

be questioned that every mining-man, including those who have been granted certificates without examination, would benefit by a school-of-mines training, and those now working on the field should view matters in this light, and take advantage of the instruction given at the mining classes of the institution.

The following table shows the number of public assays performed during the last twelve months:—

Number of public assays	209
Number of assays in connection with ton-parcels of ore	320
Total assays	529

Most of the samples for assay came from various places in both Islands, at a distance from the Thames. A large number of mines on the peninsula now employ their own assayers, and consequently fewer samples find their way to the school laboratory than formerly.

The separate assay-room for the conduct of public assays, which was built at the end of 1897, has now had fifteen months' trial, and has proved a complete success. It is kept entirely distinct from the laboratory and assay-room used for the instruction of students, and enables public assays to be carefully and accurately performed with a minimum of labour. All public assays are done in duplicate by the assistant lecturer, and every precaution is taken to insure accuracy. It is noteworthy that the majority of assays this year have had a low range in value, many of them showing less than 1s. per ton. Every assay conducted at the Thames School is made in duplicate, in order that, besides the special care taken in manipulation, there may be an independent check on the results.

Besides the usual gold and silver fire-assays, a number of determinations were made on ores of copper and antimony, ferro-manganese, cinnabar, shale, and carbonaceous clay. Various tests were also made in the laboratory as to the applicability of the cyanide process for the extraction of gold and silver, and a series of experiments with the same object were made with the permanganate (chlorination) process introduced by Dr. Black. In the latter the extractions were high, provided that great care was given to obtaining a suitable dead-roast, so as to remove all the sulphides, sulphates, &c., which rapidly deoxidize the solution used, and render the process of no avail.

The alterations completed in the battery twelve months ago have proved a great saving of labour in the actual working of the plant, and have enabled parcels of ore to be treated more expeditiously and satisfactorily than ever before. Although not working up to its full capacity, the plant has been busy with the experimental treatment of test-parcels of ore. Fifty-three parcels, of an aggregate weight of 61,476 lb., or approximately 27½ tons, have been tested, viz.: twenty-eight parcels, aggregating 40,850 lb., by pan-amalgamation; nine parcels, aggregating 10,840 lb., by the cyanide process; and sixteen miscellaneous lots, weighing 9,786 lb., the details of which are given in a tabulated statement further on. The average percentage saving by pan-amalgamation was 82·6 per cent., and by cyanide 63·4 per cent.—much the same as the averages for the two preceding years. The total value of bullion won amounted in round figures to £230, the whole of which was returned to the owners of the respective parcels.

In several instances low extractions have been obtained, but it will be understood that when ore is sent in to the school for treatment it is sometimes accompanied by a request to treat in a particular manner. In such cases arrangements are usually made with the owner that half the parcel shall be treated by the method proposed, and if that is not successful the remainder is tested by other processes at the discretion of the Director. In this way much valuable information is obtained concerning the ore and the proper mode of treatment, especially as in every case of low extraction the ore is subjected to a chemical analysis to determine the nature and quantity of the injurious substance present.

Of the nine parcels treated by the cyanide process, two consisted of tailings, and the extractions were satisfactory. The remaining parcels were quartz, but not one of them gave returns sufficiently encouraging to warrant the process being adopted at the mine. In the majority of cases a certain percentage of coarse gold was present which could not be saved by cyanide treatment, and would necessitate the erection of an amalgamation plant. In the case of the Wentworth, in which an actual bullion extraction of 89·6 per cent. was obtained from an ore worth nearly £20 per ton, this was possible only after a chloridizing roast. Looking at the results of the cyanide tests as a whole for the past few years, it is evident that very few indeed of the ores sent to the school are adapted to direct cyanide treatment. Some required preliminary roasting, others contained coarse gold; and the conclusion is that for similar ores amalgamation plants will have to be erected. In many cases, however, the cyanide process would prove a suitable method of treating the resulting tailings.

Appended hereto is a tabulated statement showing the method of treatment, percentage extraction, and other details relating to the different parcels treated by amalgamation and cyanide.

When the new machinery was erected it was found that the Pelton wheel would not develop power sufficient to drive the pans, &c., when the stamps were running at a high speed, and after a series of experiments by Mr. Parr, B.Sc., and myself it was determined to change the 16 in. driving-pulley for a 21 in. This worked splendidly, and enabled the stamps to be run, if necessary, up to a hundred drops per minute when the other machinery was in motion. (I am forwarding a diagram to illustrate the horse-power developed by a Pelton.)

It is noteworthy that the output of the three stamps is double of that of the previous two-head, and this is explained by the better movement of the pulp in the mortar-box when the odd number of stamps are used.