

with reference to the complaints of some of the witnesses as to the deleterious effects of the fumes on shrubs and trees, some of the leaves of which were exhibited, that he had noticed precisely the same appearances on the leaves of plants in gardens in the vicinity of Melbourne, which are far removed from any pyrites-treating works. There is no doubt that, if sufficient precautions be taken, little or no injury is done.

“The method of condensation which recommends itself most strongly to the notice of the Board is the introduction of water- or spray-chambers into the flues. The water should be made to play in a series of chambers, the fumes that escape the first being conveyed to the second, and so on, the effect being the gradual purification of the fumes, so that by the time they reach the open air at the mouth of the flue they are rendered comparatively harmless.

“There is some difficulty in dealing with the water after use in the condensing-chambers, as it then carries with it certain proportions of arsenious acid. In one case a suggestion is made that it be got rid of by evaporation, the arsenic remaining being saved; in another, that it be passed through filter-beds of red oxide of iron (the waste from roasted pyrites), which would purify it; in a third, that it be run off into abandoned shafts. The Board cannot make a recommendation, as future experiment only can thoroughly and satisfactorily determine the best method of purification; but so much depends on the local circumstances of each case that it may be advisable to adopt one of the plans suggested in one case where it would be impracticable in another. Care should, however, be taken to prevent such water from being allowed to flow into any source of domestic supply.

“Summary of Recommendations.

“We may briefly summarize the result of our inquiries as follows :—

“(1.) That it is decidedly better to crush quartz containing pyrites raw.

“(2.) That the method of concentration which has given the most satisfaction in this colony is the use of Borlase’s buddles, with Munday’s patent scrapers.

“(3.) That it is absolutely necessary to roast pyrites previous to amalgamation, and for this purpose reverberatory furnaces with inclined hearths are the best at present in use in the colony; that the introduction of combustible substances with the charge is not advisable; and that attention should be given to the regular supply of fuel and to the proper regulation of the draught.

“(4.) That for the purpose of amalgamation Wheeler’s pans and Chilian mills are both very efficient; but, owing to the inability of the Board to obtain analysis of the waste from each description of machine, the comparative saving values cannot be determined.

“(5.) That the evil effect of the noxious fumes on health and vegetation are not at all great, and can be easily and wholly avoided by the use of water-condensers in conjunction with suitable flues and high chimney-stacks; and that the water used in condensing be disposed of in the most effectual manner that the local features in each case admit.

“(6.) That it would be very advantageous if large central works were erected for the thorough treatment of pyrites and the whole of the waste products thereof; and that encouragement should be given by the Government, either by the way of bonus or suitable site, to the person or company first establishing such works.

“Concluding Remarks.

“The importance of dealing with the waste product of pyrites cannot be too highly estimated. Tens of thousands of pounds are annually lost to the country by the non-existence of such establishments as are advocated; but we unhesitatingly recommend, rather than this annual loss should be borne, Government assistance be given to any person or company first establishing central and efficient works for the proper treatment of the whole of the commercial products of pyrites on a large scale. Such assistance should be given subject to such conditions as may be deemed necessary to secure a permanent establishment of the works advocated. In connection with this matter, it is regretted that the Government do not see their way clear at the present time to comply with the request made by the Board for a sum of money for making an analysis of samples, as already set forth in the sixth paragraph of this report; as by this means the actual value of samples of waste from all the gold-fields where pyrites are treated could have been in some degree determined, and the commercial value of the product so obtained would have formed a reliable basis for estimating the cost of and profit on operations if conducted on a large scale. From Mr. Newbery’s evidence it will be seen that a sample of antimonial ore from Costerfield was found to contain no less than twelve different metals, some of which could be easily utilized at a small cost. We regret we are not in a position to deal with this portion of the subject so fully as its importance deserves, as we confidently believe that new industries would be established and many valuable articles of commerce ultimately produced from this source; and we venture to express a hope that the Government will not lose sight of the desirability of carrying out our suggestions in this matter.”

The following account, given with reference to the extraction of gold and silver from copper pyrites, is from Fred. Claudet, *Annales de Chimie*, Quatrième Série, November, 1872, T. XXVII., p. 407 :—

“English manufacturers draw the greatest part of the pyrites they employ in making sulphuric acid from Spain and Portugal. As they all contain more or less copper, the residues, after the extraction of the sulphur, are sold to the copper-smelters, who, on account of the large quantity of oxide of iron they contain, employ them as a flux for siliceous copper ores. In the operation they recover the copper from the pyrites, but all the iron passes into the slags. The extraction of copper from minerals by the humid method, first practised by Longmaid, and since applied by W. Henderson to the treatment of pyritous residues, does not give rise to this loss of the iron of the pyrites. This mode of treatment is now much used, in consequence of the increasing importation of these pyrites, which has risen from four hundred thousand to five hundred thousand tons annually, and continues to increase. The pyrites are sold according to the amount of sulphur