

The cyanide plant at Boatman's has now been pulled down, and the berdans re-erected in its place. After the process turned out a failure, myself and some of the students made a few experiments to find out the cause, and, if possible, remedy it. I found that although these tailings only assay from 7dwt. to 9dwt. of gold per ton, that there was 1dwt. 18gr. of the gold as floured amalgam, or in the floured mercury; now, with from twenty-four hours to forty-eight hours' percolation with weak cyanide solutions, this would not be extracted. The action of the cyanide on the floured mercury, however, tends to clean it, and bring it into a fit condition for saving on plates; so that on looking down the tail-race, where the tailings after treatment were swept away, the clean globules of mercury were found, which, on retorting, gave gold. This shows that had these tailings after treatment been passed over copper-plates, or through an amalgamator, a large proportion of this gold would have been saved.

Another thing in the treatment of these tailings was the large amount of cyanide consumed, which was costing from 10s. to 13s. per ton of tailings; by experiment, I found that this cost could have been reduced to about 6s. per ton, and the same percentage of extraction obtained, simply by altering the mode of working. The mode of working in this plant was to add to the ore about its weight of cyanide solution, at about 5 per cent., then allow the solution to stand on the ore a few hours, and then start percolating slowly through the zinc extractor, so that the solution would take about twenty-four hours to run off. By this method there is no doubt that a great deal of the cyanide added never gets a chance to act on the ore; and then, again, the solution is started to percolate through the zinc-box before it has had time to act on and dissolve any gold, therefore there is a rapid action in the zinc-box, and the cyanide is being destroyed and the zinc dissolved away for no purpose, causing a loss of both cyanide and zinc. I have found by experiment that the following is a better method of working: Allow the strong solution to percolate slowly up through the ore until it rises about two inches above the surface, then start percolating (not into the zinc-box, but into a tank, from which it is pumped up again on to the top of the ore). The solution is thus kept circulating through the ore for a certain period of time, until the cyanide used is almost totally consumed in extracting gold, when the solution is allowed to flow through the zinc extractor, and the gold is precipitated quite as well as if a quantity of free cyanide was present, and in some cases the precipitation is more complete. The action in the zinc-box is not so intense, and it therefore seems as if less zinc would be consumed. The ore is afterwards washed, first with a weak solution of cyanide, so that any cyanide of gold which may be re-precipitated in the tank is re-dissolved and taken out.

By this method of working, and then running the tailings through an amalgamator, there is no doubt that the Boatman's tailings could have been made to pay well; and although I gave the results of my experiments to the owners of the plant, they considered the process too expensive, and decided to re-erect the berdans. When experimenting I tried charcoal as a precipitant for gold from cyanide solutions, and in small tests managed to obtain almost total precipitation of the gold; but in the larger tests I was not so successful. There is no doubt that charcoal will act as a precipitant, but the solutions have to pass very slowly through it to obtain the gold.

During the year a Mudie crusher was erected at the Alpine battery, to break the large heap of buddlings stored there. This machine worked for about two months, but only managed to save about 2dwt. of gold per ton; and it is now laying idle. I made a few experiments on the tailings running away from the machine, which were worth about 7dwt. gold per ton, and found that by concentrating the tailings down to about one-sixteenth of their bulk, nearly all the gold which was being lost could be saved in the concentrates. The concentrates would then be worth over 5oz. gold per ton, and could be treated profitably by roasting and chlorination. The company, I understand, have decided to erect a concentrator.

There is still a lot of tailings on this field running away into the rivers, which would yield valuable products by concentration; and it is my intention this year to make further experiments in this direction, and to forward reports to the various companies.

*Annual Examinations.*—The students of the school would not compete in the annual examinations, as the Committee did not issue any certificates for the last. One of the students, Mr. J. W. Lee, competed for the scholarship offered by the Government, but failed to obtain the required number of marks in the various subjects. He is one of our best students here, but his papers were not done as well as what I expected from him. At the next annual examinations I intend to bring in some students from Denniston and Brunnerton to compete in some of the subjects, and to issue certificates from the Reefton School.

In conclusion, I may state that although the report on these schools this year is not so good as it might have been, there is every reason to believe that this year will see a revival in the Schools of Mines on the coast; and that the numbers attending the classes, and the support given to the schools, will increase.

I must thank the Committee, and also those members who have so willingly given their services in keeping the classes together, and worked in the interest of the various schools.

Mr. Aitken has been making experiments to show the cause of failure in the cyanide process with the tailings at Boatman's. A cyanide plant was erected there, but it failed to give a fair percentage of the gold in the tailings. He found there was from 7dwt. to 9dwt. of gold in the tailings, and there was about 2dwt. in floured mercury. The cost of cyanide in the working of this plant was from 10s. to 13s. per ton of tailings treated, and Mr. Aitken states that, from the experiments he made, this cost could have been reduced to 6s. per ton, and the same percentage of gold saved: that is, by allowing the solution to remain in the ore for few hours before commencing to allow it to percolate.