

"When the term phosphatic deposits is used, it is generally understood to refer to a combination of phosphoric acid and lime sometimes called rock phosphates. But although the term is generally applied to the above, phosphoric acid also occurs in combination with other elements commonly such as lead and iron, in the latter of which forms it has played an important part as one of the best known phosphatic fertilisers of the world, viz., Thomas's Phosphate or basic slag, being a pulverised slag resulting from the conversion of phosphates of iron into steel by Thomas's process.

"Phosphatic deposits as they occur in Nature may be divided into two classes, those derived from mineral and those from organic sources. The former of these comprise deposits resulting for the most part from the disintegration of certain volcanic rocks rich in the mineral Apatite (phosphate of lime), the second which embraces by far the most numerous and most important may be classed under two heads, the first being fossil phosphatic deposits, and the second altered recent deposits.

"The fossil phosphates are mostly met with amongst the Mesozoic Rocks, where beds resulting from deposits formed by large fish-eating reptiles occur, called coprolites, whilst the more modern are limestones which have absorbed a considerable quantity of phosphoric acid from overlying guano beds, and as these latter are by far the most likely to be met with in this State it will be necessary to consider them more carefully.

"Deposits of phosphate of lime of this class are very similar in every respect to ordinary limestones, and since they contain the phosphoric material in an insoluble form they are of no particular value as a fertiliser until manufactured, and in consequence exhibit no evidence of their existence by increased vegetation. Therefore, if deposits of limestone are met with along the coast, or even at a considerable distance inland under the following conditions, they are well worth testing.

"Since these limestone deposits, which contain a large percentage of phosphoric acid, evidently in some bygone time have formed the camping and nesting ground of sea birds, they must at such periods have been near the sea, either on the top of cliffs, ridges of rock, or islands, whilst now as the coast line is rising rapidly, and has been for a considerable period, if they exist at all will be found inland upon the hill tops or sides at a considerable elevation above the sea level, or as isolated hills upon the coastal plains. If patches of limestone are found in the hollows or areas of depression, there is small chance of their proving to be rich in phosphoric acid, as they are in all probability lake deposits; and the same remark may apply to the coastal coralline limestone hills, which are recent wind-formed deposits.

"When the fact is borne in mind that similar phosphatic deposits are being formed at the present time from Geraldton northward along our west and north-west coasts, it is highly probable that similar deposits to those met with on Yorke's Peninsula in South Australia will be discovered in this State."

**The Sunbeam Lease, No. 1121x, Kanowna.\***—In the month of July Mr. Woodward prepared the following report in connection with a proposal to grant State aid towards the development of the mine:—

"This lease, which contains an area of 20 acres, is situated about half a mile to the northward of the north-west corner of the township boundary of Kanowna, and immediately adjoins the Ballarat lease upon the west, whilst the North Lead passes upon its western side.

"The property has been worked for a considerable number of years, during which period 4,870·25 tons of stone have been raised, yielding 7,744·56ozs. of gold, worth £28,800, the average value of the stone per ton being 1·59ozs.

"Upon this property there are two main lines of reef, called respectively the eastern and western reefs, whilst between them several rich flat leaders have been worked.

"The eastern reef has a north-easterly course and lies upon the eastern side of the property, having an underlay of about 30 degrees to the eastward or into the adjoining mine. That portion of this reef which lies within the boundaries of this property has been entirely worked out above the 130-foot level from the whip shaft upon the lease and below that from the Ballarat Company's shaft. At the 130-foot level the reef has been followed for a distance of 180 feet within the property, for which length it is well defined, but at the southern end it is broken and small. From the northern end of this level a crosscut has been driven 60 feet to the whip shaft, and then on for another 130 feet to the western reef, which has been followed from this point south for a distance of 265 feet. This reef averages about 10 inches in width, and dips generally at about 62 degrees east. Above this level most of the stone has been stoped to the surface, where the reef can be traced for a distance of about 450 feet.

"From this level three winzes have been sunk: the first near the crosscut to a depth of 46 feet; the second, 130 feet further south, to a depth of 41 feet; and the third, near the end of the level, to a depth of 56 feet; whilst the two latter are connected at the 170-foot level.

"This reef has a well defined hanging wall, which is sometimes striated. The foot wall is not well marked, the country upon that side being much broken, highly mineralised, containing stringers and leaders of quartz, but which as a rule are poor in gold. The north and south ends of the 130 feet level have been mullocked up; therefore the reef cannot be inspected, but it is said to be small.

"At the bottom of the southern winze, water has been struck; this would be at a vertical depth of about 160 feet and corresponds with the water level in the adjoining mine where water is said to make at the rate of from 50,000 to 60,000 gallons per diem.

"Above the water level the country is comparatively soft but stands well in the workings with but little timber. In the northern winze, however, the rock is extremely hard, consisting of a porphyritic rock impregnated with marcasite (white iron pyrites). This rock upon the footwall side of the lode is so heavily charged with mineral close to the reef that it presents the appearance of a pyritic vein.

\* Vide Lithograph L 13, issued by the Department of Mines.

"The reef consists mostly of quartz of a laminated character, stained in places with oxide of iron and containing pyrites near the water level. Judging from the character of the western reef, it is a true fissure vein and therefore has every prospect of maintaining in depth. Its longitudinal extent has not yet been proved, but to judge from the surface indications it will probably split up and be lost to the southward. The lode is small but of good quality, as has been proved by the very constant returns of about  $1\frac{1}{2}$  ounces of gold to the ton. It is by no means a company proposition, but there is every reason to believe that a party of working miners like the present owners should be able to make a fair return from it.

"The proposed work for which the loan is asked is to sink a main working shaft nine feet by four feet in the clear, divided into three compartments, and timbered throughout to a depth of 250 feet at a point which will cut the western lode at that depth. Besides this it is proposed to purchase a winding engine, boiler, headgear, cages, rope, and tanks for bailing water, also pumps and piping if required. If this work is undertaken it will be with every reasonable prospect of success provided the sum available is sufficient to carry through the undertaking."

**Northam District.**—In the month of September, Mr. H. P. Woodward visited Northam for the purpose of examining and reporting upon certain gold discoveries. It appears that discoveries of gold have been reported from the vicinity of Northam, from the period of its earliest settlement, and that prospecting work has been carried out at various periods, both by the Government and the residents, whilst the establishment of an ore crushing plant at Seabrook has given a considerable impetus to the search for gold in recent years.

Mr. Woodward's work in the district was exclusively confined to the examination and sampling of those localities where gold is reported to have been discovered. The high state of cultivation in the district resulted in most of the potholes and trenches in which lodes are reported to have been opened up being filled up, and any sampling possible consisted solely of collecting scattered fragments from the surface.

Mr. Woodward's report is as follows:—

"Northam\* is situated upon the Avon River at its junction with the Mortlock; the surface is hilly and broken but the hills for the most part are soil-clad to the summits. Rocky ridges are rarely met with, the rock outcrops being mostly confined to the low-lying tracts and the stream beds.

"The rocks of the district are mostly granitic with belts of schistose country which strike roughly north and south with an easterly dip, and it is in these belts or along the junction of these with the granite that the mineral veins occur.

"Traversing one of these belts which lies immediately to the eastward of Northam are some large ferruginous banded quartz dykes very similar to those met with upon the Murchison goldfield. These form bold, rough, broken ridges of hills which can be traced for many miles. Associated with these dykes are numerous ferruginous quartz and hematite veins, also outcrops of limonite with opal veins and garnet rock.

"The tops of a few of the highest hills are capped by superficial ferruginous deposits (laterite), the under beds being ochre clays which are often weathered away, leaving caves beneath the harder upper beds.

"The first point examined was upon the Grass Valley road about  $1\frac{1}{2}$  miles from Northam, upon Block P. 1 (Cumine); here the road passes through a break in a large banded ferruginous quartzite dyke mass striking north and south and dipping to the eastward. A sample of this was taken and numbered No. 1, but the sample yielded no gold.

"There was also a white quartz outcrop running at an angle to it, the strike of which was more to the north-west, but owing to the extremely barren and flinty character of the stone it was not sampled.

"At Mallabine, Block 1080, about two miles to the north-eastward of the last mentioned, a considerable amount of prospecting has been done by the owner, Mr. J. Beard, and his father before him. Good prospects are said to have been obtained from small ferruginous leaders which were opened upon by means of pits and trenches which are now pretty well filled in, but a considerable quantity of stone is lying about the surface from which a sample was taken, No. 2, which yielded no gold upon assay.

"In this locality a shaft has been sunk to a depth of 72 feet 6 inches in mica schist with the object of cutting the leader at a depth, but this shaft is not deep enough to attain its object.

"Copper is said to have also been discovered in this vicinity, but since all the old holes have now been filled in and the surface ploughed over there is no trace of it to be seen at the present time.

"About half a mile north, upon the northern half of Block 1080, Mr. Beard has also done some further prospecting upon what is said to have been a ferruginous leader rich with gold, but since all the stone has been removed and the shaft is not accessible a sample could not be taken. The rocks here are similar to that at the last mentioned, with the additions of bands of garnet rock.

"At the south-east corner of P. 3, near a conical hill with a laterite capping, gold is said to have been discovered in small potholes, now filled in, upon the west side of the hill. This land is now under crop, but some fragments of common opal are strewn about upon the surface.

"Upon the east side of the hill a shaft has been sunk to a vertical depth of over 100 feet in crystalline schists with veins of hypersthene, hematite, quartz, garnets and tourmaline, the joints of the rocks being often coated by thin facing of opal.

"About three miles north of this, upon the eastern edge of P. 4, there is a large and well-defined quartz outcrop of a very barren character, striking north-west and south-east, near which, in a creek bed, gold is said to have been discovered. In this stream bed a number of holes have been sunk but apparently without result, and these have now been filled in.

\* Vide Lithograph 27, issued by the Department of Lands.