Te Aroha, Champion Gold-mining Company—Tellurium	0·30	per cent.
Sulphide of antimony	0·16	"
Karangahake, Crown Gold-mining Company—Tellurium	3·4	"
Sulphide of antimony	1·6	"

"As the profitable working of these complex silver-ores depends upon a knowledge of their composition, there is much useful work in these districts for the analyst. The amount of riches which have been lost in the Karangahake District alone by the attempt to save the gold and silver in the ordinary battery-process must have been considerable, and any mode of treatment must be based upon a knowledge of the chemistry of the subject before any real success can be obtained. With a desire to obtain as much practical knowledge as possible on these ores, I have, in conjunction with Mr. E. H. Whitaker, made a large number of experiments with ore from the Silverton at Waihi. A portion of the ore was taken and reduced to a size that passed through a wire mesh-sieve of sixteen-hundred holes to the inch. From this powdered ore portions of 5lb. each were treated in a berdan with chained revolving ball, giving in the pasty mass a thorough amalgamation with a sufficient quantity of mercury; and the parcels were treated for from three to four hours. Taking first a parcel of raw ore treated in the manner specified, the results were 16·36 gr., or 15oz. 5dwt. 19gr. to the ton. The residual matter is worthy of note as showing how large a portion of the value can be lost in running water. After washing the fine sandy portion of the ore the sludge was left to precipitate, but after two days' rest the water, still being thick and charged with clayey matter, was poured off from the sludge and the whole of the water evaporated, leaving a large quantity of an impalpable powder. These three portions of the tailings were then assayed, with the following results:—

	Sand. Oz. dwt. gr.	Sludge. Oz. dwt. gr.	Slimes. Oz. dwt. gr.
Silver	37 17 21	32 0 6	16 16 11
Gold	12 1 17	11 2 3	3 8 14

"These results give some idea of the loss which must take place where battery- or pan-treatment is concerned with the raw ore. In addition to this loss it was found that on wetting the dry powdered ore a black scum rose to the surface in every instance, on examination of which it was found to contain principally the finely-divided silver-ore, with magnetic pyrites and gold, entangled with fine globules of air. So difficult to cause separation of these particles with the air was it, that frequent stirring for several days was insufficient to precipitate the major portion. The same loss was noticeable in all the Waihi and Karangahake ores, as well as that from the Champion at Te Aroha. After many experiments with the same-size parcels—5lb.—of the same richness and degree of fineness, it was found that the best results were obtained by a careful chloridizing roasting, and treatment with sulphate of iron and common salt for four hours in an almost pasty condition with excess of quicksilver. By this means a return of 84 per cent. was obtainable of the total value present, as against 40 per cent. saved in the treatment of the raw ore as detailed above. In these experiments I need hardly say that the bullion from the Silverton ore, being so largely composed of gold, would be more favourable for amalgamation than many of the true silver-lodes already alluded to.

"*Copper.*—This metal is found in small quantities throughout the peninsula, in the form of copper-pyrites (chalcopyrites), accompanying most of the rich gold-deposits. I have also found it present in this form in several of the mixed lodes, which will be considered when dealing with the galenas—notably in the Manukau Mine in one of these veins, which yielded 12·63 per cent. of sulphide of copper; and, again, in the Little Agnes, at Tararu, which yielded from 3 to 9·7 per cent. From Coromandel also I obtained in a similar lode 15·49 per cent. of sulphide of copper, and at Port Charles to the extent of 6·4 per cent. Captain Hutton also, in 1867, reported the presence of copper in veins between the Thames and Tapu; but in no instance on the peninsula am I aware of its existence in payable proportions.

"*Lead.*—This metal we have present in a good many places in the district in the form of galena. At Port Charles is a vein carrying also copper and iron-pyrites, and yielding 25 per cent. of metallic lead. At Coromandel, in the Driving Creek, is a narrow vein containing a good clean sample of galena, but irregular in size and quantity. At Waiomo and at Cabbage Bay are similar veins; but very much intermixed with other sulphides—notably zinc, antimony, and iron. In the Tararu Creek are several veins of the same character, also containing a large amount of zinc and antimony. So large are the percentages of these metals as to make it valueless as a lead-ore. In the Manukau Mine a well-defined vein of this character was also worked, but not with any payable result. I know of no lead-ores south of Grahamstown until we reach Te Aroha; but here we have several at the Tui Creek and at Waiorongomai. In the latter district are several compact well-defined veins carrying a fair sample of galena. At several places in this locality I have found lead in the shape of chromate in small quantities. The galena in these mines can only be worked to advantage when containing sufficient gold or silver to make it valuable on this account, and it will be of interest to note the extent to which the precious metals are present in these lodes. The following are the assay returns which I have obtained from samples most of which I have taken from the lodes myself:—

	Silver. Oz. dwt. gr.	Gold. Oz. dwt. gr.
Port Charles	2 8 17	0 0 7
Coromandel	5 12 17	0 1 15
Coromandel	3 8 14	0 4 21
Waiomo	4 16 6	0 1 18
Little Agnes, Tararu	6 12 0	0 9 19
Manukau, Thames	2 15 12	Nil
Waiorongomai (galena)	3 8 14	0 9 19
Waiorongomai (quartz and galena) ...	4 18 0	2 5 17