

grant of £100 has relieved the committee of all existing liabilities, while the improvements referred to above, and the chemicals to arrive from England, will place the school in a better position than it has occupied for some time.

*“Experimental Plant.”*—Since March, 1889, only two samples of ore have been treated at our plant—one by Mr. Montgomery, in July, 1889, and one by myself in January of this year. This is very disappointing, and is no doubt attributable to the general falling-off of the mines in the up-country goldfields, and the competition of the large reducing-works recently erected at Waiorongomai, Waihi, and Karangahake. Six samples of tailings from previous tests were put through the berdan by the students with a view of recovering a portion of the large amount of quicksilver lost during the original experiments in 1888, and in this respect their efforts were very successful.

*“No. 1. Particulars of Working-tests of Ore from Werahiko Mine.”*—This parcel of ore weighed 3,123lb., and contained 7·8 per cent. of moisture, thus leaving 2,879lb. of dry ore. It was treated by first crushing it wet, using quicksilver in the stamper-box, and then collecting all the tailings and grinding them in the Railley pan. The ore milled very freely, and yielded a good proportion of its gold to the battery-plates and ripples. The tailings passed through three large settling-pits, and only a very small proportion escaped. After the tailings had settled the water was drawn off, and the tailings conveyed to the Railley pan, in which they were ground and amalgamated. The first pan-charge was worked cold, and without chemicals, for six hours. A test from this pan showed that it still contained 17dwt. 15gr. of gold and 1oz. 7dwt. 18gr. of silver to the ton. To try and improve this the next charge was worked hot for six hours, with the addition of copper-sulphate and salt. The use of copper-sulphate was found to be a mistake, as the copper reduced in the pan coated all the iron ground off the false bottom and muller, which then amalgamated with the quicksilver, forming a sludgy mass of so-called ‘iron-amalgam.’ The tailings from this test contained 1oz. 0dwt. 4gr. of gold, and 1oz. 7dwt. 17gr. of silver to the ton, showing a larger loss than by the cold amalgamation without chemicals. The next two charges were amalgamated hot, but without the addition of copper-sulphate. The tailings from these were found to contain respectively 17dwt. 15gr. of gold and 2oz. 0dwt. 8gr. of silver, and 1oz. 0dwt. 4gr. of gold and 2oz. 10dwt. 10gr. of silver, to the ton. The tailings from the fifth charge contained 1oz. 2dwt. 16gr. of gold and 1oz. 7dwt. 17gr. of silver to the ton. The mean of all the assays of the tailings after pan-treatment showed an average loss of 18dwt. 15gr. of gold and 1oz. 17dwt. 7gr. of silver to the ton. This is a very unsatisfactory result, but it showed that cold amalgamation, without chemicals, gave a slightly better result than hot amalgamation, with or without chemicals. By bulk-assay the ore contained 3oz. 6dwt. 9gr. of gold and 4oz. 10dwt. 8gr. of silver to the ton. The total bullion saved from plates, pans, tailings ground in berdan, and iron-amalgam amounted to 2oz. 5dwt. 1gr. of gold and 2oz. 19dwt. 14gr. of silver to the ton, which is equal to a saving of 68 per cent. of the gold and 66 per cent. of the silver. The gold is so finely divided that probably some wet process, such as chlorination, will be found indispensable to save it.

*“No. 2. Ore from Prospectors’ Claim, Puhipuhi, January, 1890.”*—This sample of ore weighed 225lb. It was composed of very hard amorphous quartz, generally white, greyish-white, or milky in colour. It was often chaledonic in character, and sometimes possessed a banded, wavy structure, due to the alternations of white, sterile, and mineralised quartz-laminæ. Fine pseudomorphs of quartz, apparently after rhombohedral crystals of calcite, were common, occurring generally in drusy cavities in the ore. Short interlacing crystals of stibnite were also present, but not so plentifully as in the samples forwarded for assay in October and November. Small dark-red crystals of ruby silver (pyrargyrite) were sometimes, but rarely, seen associated with the argentite, which yields most of the silver, and imparted to the portions of the stone where it occurred a bluish-grey colour. The ore contained less than 0·25 per cent. of sulphides, and did not concentrate to advantage. The pulverised ore, after being dried, showed an assay-value of £11 17s. 4d. per ton—gold, 11dwt. 8gr.; silver, 63oz. 19dwt. 9gr. Argentite being a free-milling ore, 110lb. of pulp was treated by the ordinary pan-process—that is, four hours’ hot amalgamation with 20lb. salt, 10lb. copper-sulphate, 10lb. iron-sulphate, and 5lb. alum per 2,000lb. of ore. The return from this charge was 2oz. 1dwt. of bullion, which was 14·1 fine in gold and 958 fine in silver. This represents a return of 64·7 per cent. of the bullion per ton, and 70·3 per cent. of the assay-value, showing that the proportion of gold saved was larger than that of the silver. The best results were obtained by subjecting the ore to a chloridizing roasting, and then amalgamating in an iron pan. Ninety pounds of the dry pulp was roasted with 6 per cent. of salt, 5lb. copper-sulphate, 5lb. iron-sulphate, and 5lb. alum per 2,000lb. As the ore was deficient in the quantity of sulphides needed to create the sulphuric acid necessary to assist the chloridizing of the silver, it was roasted with the addition of 3 per cent. of iron-sulphate. The result from this test was 2oz. 4·5dwt. of bullion, 013·2 fine in gold and 986 fine in silver, representing 85·5 per cent. of the bullion and 93 per cent. of the assay-value. The proper method by which to treat ores of this class is to crush dry, chloridize, roast, and then pan-amalgamate hot with the addition of chemicals. The bullion extracted by these tests was refined, granulated, and forwarded to the secretary of the company in two sealed bottles.

*“Laboratory.”*—The number of samples of ores, bullion, minerals, tailings, &c., sent by the public for assay or analysis during the past year was 180, made up as follows: Gold and silver, 146; bullion, 4; lead, 3; zinc, 1; antimony, 2; copper, 6; manganese, 6; nickel, 1; coal, 2; limestone, 1; rocks, 1; waters, 2; miscellaneous, 5: total, 180. Of these no less than 155 have come to hand during the last six months, leaving only 25 for the previous half-year. Samples are now received from all parts of the North Island for assay and determination, showing that the Thames School of Mines has established itself as a place where reliable results may be obtained. These necessarily involve a large amount of work in addition to my ordinary duties, which occupy my time to the fullest extent. I have, however, to acknowledge the valuable assistance of my laboratory assistant, Mr. Edwin Banks, in the assay of a large number of samples.