

the directions in which it may be used to advantage.

(4.) A production of \$34,000,000 to the end of 1905 is convincing evidence of the substantial worth of the camp. While the profits of this production have not in the past been as large as could have been wished, the larger mines are to-day operating at a profit.

(5.) Costs generally being lower and prices of metals high, the prospect is that dividends aggregating a considerable sum may reasonably be looked for in the future.

The more complete report, with maps and other illustrations, now in course of preparation, will doubtless prove still more useful than that already published, and will serve to further demonstrate the value of the investigations made. It may be added that owing to Mr. Brock having previously had occasion to carefully examine the Le Roi, War Eagle and Centre Star mines, his services in directing the investigations are of especial value.

#### TREATMENT OF LEAD-ZINC TAILINGS IN AUSTRALIA.

SEVERAL processes for the treatment of lead-zinc ore tailings in use in Australia have recently been briefly reported on to the Department of Trade and Commerce of Canada, by Mr. D. H. Ross, commercial agent for Victoria, South Australia, Western Australia and Tasmania. Writing from Melbourne under date March 19, 1906, Mr. Ross reported as follows:

*Purchase of Old Tailings in Australia*—While the old tailings dumps of the Australian gold mines have been purchased by cyanide operators, there still remain very large old dump heaps from the zinc-lead silver mines, these ores having been treated for the lead and silver the residues carrying 6 per cent lead, 6.3 oz. silver per ton, and 20 per cent zinc. Australian metallurgists now claim to have successfully tackled the problem of treating zinciferous tailings of which many millions of tons have accumulated, hitherto practically worthless, but now representing a value of millions of pounds sterling.

*Concentration Treatment of Ores*.—Canadian mining men, particularly those interested in the investigations being made upon zinc deposits in British Columbia, should carefully ascertain the relative values of the various processes now in operation in Australia in the treatment of zinc residues which have been left after treating the lead-zinc ores from the mines. The general process of taking out the lead, which all the mines—at Broken Hill, New South Wales—have previously been taking out of the ore, is one of concentration by means of jigs and various types of concentrators, such as the Frue vanner, Wilfley table, and other concentrators of this description.

Previously no satisfactory process had been brought forward for extracting the zinc from the ore, and this zinc-bearing residue has been put to one side for a number of years until now there are probably 5,000,000 tons of material carrying on an average about 20 per

cent zinc and 6 per cent lead. There are also at Broken Hill immense quantities of residues carrying a lower percentage of zinc which will probably be treated later on.

*Purchase and Treatment of Ores*.—A company was formed a few months ago in Melbourne—with a capital of £350,000—for the purpose of purchasing large quantities of tailings from the different mines and treating them by what is known as the "Potter" process. This company has purchased and secured the option on about 4,000,000 tons of tailings, estimated to produce 269,000 tons of lead, 20,638,000 oz. of silver and 738,000 tons of zinc. The preliminary plant has just been completed and is giving excellent results on a treatment of about 50 tons of tailings per day, but a plant is now being designed in Melbourne capable of treating 2,000 tons of material per day, and later it is intended to increase the daily capacity to 4,000 tons.

*The "Potter" Process*.—After some years of experimenting the inventor of the process—Mr. Potter—discovered a cheap and effective method of extracting the zinc from the huge dumps of Broken Hill tailings by use of sulphuric acid in a dilute form, the effect of which—when added hot to the tailings—is to float the zinc to the surface, when it can easily be run off. It is a strange thing about this process that the heavier portion of the tailings, viz., the metallic, rises to the surface, being ballooned up by the gaseous bubbles formed by the action of the acid, leaving the lighter substance, the gangue, at the bottom.

The procedure adopted in the working of the Potter process is that the material from the dump is thrown continuously, by means of a belt conveyor, into a spitzkasten. At the bottom of the spitzkasten is introduced a pipe by means of which boiling sulphuric acid of about  $\frac{1}{2}$  per cent strength is pumped in—the ore being thrown on top of this liquid with a fall of about a foot. There is a certain amount of carbonate in the material which is attached by the acid and forms carbonic acid gas. This gas rising from the solution leaves the gangue, but forms on all metallic particles a coating which raises the metallic particles to the surface of the liquid and they are allowed to flow over the edge of the spitzkasten. The gangue falls to the bottom and is drawn off by the ordinary spigot. The particles of gas seem to be detached from the mineral by striking the bottom of the launder, leaving the mineral to be carried by the solution to the settling pits. The solution is then decanted and sent back to the boiling vats, after being cleared and brought back to the proper strength. The concentrates are sent direct to the smelters. The process is thus continuous and the concentrate obtained, so far, averages about 45 per cent of zinc and 5 to 6 per cent of lead, but it is possible that further experience will perfect the method of working, so that the concentrate will be obtained of perhaps 60 per cent of zinc.

*The "Cattermole" Process*.—Another process—known as the "Cattermole"—is also being used at Broken Hill in the extraction of zinc from tailings.