

in the drive south of the stope. Payable values were evidently confined to portions of the reef. No work was being done on this reef at the time of inspection.

PRODUCTION.

For the periods 1904-1913 and 1926-1937 Mines Department records show that 20,475 tons of ore have been crushed for a total of 4,464.84 ounces of gold, including only 11.66 ounces of specimen gold. From 1913-1926 no production is recorded. The average grade of the ore produced is therefore 4.4 dwts. An inspection of the yearly returns indicates that, except for 1904, the yearly average grade has not exceeded 9.4 dwts. gold per ton. The ore bodies are therefore to be regarded as of low grade.

CONCLUSIONS.

At the time of inspection work was confined to one ore body, from which the greater part of the ore crushed has been obtained. The average grade of the ore produced has been low. The present examination has not revealed any geological difficulties, and no reason is apparent why the lode formation should not continue downwards. The presence of the best values in vughy quartz or open textured quartzite is suggestive of secondary enrichment. No free gold, visible to the naked eye, is reported to be present in the ore body. All the ore so far produced has come from the zone of oxidation, and although the workings extend below normal water level the zone of primary ore has not yet been reached. Any general increase in values immediately above the zone of primary ore should be regarded as evidence of secondary enrichment, and values in the primary ore should be expected to drop away.

There appear to be no geological difficulties to complicate the testing of lodes immediately below the present workings.

REPORT ON THE CLACKLINE FIREBRICK CLAY PITS (SOUTH-WEST DIVISION).

(By R. S. Matheson, B.Sc.)

The brickyards embrace portions of Locations 18, 19, 171 and 172 (Lands Dept. Litho. 2A/40), and are situated on the north side of the Great Eastern Railway approximately one mile west of the Clackline Station.

GENERAL GEOLOGY.

The rocks of the area bear a striking resemblance to those of the Yilgarn System,* and consist of interbedded greenstones and erosion sediments which have undergone a high grade metamorphism. The main rock types are schistose greenstones, mica schists, sillimanite schists and garnet schists, and they have been intruded by granite and epidiorite dykes. The general strike is N.N.W. and the dip 70° W.S.W. The country has been highly folded and sheared, but too small an area was mapped to arrive at any reliable structural interpretation. Some evidence suggesting the existence of minor structure can be seen in the workings, but it could not be interpreted.

* G.S.W.A. Bulletin No. 97 in preparation.

Weathering has been the main process in the formation of the clays. The quality of the clay depends on the extent of weathering and the nature of the parent rock, and variations in quality are bound to occur vertically and along the strike of any rock band.

The following materials are used by the management in the production of the firebricks.

1. *Kaolinised Schistose Greenstone* (No. 1 Clay).—This material is puggy and white, and has a banded appearance due to the presence of black streaks. A gradation from this material, through biotite schist to only partly weathered greenstone schist, was observed. This alteration is identical with that seen by the writer in the underground workings of Marvel Loch Gold Development, N.L.** The kaolinised schistose greenstone is the predominant type of clay and its occurrence can be seen on the accompanying map (Plate I.).

2. *Kaolinised Dolerite* (No. 3 Clay).—This material is blocky, cream coloured, and contains scattered black specks, but there is no suggestion of banding. The clay is believed to be a weathering product of a dolerite dyke, because of its similarity to the decomposition products associated with the dolerite dyke outcropping in the creek, east-south-east of the north pit.

3. *Sillimanite Schist*. (No. 4 Clay).—The material is white to straw coloured, and sillimanite can be seen in the hand specimen. The sillimanite is a metamorphic mineral, and variations in the percentage of sillimanite in the rock are bound to occur.

4. *Kaolinised Mica Schist*.—The only occurrence of this material is in the crosscut off the east side of the north pit, and a gradation from white kaolin to hard mica schist was observed.

Mica schist is used in the manufacture of some bricks and at present is obtained from a point about one mile north of the brickyards. A band of mica schist occurs in the north pit and should be tested for its suitability in brick making as it is more conveniently located for cheap mining.

5. *Pegmatite*.—Decomposed pegmatite veins and stringers occur abundantly throughout the workings, and the material is being used as a "filler."

NORTH PIT.

The pegs, which were placed as guides for stripping the overburden from the useful clay bands, are shown on the map, but a little explanation is necessary.

The kaolinised schistose greenstone band is divided by a fissure along the north drive, into two qualities of clay, and the position of the fissure at the surface has been pegged. The higher quality kaolin lies to the east of the fissure, and the quality decreases as the biotite schist, in the face of the west crosscut, is approached.

The kaolinised mica schist band in the crosscut from the east side of the pit is 18 feet wide, but apparently lenses out before the east crosscut from the north drive is reached.

** G.S.W.A. Bulletin No. 98 in preparation.

Tale schist* is showing in the face of the crosscut from the east side of the pit, and the west boundary has been pegged at the surface. The extent and usefulness of the tale schist, however, has yet to be investigated.

SOUTH PIT.

No explanation of the pegging is necessary but a few other things must be mentioned.

Judging from surface evidence the width of the kaolinised schistose greenstone in the end of the crosscut off the west side of the pit is much greater than that already exposed in the crosscut.

The kaolinised dolerite (No. 3 Clay), owing to its mode of origin, may cut across the strike of the country or may not persist along the strike.

Sillimanite schist, which is thought to be the northerly continuation of the sillimanite schist in the south pit, was found outcropping in the creek near the north pit, and the probable position of the bed between these two places is shown on the map.

The green clays disclosed in the south pit are decomposition products of schistose greenstone and may be stained with nontronite. These clays are of little use commercially as they cause excessive shrinkage.

There is obviously some discrepancy in the mapping of the geology in the workings off the north end of the south pit, but only further development work will clear up this point. Since garnet is a metamorphic mineral, the garnet schist will occur sporadically, so that the absence of garnet schist in the north drive at the boundary of the sillimanite schist does not refute the presence of faulting as shown.

* This is now believed to be only a decomposition product of the mica schist.

LANCEFIELD GOLD MINE.
MT. MARGARET GOLDFIELD.
(By R. S. MATHESON, B.Sc.)

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GENERAL REMARKS.

The Lancefield Gold Mine is situated at Beria, approximately 5 miles north-north-west of Laverton, in the Mt. Margaret Goldfield.

The area is featureless, except for a gentle rise in the country to the south-east, towards the Mt. Crawford line of hills.

The Lancefield G.M. Co. holds twenty leases embracing an area of approximately 371 acres, and these are shown on the accompanying geological plan (Plate II.). Mining operations in the past have been carried out on G.M.L's. 715T, 806T, 2221T and 2225T, but at present (November, 1937), work is confined to the latter three leases. Preparations are being made to retreat accumulated tailings.

The mine has been one of the largest producers in the State, and from 1899 to 1937 1,221,166.98 tons of ore were treated for an average value of 7.34 dwts. of gold per ton. The production table appears as Appendix A. at the end of this report.

Wells are the source of an adequate supply of water for domestic and mining purposes, ground water level being generally from 50 to 70 feet below the surface. Timber for fuel and underground use is unobtainable in the vicinity of Beria, and supplies are at present being carted a distance of about 30 miles.

GENERAL GEOLOGY.

The country rocks in the vicinity of the mine consist of metamorphosed basic lavas and tuffs, which have an average strike N. 30° E. and an average dip 40° south-eastward, and these are referred to throughout the report under the general term "Greenstone." Interbedded with the greenstones are several bands of ferruginous quartzite or jaspilite of sedimentary origin. It has been impossible to determine whether these bands of jaspilite are separate horizons, or whether they represent one bed which has been repeated by folding. The rocks are highly folded, and have been intruded by granite and quartz porphyry. Mapped with the granite, and undifferentiated from it on Plate II., are large areas of gneiss, granitised greenstone, and hybrid rocks, which are considered to owe their origin to the replacement or assimilation of large portions of the greenstones by the invading granite. All the rocks are presumed to be of Pre-Cambrian age.

Exposures in the vicinity of the Lancefield Gold Mine are very poor owing to deep weathering, and large areas are entirely masked by alluvium. The true nature of the greenstones was only determined after examining the exposures in the mine workings and bore cores.

Areal mapping, now in progress, suggests that the Lancefield ore body is situated on the eastern limb of a south-easterly pitching anticline. The main structure is complicated by minor folds, one of which has an important influence on the Lancefield ore body, and is referred to further in the section of this report dealing with recommendations and conclusions. This fold is indicated at the surface by a marked change in strike, near the south-west corner of the Lancefield group of leases, from N. 30° E. to N. 35° W.