

A race 40 chains in length was constructed to convey water to the power-plant and deliver it under approximately a 300 ft. head through a pipe-line to the Pelton wheel.

The Nos. 2 and 3 West crosscuts (125 ft. and 217 ft. in length respectively) driven by the now defunct Alpine Mining Co. in their efforts to locate the north block, which when producing at its peak was the mainstay of the district, were cleaned out for the purpose of ascertaining the structure of the country, dip, and direction of the major fault.

A drive, 150 ft. in length, was extended on a fault-line from No. 3 crosscut, but was abandoned when the survey of Nos. 1 and 2 levels of Reid's reef was completed and the relative positions of these levels and the Alpine workings ascertained.

The work now in hand is the extension of No. 3 crosscut westward to cut the downward continuation of the ore-channel developed on No. 1 level, Reid's reef. A considerable amount of geological investigation was carried out on the surface and in the accessible workings of the Lyell district. The unexplored country, with 1,500 ft. of backs between Reid's No. 1 level and Alpine No. 7, offers scope for legitimate prospecting and possible reward if the formerly highly profitable north Alpine block can be again discovered and developed. All the lode prospecting and development carried out in the Buller County was under the direction of the Labour Department's mining staff, and the necessary finance was provided from the Employment Promotion Fund.

The average number of men employed on lode-development work was twenty.

Inangahua County.

Blackwater Mine (T. R. Hogg, Manager).—This mine employed an average of two hundred and thirty men. Development completed during the year totalled 1,561 ft. of driving, 188 ft. of rising, 592 ft. of winzing, and 144 ft. of crosscutting. The details concerning the development on main levels are given below:—

No. 11 Level Drive North: This drive was continued along the Prohibition fault, and after advancing for 37 ft. a reef was encountered showing good values. The reef was driven on, and by the end of the year 43 ft. of reef was exposed averaging 11.29 dwt. over a width of 22 in.

No. 12 Level Drive North from Crosscut West at 105 ft. N.: This drive was advanced 141 ft., of which 103 ft. were on reef averaging 19.75 dwt. over width of 22 in.

No. 12 Level Drive South from Crosscut West at 105 ft. N.: This drive was advanced 91 ft., of which 40 ft. exposed reef averaging 21.81 dwt. over width of 18 in.

No. 13 Level Drive South: An advance of 360 ft. was made in this drive, of which 259 ft. exposed reef averaging 18.85 dwt. over a width of 31 in.

No. 13 Level Drive South, Backshoot Drive: This drive was advanced 52 ft., all of which exposed reef averaging 14.68 dwt. over a width of 22 in.

No. 14 Level Drive North: This drive was started during the year and an advance of 430 ft. was made, 388 ft. being on reef averaging 12.54 dwt. over a width of 24 in.

No. 14 Level Drive South: This drive was started during the year and an advance of 391 ft. was made, 211 ft. exposed reef averaging 17.38 dwt. over a width of 21 in.

During the early part of the year the No. 14 level station crosscut intersected the reef at a distance of 54 ft. from the shaft, and the driving of No. 14 drives north and south was commenced.

The reef continues to show up well in the bottom levels, indicating continuity in depth.

Ore-reserves at the end of the year stood at 91,647 tons, this figure being 6,770 tons in excess of the previous year's total. 43,506 tons of ore were treated for a return of 16,079 oz. 16 dwt. by amalgamation, 2,697 oz. 10 dwt. by cyanidation, and 688 oz. 2 dwt. recovered from roasted concentrates, making a total of 19,465 oz. 8 dwt.

The total value of gold won from all sources amounted to £161,147 5s. 11d., making a gross total of £2,837,144 3s. 2d. by the sale of 576,562 oz. 7 dwt. of gold won since the mine commenced operations in 1908. Dividends paid during the year amounted to £18,749 8s., making a total of £381,236 18s. distributed to shareholders since the inception of the company. The foregoing dividend figures are given in English currency.

New Treatment Plant: The construction of the new treatment plant was completed during the year, and the crushing and flotation sections were put into operation during the month of July. The full cycle of treatment was commenced during the month of November, and has given entire satisfaction to date.

New Assay Office: A new and well-equipped assay office was erected adjacent to the site of the new mill.

Old Mill: Crushing and treatment in the old battery was suspended at the end of July, and from that time until the end of the year the work of cleaning up in and around the plant was carried out.

Electrical: A new substation was erected to distribute power to the new treatment plant, which is run entirely by electricity, and alterations and additions were made to the original substation.

Hydro-electric Plant: During the year work was commenced at the old battery-site on the erection of a new hydro-electric plant incorporating two modern Pelton wheels, to utilize the water from the water-races used to drive the old mill, and to convert same into electrical energy.

Notes on Metallurgical Treatment at Blackwater Mine by Courtesy of the General Manager (to be read in conjunction with the flow-sheet on page 34): The ore from the mine-bin is fed, by means of a Ross feeder, on to an 18-in. conveyer-belt leading to the primary jaw-crusher, where it is crushed to approximately 2 in. A second conveyer-belt, 16 in. in width, then conveys the broken ore to the mill ore-bin, this latter being a circular wooden bin with a capacity of approximately 500 tons. From the main-mill bin the ore is fed by means of a Challenge ore feeder on to a third conveyer-belt, which latter passes the ore direct to a 6 ft. by 6 ft. Marcy ball mill—passing through an automatic weighing-machine *en route*—which grinds the ore to $\frac{1}{2}$ in. mesh. At the feed end of the Marcy ball mill, cresylic acid, pine oil, and a xanthate, chemicals essential for the flotation process, are added, and these become well mixed with the ore on its passage through the ball mill. The discharge from the Marcy mill is then pumped over a series of strakes, which collect the heavy concentrates and coarse gold. These concentrates are treated in an amalgam barrel for the recovery of the coarse gold. The overflow from the strakes then passes to a rake classifier, where the product is split up, the underflow being led to a 11 ft. by 5 ft. ball mill, and the overflow goes to a second series of strakes (blanket strakes as before), the concentrates obtained from the latter being treated in the same manner as that recovered on the first set of strakes. The discharge from the 11 ft. by 5 ft. ball mill, which has now been ground to 60 mesh, then joins the discharge of the 6 ft. by 6 ft. Marcy ball mill, and is returned over the first series of strakes for further removal of concentrates. The overflow from the second series of strakes is led to a surge tank and on through a series of six Fagergren flotation cells. The first two cells recover a clean concentrate, which is led to the No. 1 Dorr thickener for further treatment in the cyanide department, and, the concentrate obtained from the remaining four cells, joins up with the overflow from the rake classifier and is returned to the second series of strakes in a closed circuit back to the feed end of the flotation cells. The tails from the flotation cells are sent to waste.

Cyanide Department: The concentrates obtained from the flotation cells, having been collected in the No. 1 Dorr thickener, are now thickened up, the overflow being returned to the last two flotation cells and the thickened concentrates, or underflow, is passed through a disk filter. After passing through the disk filter the concentrates are dragged slowly over a Lowden drier to remove moisture, and are then elevated to a steel storage tank, from whence they are conveyed to an Edwards roasting furnace by means of a screw conveyer. Having passed through the roaster, the concentrates or calcines are then passed through a cooling-conveyer and on to a Devereaux agitator—of which there are four—where they are agitated with cyanide. When sufficient