

THE GREAT WAIHI MINE.

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INTRODUCTION.

In a graphic article in the Mining and Scientific Press, on "The Great Gold Mines,"* Mr. T. A. Rickard includes the Waihi Mine of New Zealand in the world's sixteen great gold mines, and mentions that the choice for the premier position among these rests between the Robinson Mine of the Transvaal and the Waihi. In the concluding remarks of the article he places the Waihi second to the Robinson only on the score of the larger, definitely-ascertained ore reserves in the latter.

The Waihi Mine is situated within the limits of the town of Waihi, in the Hauraki Mining Division, Auckland Province, New Zealand. The mine lies in an easily accessible locality, some seventy miles south-east from the city of Auckland, the metropolis of New Zealand, with which it is connected by rail.

The Martha lode, which is the vein of most conspicuous outcrop in the Waihi District, was discovered in 1878. The initial operations on the Martha lode by the original prospectors, and by the Martha Gold Mining Company subsequently floated, were not successful. In 1890 the Waihi Gold and Silver Mining Company, Limited, which had been formed in 1887 to work the Amaranth lodes, bought the Martha Company's property for £3,000. Even this venture can hardly be said to have met with great success till the inauguration, of the cyanide process in 1894. Since that date the rise of the Waihi Mine from the rank of an insignificant prospect to that of one of the foremost gold mines of the world has been rapid and consistent.

The area held by the Waihi Company amounts to 765 acres. This area covers not only the Waihi Mine proper located on the Martha lode and adjoining veins, but also the Silverton, Union and Amaranth veins on the Silverton Hills, which are, however, not being worked at present, and are consequently not considered in this article. Continuous along the line of strike of the Martha lode, in a general northeasterly direction from the Waihi Company's property, are in succession the holdings of the Waihi Grand Junction, the Waihi Extended and the Waihi Consolidated companies, while a separate holding of the first-named company bounds the Waihi Mine to the westward.

General Physical Geography.

The workings of the Waihi Mine are situated on the slopes of Martha Hill, on the slopes of the Silverton Hills, and beneath the stretch of flat-lying ground half a mile wide between these two physical features. The Martha and the Silverton Hills stand at the northern edge of the gently rolling Waihi Plain. This plain, which is about seven miles from northwest to southeast, and rather more than four miles at its greatest extension in the opposite direction, has an altitude of about 280 feet above sea level, and is surrounded by low hills, showing smooth slopes and few rock ledges. The hills are continued northward from Martha Hill as the mountainous, densely forested country, which forms the backbone of the Hauraki Peninsula. Martha Hill is connected with this elevated country by a ridge, which may be spoken of, as the Martha ridge, rather

lower in altitude than the hill itself. The Silverton Hills are low features forming outliers from the mountains, within the plain. The relatively extensive Waihi Plain, through which meanders the Ohinemuri stream, represents topographically an old lake basin. Formerly the Ohinemuri flowed to the east coast of the Hauraki peninsula, but the damming of its course in that direction by a rhyolite flow resulted in the development of the lake above mentioned. The basin now drains westward through the wild and beautiful Karangahake gorge to the valley of the Thames. The plain is covered only by low manuka scrub, of little commercial value save as firewood, but the more elevated country is forested with larger trees eminently suitable for mine timber.

General Geology.

The oldest rocks that can be inferred to exist in the Waihi goldfield are argillites and grauwackes of Jurassic and pre-Jurassic age, which form the base-ment series of the whole Hauraki peninsula. Since, however, no outcrop of these sedimentaries has been located within a radius of twenty-five miles of Waihi these rocks may here be regarded as comparatively deep seated.

Tertiary volcanics comprising dacitic, andesitic and rhyolitic lavas and pyroclastics, form the whole of the superimposed rock complex.

The oldest of the volcanics exposed in the Waihi area are dacitic lavas which were ejected upon an old land surface of argillites and grauwackes probably when the land stood at a considerably higher elevation than at present. These dacites, which are the rocks in which the gold-silver bearing veins occur, have but a very limited areal extent at the present surface, since they are in great part covered by the younger volcanics to be later described. In the locality under description outcrops of the vein-bearing dacites are to be seen only in the Martha hill and ridge, and on the Silverton Hills. Wherever encountered, they are highly altered by hydrothermal metamorphism. On the surface they are often weathered to a soft, unctuous clay-like material. The effects of hydrothermal alteration are especially apparent in the neighborhood of the various veins, where the dacites, though hard, are almost completely propylitized and seamed by stringers of calcite, quartz (both chaledonic and highly crystalline), orthoclase (variety valencianite), in minor amount, and pyrite.* The vein-bearing rocks have been described as rhyolites,† but careful chemical and petrographical investigation have led the writers of the present paper to classify them as dacites.

Younger andesitic and dacitic lavas and tuffs overlie an irregular surface of the vein-bearing dacites. They form the higher hills in the vicinity of the town of Waihi, and in places occur intercalated between the vein-bearing dacites and the rhyolitic flows of the Waihi plain skirting the Martha and Silverton Hills.

Unconformity between the older vein-bearing dacites

*See paper by Waldemar Lindgren, Engineering and Mining Journal, New York, Feb. 2, 1905.

†"Rocks of Cape Colville Peninsula," Sollas & McKay, Vol. II., 1906, pp. 67-68.

**"Mining and Scientific Press," San Francisco, 4-5-07, p. 565.