurrences would prove to be the one folded bed. But whether the general kyanite content will be higher in the north-western occurrence, justifying further mining, can only be demonstrated by opening the bed along the strike. There is nothing to suggest that the kyanite content here will be higher than the occurrence to the south-east.

In this north-western occurrence, after extracting the surface boulders by means of bull-dozers, quite a considerable excavation was made in the underlying clays. At one side of the open cut there is a thoroughly decomposed kyanite-quartz schist merging to muscovite-quartz-schist. Some

specimens showed limonitic pseudomorphs which may be altered garnets. A kyanite mass was exposed at one point and was cut at a shallow depth by a short shaft and short cross-cut. It was at this stage that Mr. Lord made his visit, and his samples taken across the 8 feet of kyanite in the cross-cut averaged 62.66% Al_2O_3. During my visit this cross-cut was blocked by debris.

A cross-cut 30 feet to the west exposed brown, white and red clays, as in the open cut above, and a cross-cut totalling about 60 feet to the east exposed what appear to be decomposed mica-schists, which, according to Lord, contained some kyanite near the massive kyanite. The strikes are apparently approximately north-south, dips to the east, but according to Lord the strike is almost east-west close to the kyanite mass - presumably there is some folding. An inclined shaft has since been carried down 36 feet on the underlay in the underlying clays and followed a thin bed of kyanite rock, but the shaft is now timbered almost to the bottom. A vertical face of kyanite at the bottom of the shaft strikes approximately north-south judging from the very limited length exposed. There appears to have been some movement along the bedding here. Just below the footwall of this kyanite a decomposed felspathic mica-schist, gneissic in character, is exposed - this, probably, is the main country rock of the area, within which the kyanite-quartz-schist is interbedded.

If the large mass of kyanite rock in the cross cut above persists, it should be met in the lower level by driving to the north. From the strikes shown by Mr. Lord, there may be some slight folding. The evidence available provides no cause for optimism, but in view of the development already completed it would be advisable to make the small additional expenditure which will finally prove the deposit one way or the other.

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7/1/49