

is worked. In common with other parts of the Wakatipu district, the reef is variable and patchy, but this feature has not prevented the mine from more than paying its way. There is nothing fresh to report in this part of the district. In my report of last year a full account was given of the reefs of this locality, and I am of opinion that if these were systematically opened out on a fairly large scale, and the most approved labour and gold-saving arrangements adopted, payable results would be obtained.

The Bendigo reefs on the Dunstan Range (Cromwell Proprietary) have been practically idle for some time. Very rich returns were obtained here some years ago from mines worked on a small scale, and I cannot but think that if the ground were worked somewhat on the lines hinted at in my report of 1898, the undertaking could be made a very profitable one. The closing remarks on the Macetown reefs are, I think, equally applicable in the case of the Bendigo.

On the Carrick Range very little is being done, the mines here being on quite a small scale, but on the Old-man Range the two mines above Bald Hill Flat continue to yield payable returns. In the district comprising Mount Highlay, Macrae's, Nenthorn, and Hindon there are a few small mines at work.

At Waipori, the O.P.Q. Waipori Gold-mines (Limited) have got their mine into good working-order. During the year a crosscut was driven west from the lowest level for a distance of 37 ft., when a vein of quartz, which on being opened up has been found to be 10 ft. in width in places, was cut. As this vein was also cut at 2 ft. from the ground, being stoped out at a distance of 60 ft. above the level, it naturally has the appearance of being a branch from the main reef. The whole of the quartz opened out at the low level is reported to be good, and this has given encouragement to the company, who intend to sink the shaft 150 ft. deeper and open up the reef at a lower level. From the 80 ft. level a winze 50 ft. in depth has proved the quartz to increase in thickness from 1 ft. 3 in. to 8 ft. A considerable quantity of ore has been obtained from the adit below the level of some old workings. Additions in the shape of two Union vanners have been made to the battery, and there is a probability that the crushing plant will be increased to twenty stamps. The present stamps are 1,250 lb. in weight, and have a short, quick drop. This is found to answer very well with the class of ore which has to be treated, and a recent crushing is reported to have averaged $4\frac{1}{2}$ tons per stamp per day. Gold to the value of over £9,000 has been obtained for twelve months, and a lot of concentrates are on hand which are to be sent to New South Wales for treatment. The average yield of quartz in this mine is given as $8\frac{1}{2}$ dwt. of gold to the ton. The best crushing the company have yet had realised 190 oz. 11 dwt. of gold from 193 tons of stone. Occasional patches assay as high as 5 oz. to the ton.

The Bella Mine, reported by me last year as working on a small scale, has, I understand, been proved to be rich; but the ore requires chemical treatment in addition to amalgamation. In consequence of this the mine was shut down, pending arrangements for raising the capital necessary to erect plant, &c.

At Preservation Inlet a small amount of work has been done, but there are no developments of any importance to report, and the mining population has very considerably decreased.

Taking the future character of quartz-mining operations into consideration, it appears more than probable that the bulk of the output of gold from this source will be obtained from ores of low grade. This being the case, it is quite evident that the question of working-costs must receive very careful thought, and every effort made to produce the ore at the lowest possible price per ton, consistent, of course, with the safe and efficient working of mines. To work low-grade ores economically it is necessary that the output should be large, and winding and pumping operations, as well as the handling of the ore, concentrated as much as possible. To do this the old-fashioned ideas of numerous shafts, geared winding-engines of small power, light loads and slow speeds, with the necessary staff of enginemen, brace- and chamber-men, truckers, &c., comparatively idle during a good portion of their time, will have to be superseded by works laid out on a thoroughly comprehensive system. So far as my observation has yet gone, there are very few quartz-mining properties in New Zealand where the whole output could not be raised in one shift, and from one shaft, if the mine were laid out with a view to the highest possible degree of efficiency and economy. With a good roomy shaft, sunk in a suitable position, reefs intersected at convenient levels by a system of crosscuts, ore from intermediate levels tipped into passes or shoots connecting with the winding-level below (so as to obviate too many "hanging-on" places in the shaft), large cages, direct winding-engines, a plentiful supply of trucks, and winding from different levels carried on during stated hours, a very large output could easily be maintained, with a minimum cost for labour in raising and handling the ore. In illustration of this I would point to the many collieries in England where from one shaft an output of over 100 tons per hour is maintained from depths exceeding 1,000 ft. Systematic and reliable ventilation could also be provided for by means of an independent air-shaft and ventilating-fan, the shaft being sunk on the underlay if only one reef is worked, or, if vertical, connected with the reefs by means of crosscuts, and the air conveyed through the workings much in the same manner as is done in coal-seams lying at fairly high angles, and worked on the long-wall system.

The reports of the several Wardens contain much interesting and useful information concerning quartz-mining in their respective districts.