kilogrammes of iodine, representing the loss of this substance, and 1,900 kilogrammes of zinc. It is remarkable that the gold, which is not present in the mineral in weighable quantity, should be sufficient, nevertheless, to cover all the cost of the operation. The cost of the iodine, always high, has become much more considerable by the abnormal increase of the cost of this substance. This has called my attention to the use direct of the washings of the 'vareech'-ash instead of iodide of potassium, and recent experiments in this direction have answered our expectations. Not only are we able by this means to utilize all the iodine contained in this varech, of which a great part, as is well known, is usually lost; but, also, these trials have suggested the idea of an inverse operation, on which I am engaged, for manufacturing iodine, which consists in precipitating this metalloid from the washing of the varech-ash by means of a salt of silver. This separation of 20 grammes of precious metals to the ton of burnt pyrites is doubtless small; but when we reflect that in England alone the operation can be applied to 340,000 tons of mineral, and produce thus, with a proportionally increased profit, 7,200 kilogrammes of precious metals, of a value of 1,700,000 francs, we shall see that such an annual result should not be neglected. The above process can also be employed for various cupreous minerals capable of treatment by the wet method, and we are beginning to apply it to the copper ores of Cornwall, which contain generally more silver than Spanish pyrites, and which at present are only worked by the dry method, and for the extraction of their copper only."

"To the directors of the Port Phillip and Colonial Gold-mining Company.

"GENTLEMEN,— Metallurgical Laboratory, School of Mines, London, 23rd June, 1862.

"In accordance with your instructions, I have carefully considered the question, how to diminish as far as practicable the amount of gold which escapes in the tailings. I have made numerous experiments upon this subject, and I have now the pleasure of communicating to you such of the results as seem to justify a positive conclusion.

"From the letter of Mr. Bland, of (no date), it appears that the chief difficulty with which he has to contend is the treatment by amalgamation of the matter of which you have sent me a sample, under the name of 'Pyrites and iron from blankets;' and he then writes, 'The remainder of the gold (about 10oz.) is caught upon the blankets with the pyrites and a portion of the sand; and it is this fine gold, associated with the tailings, that Dr. Percy wants to experiment with chemically, the separation from which is our present difficulty.' I have accordingly devoted my attention to the examination of this matter (which I will call blanket-stuff) with a view to the removal of this difficulty.

"*Nature of Blanket-stuff.*—It consists essentially of finely-divided metallic iron derived from the stamp-heads, iron pyrites, and arsenical pyrites, together with a small proportion of siliceous sand.

"(*a.*) *Metallic Iron.*—This may be readily and completely separated by a magnet. Three experiments were made to determine the amount of iron which might be thus extracted, and the results are as follow:—

"No. 1.	... ...	Iron separated, 45·72 per cent. of the blanket-stuff
No. 2.	... ...	Iron separated, 45·72 per cent. of the blanket-stuff
No. 3.	... ...	Iron separated, 49·20 per cent. of the blanket-stuff
Mean	... ...	46·90 per cent. of the blanket-stuff

It might be supposed that some gold would adhere to this finely-divided iron, and this supposition was confirmed by experiment. One ton of iron retained 1oz. 8dwt. 18gr. of native* gold. This proportion is doubtless very small in relation to the total amount of gold in the original crushed; but in the reports which I have received from you there are no data from which this relation can be readily completed.

"*Iron Pyrites.*—The residue, after the separation of the metallic iron by the magnet, consists almost entirely of iron pyrites and arsenical pyrites, which contained 0·083 per cent. of native gold —that is, 27oz. 2dwt. 12gr. to the ton.

"Experiments were now made to determine whether the gold might not be completely extracted by amalgamation from the pyrites of the blanket-stuff after the separation of the metallic iron by the magnet. The results are as follow:—

"*On the Extraction of the Gold from the Raw or Unroasted Pyrites.*—The stuff was mixed with water to the consistency of thick mud, so that the mercury might be uniformly distributed in fine globules through the mass. After the addition of the mercury the whole was saturated from time to time during about twenty-four hours. The mud was afterwards diluted with water, and again triturated at repeated intervals. It will be perceived that the most favourable conditions were presented for the action of the mercury.

"First experiment.—Gold separated, 8oz. 14dwt. 17gr. per ton of iron pyrites. Second experiment.—Gold separated, 8oz. 10dwt. per ton of iron pyrites. Thus only about one-third of the gold was extracted by the mercury.

"*On the Extraction of the Gold by Amalgamation from the Roasted Pyrites.*—The roasting was carried on until sulphurous acid ceased to be evolved. The amalgamation was conducted with the precautions above described.

	Oz.	dwt.	gr.	
"First experiment.—Gold extracted by amalgamation	24	16	13	per ton of iron pyrites
Second experiment.—Gold extracted by amalgamation	25	1	3	per ton of iron pyrites
Mean	24	18	20	

The residue after amalgamation retained of gold 16dwt. 8gr. per ton of iron pyrites.

* Gold containing silver, as it occurs in nature in an auriferous quartz