

the possibility of petroleum occurring in commercial quantity is small. Further, the Ward-Cape Campbell district, in common with the greater part of Marlborough, has been so much broken and disturbed in all sorts of ways that nearly all the petroleum which may once have existed in the various rocks of the region must have escaped long ago.

The greywacke itself is of such a nature that very little oil could have originated in it; and hence it can never have been important as a source of oil, though, owing to its jointed nature, under certain circumstances it could have acted as a reservoir for oil produced in other rocks. It is not unlikely that the oil seen by me was produced in some other rock, and that owing to the disturbances in the strata alluded to above it has made its way into the greywacke and thence to the surface. The original oil-rock may have been any of the Cretaceous and Tertiary rocks that outcrop east and west of London Hill. It is not necessary to discuss the matter further in this report; all that need be said is that the oil-occurrence has practically no commercial possibilities. If a pit a few feet deep were sunk at the seepage a small flow of oil, probably a few gallons per day only, would perhaps be obtained. So far as can be seen, boring at the seepage or in the neighbourhood is inadvisable.

7. THE TALISMAN MINE, KARANGAHAKE.

(By J. HENDERSON.)

I arrived at Karangahake on the 17th November, 1920, and left on the 20th, and within that time examined the lower workings of the Talisman Mine, the cores from the diamond-drill holes, the plans and sections of the mine, and the assay sheets. In addition, the resident manager, Mr. H. Stansfield, gave me much information concerning the nature and structure of the main lode and the country it traverses.

The Maria lode, which has yielded by far the greater amount of bullion won from the Talisman Mine, is contained in the great pile of volcanic rocks that forms Karangahake Mountain, a prominent peak on the western side of the Hauraki Range, overlooking from the south the junction of the Waitawheta and Ohinemuri rivers, seven miles south-west of Waihi. The lode, together with numerous less persistent parallel lodes, strikes in a general north-and-south direction and dips westward. The profitable ore occurs in patches of greater or less size, separated by portions of the lode in which the vein-material is poor, barren, or altogether absent. The ore-bodies, although erratically distributed, are grouped to form four irregular shoots or sections from north to south known respectively as the Woodstock, Talisman, Bonanza, and Dubbo sections. In the upper portion of the mine all the ore is oxidized, but rich sulphide ore occurs below the present drainage level in the Bonanza and, to a much less extent, in the Dubbo sections. Of late years the bulk of the bullion has been obtained from sulphide ore mined from these sections. The upper levels have long been abandoned, and the lower workings are approached by an adit driven southward from a point some 40 ft. above the level of the Waitawheta River. Near the entrance of this adit the Woodstock shaft has been sunk vertically to a depth of about 500 ft. In this, the main drainage-shaft, has been placed a Cornish pump capable of lifting 1,500 gallons per minute, but at present discharging about half that amount of water. At the end of the adit, about 1,700 ft. from the entrance, is the Talisman shaft. This is an incline shaft originally started as a winze to prospect the Talisman shoot, but now much enlarged and extended to tap the Bonanza section of the lode. Below the main adit, which reaches the Talisman section a little below No. 11 Talisman level, four levels have been opened from the Talisman shaft. Another, No. 16, is reached by winzes from No. 15 level. The main drainage-tunnel from the bottom of the Woodstock shaft reaches the Talisman shaft midway between Nos. 14 and 15 levels.

The bulk of the ore from the Woodstock section has been won from above the main adit, though ore has been stoped for 100 ft. lower. All this ore was oxidized. The level south from the bottom of the Woodstock shaft penetrated sulphide ore of moderate value and small amount.

In the Talisman section ore has been stoped from the surface to No. 13 level, 1,500 ft. below. The ore was oxidized and generally of moderate value, though in the lower levels some of it was rich.

The Bonanza section contained oxidized ore to a depth of 500 ft. below the surface. For 350 ft. below this the fissure dipped less steeply, and the vein-material was narrow and contained little bullion. About 200 ft. above the level of the lowest adit oxidized milling-ore again appeared, and continued downward to drainage level, where it gave place to rich sulphide ore. This continued downward, occupying more and more of the fissure, to No. 14 level, over 400 ft. below the cap of the sulphide ore. In No. 15 level, about 140 ft. below No. 14, the rich ore was discontinuous and the length over all much less. Below this, though the siliceous vein-filling is of average thickness, the bullion content is less and still more patchy.

The Dubbo section near the surface yielded a little oxidized ore; then for 1,300 ft. in depth the lode contained only trifling patches of ore. In No. 13 level high-grade sulphide ore was found, and this continued downward, though not in large amount, to below No. 15 level, a vertical distance of over 400 ft.

Unoxidized vein-material consists of quartz containing gold and sulphides in variable amount. It is termed "ore" if its bullion content is such that it can be mined and milled at a profit. In the Bonanza section, vein-material without change in thickness, but worth but a few shillings per ton, continues downward below rich ore. The change takes place with little alteration in the appearance of the lode-material. Perhaps the banding is not so prominent as in the rich ore, but sulphides of iron, zinc, and copper are as abundant, although they are more coarsely crystalline. The transition from high-grade ore to almost barren vein-material takes place in a few feet, but in places alternations of high- and low-grade quartz occur. The bottom of the Bonanza ore-body is highly irregular, and rich ore follows breaks and leaders in the country in long narrow extensions downward along the lode.