The great disadvantage which this district is labouring under more than any other mining district is the large quantity of refractory ores found, without knowing how, or, at least, having a proper method to treat them. All the gold here is alloyed with silver, and some of the ores contained sulphides, chlorides, tellurides, selenides, and antimonides of metals, which makes them complex in character and difficult to treat with the present appliances.

A gentleman, Mr. Parkes, has recently come out from England to superintend the erection of metallurgical works at the Thames, whereby he claims to be able to save the whole of the metals in the ore. This gentleman represents a syndicate who has taken out a patent process for the treatment of auriferous and argentiferous ores, both by a dry and wet process, and who has sold the right to use it in New Zealand to a company in Auckland. From what I could learn during my interview with Mr. Parkes he intends to smelt the ores, which he says can be done, even if they contain 97 per cent. of silica, at a cost not exceeding £2 per ton; but the great success claimed for the process is that the ores can be smelted in a cupola without any condensing-chambers to collect the fumes, and that none of the metals are carried away. The following is an extract from the *West Coast Times* on Mr. Parkes's process:—

"It is known that Mr. Alexander Parkes, an English metallurgist, bearing a high reputation, is now on a visit to New Zealand with the object of starting reduction works at the Thames, for the purpose of dealing with the refractory ores in that district. Before leaving England an exhibition was given at the Experimental Works, East Greenwich, by the company with which Mr. Parkes is connected—the Parkes Gold and Silver Smelting Company—at which various ores of a refractory nature were 'put through' successfully. The raw ore is first crushed roughly, then intimately mixed with the fluxes, and put in the reverberatory smelting furnace; it is then allowed to smelt for three to four hours, when the ore and fluxes become one liquid mass of molten material. The slag, which swims on the top in a fine fluid state is now skimmed off, and the regulus tapped, which flows out into iron or sand moulds. This regulus contains all the gold and silver and other metals. The regulus is allowed to cool and disintegrate. It is then placed in a calcining furnace, and about half the sulphur burned out of it. It is then mixed with oxide of lead and smelted, and the gold, silver, and copper combine with the lead, and form an alloy. When this is considered complete, the lead is tapped and run into moulds. This lead is then smelted in the cupelling furnace, and oxidised in the usual way, leaving behind it the precious metal. The fluxes vary in their kind and proportions, according to the particular nature of ore to be operated upon. The operations are also varied to a considerable extent. The regulus of some ores does not require calcination, and the lead is mixed with the ore before being put into the furnace, and in cases may be even mixed with the regulus in the furnace after the slag has been skimmed off. The ore the company had been smelting off was the 'Alexandra,' from Queensland, which was a very refractory one, and contained lead, sulphur, copper, zinc, and upwards of 50 per cent. of silicious insoluble matter. In dealing with this ore the operations were conducted without the slightest difficulty. There were only 2dwt. 10gr. of gold found in the ton of slags, out of 2oz. 12dwt. in the ton of the ore; and 2dwt. 10gr. of silver in the ton of slag, out of 1oz. 5dwt. contained in the ton of raw ore. The fluxes used for this particular ore are lime, salt cake, iron ore, fluor spar, and coal; in all 920lb. to the ton of ore, and costing only 4s. 9½d. Those who witnessed the tests were representative men from all parts of the world, and at the conclusion pressing invitations were given to Mr. Parkes to visit South Africa and Queensland to erect smelting works in those places, substantial guarantees being offered. The essence of the process seems to be in the fluxes used, which consist of blue billy, sulphate of soda, lime, fluor spar, and carbon in certain proportions, according to the character of the ore to be treated. The ore is pulverised without being previously calcined, and is then mixed with the fluxes, which are also in the form of powder. The mixture is then smelted in an ordinary copper smelting furnace, and the resulting regulus is treated with water before it is quite cold, which causes its rapid disintegration. This saves the operation of mechanical disintegration which is necessary with regulus produced in the ordinary way. The regulus is subsequently calcined and then melted with lead to collect the gold and silver, the lead being afterwards cupelled for bullion. Although the tests hitherto applied have been successful, it is quite likely that some may still refuse to submit to the treatment. The most important feature in connection with these ores is their difference from each other. In the same mines, ores of entirely different constitution are frequently met with often requiring a very different process."

I am very doubtful, however, whether the smelting process will ever be carried on with New Zealand ores at a cheap rate. The cost of obtaining necessary fluxes will always make it an expensive process here. With regard to the wet process, the ores are first ground in a dry state and afterwards lixiviated in their raw state, notwithstanding that they contain a large amount of arsenic and sulphur. Mr. Parkes could not describe this process to me, as the patent has not yet been secured, but he affirms that ore can be treated by this means at a very cheap rate. Time will show whether Mr. Parkes's processes are the success he represents. It is to be hoped they will be, although I have my doubts on the subject; but should he be successful there will be large bodies of ore worked at a profit, which are now being cast into the waste-heap as worthless material.

At Grahamstown, where the principal mines are situated, they have a heavy drag in paying contributions towards keeping the big pump at work, especially in those mines which are not working on payable stone, but merely carrying on prospecting works. It was proposed about two years ago to apply water as a motive power in lieu of steam to work the pumping-machinery, which was estimated to cost about £4,000, of which amount a subsidy of £2,000 was authorised; but as soon as the subsidy was authorised the Drainage Board wished to get the money to pay off their liabilities, instead of applying it to the purpose for which it was granted. It was shown at the time this subsidy was authorised that if alterations were made whereby the pump could be worked with water-power when water was available, and in dry weather connected with the steam-engine, the saving in cost of maintenance would be over £1,000 per annum.