

1895.

NEW ZEALAND.

IRON - ORE, LIMESTONE, AND HÆMATITE PAINTS
FROM COLLINGWOOD

(REPORTS FORWARDED BY AGENT-GENERAL).

LIMESTONE FROM TE KUITI

(REPORT OF ANALYSIS, BY W. SKEY, ANALYST TO THE MINES DEPARTMENT).

Presented to both Houses of the General Assembly by command of His Excellency.

No. 1.

MEMORANDUM from the AGENT-GENERAL to the Hon. the PREMIER.

Iron Ore, Limestone, and Hæmatite Paints.

Westminster Chambers, 13, Victoria Street, London, S.W., 13th July, 1895.

IN accordance with the instructions conveyed by Mines Department, Memorandum No. 60 (95/88), of 23rd January last, I submitted the specimens of iron-ore, limestone, and hæmatite paints, which were shipped to me on behalf of Mr. J. W. Humphreys, of Collingwood, to the Imperial Institute for the purposes of testing and investigation by the Department of Scientific and Practical Research, and I now beg to transmit herewith copy of letter I have received from Sir F. A. Abel, covering a report of the results of the examination thereof.

You will observe that a further communication is expected from the Director of the London and North-Western Railway Works at Crewe, and that Sir F. A. Abel promises to supply the information when he receives it.

I have consented to the publication of the results of the examination of these products in the *Imperial Institute Journal*, as suggested by the last paragraph of Sir F. Abel's letter.

W. B. PERCEVAL.

(Enclosure in No. 1.)

Imperial Institute of the United Kingdom, the Colonies, and India,
Imperial Institute Road, London, S.W., 11th July, 1895.

SIR,—

Referring to the letters from your Secretary, dated the 13th and 20th March last, I have now the pleasure of forwarding to you herewith, for transmission to the Government of New Zealand, a report on the samples of iron-ore, limestone, and hæmatite paints which were sent to this country for examination and report.

With reference to that part of the report which deals with the hæmatite paints, I shall have the pleasure of communicating with you again thereon as soon as I have received from the Director of the London and North-Western Railway Works, at Crewe, information as to the results of the practical trial to which the paints are being submitted.

I shall feel obliged by your informing me whether the results obtained by the examination of these products of New Zealand may be published in the next (August) number of the *Imperial Institute Journal*, under the head of "Work performed in the Research Department of the Institute";

and, if so, whether you can furnish me with any further information in regard to the samples in question, such as particulars of the localities or districts in New Zealand from which these samples were obtained.

I am, &c.,

F. A. ABEL,
Secretary and Director.

Sir Westby B. Perceval, K.C.M.G., Agent-General for New Zealand,
13, Victoria Street, S.W.

(Sub-Enclosure to Enclosure in No. 1.)

REPORT on samples of IRON ORE, LIMESTONE, and HÆMATITE, PAINTS received from the AGENT-GENERAL for NEW ZEALAND.

1. Iron-ores.

THE samples consisted of large lumps of a dense purplish-brown ore. Examination with a lens showed that it was probably brown hæmatite (hydrated ferric-oxide) in a semi-crystalline condition, often disposed in striæ or twisted laminae, and occasionally in a honeycombed form. The numerous large cavities in the lumps contained deposits of an ochre-coloured earth. An average sample was prepared from a large number of pieces, and when submitted to chemical examination gave the adjoined results as the mean of three analyses, in which the greatest range of variation on the components present in small proportions was not more than 0·07 per cent., and on the iron not more than 0·18 per cent. The figures correspond fairly well with the analyses of certain brown hæmatite ores obtained from Northamptonshire (England), and made under the direction of Dr. Percy (Percy's Metallurgy, "Iron and Steel," p. 208). These analyses are given for purposes of comparison:—

	New Zealand Ore.		Northampton Ores.	
Silica and gangue	12·41	...	7·58	5·33
Hydrosopic moisture	1·24	...	—	1·80
Combined water and organic matter	10·87	...	11·89	12·40
Ferric oxide	76·26	...	74·12	76·00
Alumina and phosphates	0·13	...	1·55	2·30
Manganese	Trace	...	0·57	0·40
Gold	Trace	...	—	—
Sulphur	Trace	...	Trace	—
Phosphorus	Trace	...	3·17	1·03
Magnesia	—	...	0·18	0·11
Lime	—	...	0·76	0·40
Carbonic acid	—	...	0·57	—
Percentage of iron	53·38	...	51·88	53·2

The New Zealand ore is decidedly superior to the Northampton ore represented by the above analyses, on account of its freedom from phosphorus.

As traces of gold were discovered in the average sample analysed, a special examination was made of a large average sample of the ore for this metal, and a minute quantity of gold extracted. Specially-selected lumps were also separately examined, and a sample weighing 21lb., consisting of specially-selected lumps, was examined by the cyanide process, but in no case was more than a trace of gold discovered.

2. Limestone.

The sample consisted of irregular lumps of a very dense and highly crystalline limestone, for the most part of a bright white colour, but with dark grey-coloured streaks and occasional rusty-yellow patches. An average sample was prepared, and its constituents determined qualitatively and then quantitatively. The figures subjoined are the mean of two very closely concordant analyses, checked by a second pair made by another worker.

	Per cent.
Lime	54·65
Carbonic acid	43·24
Silicic acid	1·11
Ferric oxide and alumina	0·135
Magnesium	Trace.
Moisture	0·48

It thus appears that this limestone is a very pure carbonate of lime, the impurities amounting at most to less than 2 per cent. (excluding water). A special examination was made for phosphorus, with a negative result.

3. Hæmatite Paints.

The samples were of two colours, yellowish-brown and purple-brown, the latter being evidently produced by exposing the original (yellow-brown) material to heat. Both corresponded in character to Calley's "brown" and "purple-brown" Torbay paint.

The brown paint contained somewhat over 2 per cent. of water, while the purple-brown paint contained somewhat less than 1 per cent. The proportion of siliceous matter varied considerably in different bags of the same kind of paint (ranging from 9 to 20 per cent.), and the ferric oxide ranged in amount, in the original yellowish-brown paint, between 69 and 76 per cent.; in two samples of the purple-brown paint it amounted to 83 and 87 per cent. respectively.

Both paints are well-ground. They have been submitted to practical tests in comparison with the Torbay paint in a well-known extensive Government establishment, in which Torbay and other iron-oxide paints have been largely employed.

The following is the result of the trial of the yellow-brown paint:—

New Zealand Paint.
 17lb. oxide ground in oil required.
 5½ pints boiled linseed oil.
 1½ " turpentine.
 2lb. patent driers.
 Weight, made up, 26lbs.
 26lb. paint covered 146 sup. yards; one coat.
 The paint worked out well, with good body.
 There was no sediment in pot as work proceeded.

Torbay Paint.
 17lb. oxide ground in oil required.
 5 pints boiled linseed oil.
 1 pint turpentine.
 2lb. patent driers.
 Weight, made up, 25lbs.
 25lb. paint covered 110 sup. yards; one coat.
 The paint worked out well, with fair body.
 There was no sediment in pot as work proceeded.

The New Zealand oxide is a better paint than Torbay, so far as covering-power is concerned; and the difference in amount of materials required in making-up the New Zealand oxide, as against the Torbay, does not even bring the latter pigment up to the former.

The roasted purple-brown paint required exactly the same proportions of oil driers and turpentine as the yellow-brown paint; 26lb. covered 130 yards superficial, as against 146 yards for the same weight of the unroasted oxide. In the latter case, the iron surface to which the paint was applied was thoroughly warmed by the sun at the time of painting, and this may, to a great extent, account for the somewhat larger area covered by the paint.

The price paid for the Torbay paint, which was tried against the New Zealand, was £1 4s. 6d. per hundredweight, ground in oil to paste.

Samples of the two paints are at present undergoing practical tests at the works of the London and North-Western Railway, Crewe, through the kindness of Mr. F. W. Webb. The results will be reported as soon as received.

11th July, 1895.

F. A. ABEL,

Secretary and Director, Imperial Institute.

No. 2.

New Zealand Geological Survey (Laboratory).

RESULT of ANALYSIS of SPECIMEN No. 6,898 from TE KUITI. Received 13th August, 1895; reported on 14th August, 1895.

Sub-crystalline Limestone or Marble.

THIS is a very compact homogeneous stone of a pleasant brown colour. It would polish to a marble of medium quality, and make a good ornamental building-stone for corners, facets, &c. The analysis subjoined shows it to be almost pure calcic carbonate:—

Calcic carbonate ...	...	...	...	...	...	Per cent.
Magnesia carbonate	...	...	...	...	...	92.78
Sesqui-oxide of iron	...	...	...	...	...	2.93
Alumina	...	...	...	...	...	1.79
Silica	Traces
Water	2.29
						21
						100.00

WILLIAM SKEY,
 Analyst to the Mines Department.

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