

than is contained in what is called a Bessemer ore. Taranaki ironsand carries a high percentage of titanium, which is refractory, whereas Parapara carries little of it, so that it would handicap Parapara ore by mixing it with Taranaki ironsand. I would not mix them.

36. Is it possible, instead of using the furnaces you have been speaking of, to use electrical power? Would it be possible to install electrical furnaces to treat this ore at Parapara?—It would be possible but not advisable. I have here a recent article read before the Staffordshire Iron and Steel Institute, showing the developments of the electric steel furnace. It is an extract which appeared in a recognized journal, the *Colliery Guardian*, and refers to the purposes for which electrical steel furnaces are used. The date is November, 1918 [extract read]. I may say that none of the large works use electric steel furnaces except for smelting scrap steel, but it is possible that in the course of time electric heat may be employed for smelting ore.

37. Could the residuum of slag be utilized for the manufacture of basic slag for agricultural purposes?—No, because the phosphorus-percentage in New Zealand ore is much too small to produce a basic slag, although it is much too high to produce Bessemer or first-quality steel. To make steel from both Taranaki and Parapara ore would necessitate the use of what is called the basic process, using the open-hearth furnace.

38. Therefore as to Parapara ore the residuum could not be utilized?—No, the slag would be valueless.

39. *Dr. A. K. Newman.*] Do you think the problem of getting the titanium out of the iron-sand is possible of solution, because that appears to be the keynote of success?—I may say that in the treatment by the Heskett-Fraser process of Taranaki ironsand they can eliminate most of the titanium.

40. That is one of the reasons of its success?—Yes. I believe that is something quite new, and there is no doubt about it that it is successful in eliminating much of the titanium.

41. *Mr. Veitch.*] Do you know of any other iron deposit in New Zealand that you think would be of any magnitude that could be successfully worked?—No.

42. You do not think the time is ripe?—I have gone into the question thoroughly, and I am perfectly satisfied that the time is not ripe. It is not opportune to work our iron deposits at a profit.

43. Do you know of anything having been done to ascertain whether there is coal suitable for working the ore in the vicinity of the deposits?—The country has been very well prospected for coal. They are working collieries in the neighbourhood now, but none of the coal is suitable for producing a blast-furnace coke.

44. *Mr. Craigie.*] You are aware that Parapara is under lease to certain syndicates on certain terms?—Yes.

45. Would you recommend that the Government should determine those leases and hold them, so that they can be worked by the State—so that, in fact, later on, when conditions are favourable, that can be done?—I am certainly favourable to the leases being cancelled at once, and thus to bring the ore back to the Crown.

46. You hold that until the conditions are more favourable they should not be worked, but might be worked later on?—Certainly.

47. *Mr. Sidey.*] You are very hopeful about the Taranaki ironsand being worked?—I am satisfied that both will be worked, and will be of great benefit to the country in time to come.

48. You think that Taranaki ironsand can be profitably worked now?—No; but I believe they will shortly produce marketable pig iron, but not at a cost that will enable them to compete with the imported pig iron. There are five different grades of pig iron used in the foundries in New Zealand. One blast furnace using one ore can only produce one grade of pig iron. The output of one furnace would greatly exceed all New Zealand's requirements for one grade of pig iron.

49. I understand you to say that, even although they could produce an article which is satisfactory and which is a marketable article, it could not be produced at the present time at a payable price?—Yes. I am satisfied that Taranaki cannot produce marketable pig iron at a price to compete with the imported article at the pre-war price.

50. The Committee is anxious to know of any other mining industries which can be successfully established in this country. Take, for example, the oil industry?—When I was advised that I would perhaps be required to appear before this Committee I got a few figures together in connection with other industries, and I could make certain recommendations as to those minerals which we have here and which I believe can be successfully developed.

51. *Mr. Luke.*] There are two conditions that would make that successful. One would be the export of pig iron or the making of rails. I quite agree with you about the making of bars of a multiplicity of sizes, that we could not compete with the imported article, but could we compete under certain conditions in the manufacture of our own rails? Would that keep a furnace going, plus the foundry requirements?—I do not know what our requirements in rails would be. If you had a large demand for steel rails that would help one blast furnace to be worked continuously but there are other things that have to be considered. Some New Zealand ore might not be very suitable for the manufacture of rails. I am not satisfied that Taranaki ironsand would be suitable for the manufacture of steel rails. I believe that Parapara ore might be so used.

52. *The Chairman.*] Can you tell us what it is costing the Taranaki people to produce pig iron per ton?—I estimated that the price ran into many pounds for producing the small quantity which they did, as they threw nearly all of it away—the white iron. Very little grey pig iron was produced. I do not think they have produced many tons from ironsand, and I think the total expenditure at the Taranaki furnace has been about £40,000.