0/9 5,000—17-1-99.

Revenue (1899) Department.

MISCELLANEOUS SERIES.

G.O., No. 895

DATED 3rd March. 99

[Despatch Abstract.]

Endorsement of the Govt. of India forwarding certain papers regarding the experiments carried out in Middlesborough with Bengal Coal and Salem Iron ore, recorded with reference to G.O., No. 7, dated 4th January 1899.

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

$\frac{0}{18}$ 4,000 — 18-10-98.

Revenue (1899) Department.

CURRENT No. 1415

2/3/99.

Sict Secy

From

The Government of India —
Public Works Dept.

Order No. 1895 dd 3rd March 1899.

Recorded with ref to
G.O. No 7 dt 4-1-89

No. 163 C.W.C. and I.

1.3.99

Dated 16th February 1899

Received 25th " "

Registered 27th

Enclosures 1

Spare copies. —

Note

A copy of the papers now forwarded by the Govt. of India has already been communicated direct to this Govt. by the Secy. of State - vide Go. No. 7 dt. 4. 1. 99

P.C. 1.3.99.

Secy 1.3.99

SUBJECT.

Forwarding for information certain papers regarding the Experiments carried out in Middlesborough with Bengal Coal and Salem iron ore.

U Spr 2/3/99

BACK PAPERS.

G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.

*No.*153 C.W.C.& I.

GOVERNMENT OF INDIA:

PUBLIC WORKS DEPARTMENT.

CIVIL WORKS
Coal & Iron

All communications should be addressed to the Secretary.

Simla, the 16th February 1899.

The under-mentioned papers are forwarded to the Secretary to the Government of Madras, Revenue Department, for information, in continuation of this office letter No.652 C.W.C.& I., dated the 5th November 1898.

By order,

W.Sp. 686 19.11.98

O. C. Lees
Under Secy. to the Govt. of India.

Documents referred to.

Copy of Despatch No.220 Revenue dated the 1st December 1898 from the Secretary of State for India, and of its enclosures.

Report by Professor Dunstan of the Imperial Institute on samples of Salem Iron Ore and Bengal Coal.

M.I.

No. 220 (Revenue), dated India Office, London, the 1st December 1898.

From—Her Majesty's Secretary of State for India,
To—The Government of India.

In continuation of my Despatch No. 148, dated the 25th August 1898, I forward copy of a report* from Professor Dunstan of the Imperial Institute, on samples of Salem iron ore and Sanctoria coal. The statements in this report, while not gainsaying the analysis of the samples sent to Middlesborough, put a somewhat different complexion on the possibilities of Salem iron ore and Bengal coal for smelting purposes, and suggest further investigation.

*Letter from Sir F. Abel, dated 11th November 1898, with one enclosure.

I have, etc.,
GEORGE HAMILTON.

No. R. 445—4, dated Imperial Institute, the 11th November 1898.

From—F. A. Abel, Esq., *Honorary Secretary and Director,*
To—The Under-Secretary of State for India.

Referring to your letter of the 26th August 1896 (No. R. and S. 1786), with which you forwarded, by direction of the Secretary of State for India, a copy of reports concerning the tests and experiments carried out with Bengal coal and Salem iron ore at the works of Messrs. Bolckow, Vaughan & Co., of Middlesborough, I have the honour to request you to be so good as to submit to the Secretary of State the accompanying memorandum, prepared by the Director of the Scientific and Technical Department of the Imperial Institute, Professor Wyndham Dunstan, on the subject of the experiments in question, the results furnished by them, and the results of examination of Bengal coal and Salem iron ore carried out in the Scientific Department of this institute.

I venture to submit that the statements contained in this memorandum are worthy of careful consideration in reference to the question which led to the experiments instituted at the Middlesborough works.

Memorandum on the trials by Messrs. Bolckow, Vaughan & Co. of samples of Salem Iron Ore and Bengal Coal, by Professor Wyndham Dunstan, F.R.S., Director of the Scientific Department of the Imperial Institute.

In connection with the correspondence which has taken place between Mr. H. G. Turner and the India Office with reference to Mr. Turner's application for a concession to smelt the Kanjaimalai ore, I wish to draw attention to the following points.

In 1892 Mr. T. H. Holland, Assistant Superintendent of the Geological Survey of India, was deputed by the Government of India to secure for the Imperial Institute a representative collection of the iron ores of Madras. In transmitting the collection of samples Mr. Holland suggested that they should be experimentally examined (see Sir E. Buck's demi-official letter No. 1088—99, to Sir Frederick Abel, dated 5th May 1892, F.S.S., No. 26).

The specimens were accordingly submitted to analysis in the Laboratories of the Imperial Institute, and the results published in the Journal of the Imperial Institute, Volume 2, No. 18 (June 1896).

This collection included six samples of ore from Kanjaimalai in the Salem District of Madras, which, on analysis, furnished the following results :—

Number.	Available iron.	Insoluble residue (silica).	Lime.	Sulphur.	Phosphorus.
799	68·95	1·04	...	·16	·13
815	70·06	1·72	...	·20	...
873	63·57	8·89	...	·29	...
874	66·96	3·17	...	·10	...
812	36·44	46·95	...	·29	...
813	35·73	48·45	...	·29	·27

The average percentage of available iron is thus 56·95, the highest percentage being 70 and the lowest percentage 36. Out of the six samples four were therefore of excellent quality, and only two inferior. The four samples are undoubtedly suitable for conversion into pig iron by smelting on the large scale, whilst the two samples are valueless for this purpose.

A specimen of the consignment of ore specially selected this year by Mr. Middlemiss, of the Geological Survey of India, for transmission to Messrs. Bolckow, Vaughan & Co. as typical of the Kanjaimalai deposit, referred to in his memorandum of the 6th February 1898, furnished on analysis in the Laboratories of the Imperial Institute the following results, which

are in substantial agreement with those obtained by Messrs. Bolckow, Vaughan & Co. and recorded in their letter of the 28th July 1898 (see appended report on Salem ore and Sanctoria coal by Mr. J. E. Stead). In the following table, column 1 gives the results of the analysis made in the Scientific Department of the Imperial Institute, column 2 the results of Mr. Stead :—

	Imperial Institute.	Mr. Stead.
Iron	38·74	39·02
Insoluble residue (silica)	44·09	42·36
Lime	·365	1·00
Sulphur	·076	·03
Phosphorus	·14	·13

It is therefore clear that the specimen of Kanjaimalai ore, regarded by Mr. Middlemiss as representative, is extremely poor and quite unsuitable for smelting in the blast furnace. In connection with the favourable opinion expressed by Mr. Jeremiah Head in his report to the Secretary of State, dated 11th March 1898, as to the possibility of smelting the Kanjaimalai iron ore, it should be pointed out that he has taken, as provisionally representative of the ore, the results of the analysis of the best specimens from the Imperial Institute set, and has taken no account of the recorded results of the analysis of the two inferior specimens (Nos. 812 and 813) which correspond with the samples regarded by Mr. Middlemiss as an average representative portion of the Kanjaimalai deposit.

Turning to the coal. One hundred tons of Bengal (Sanctoria) coal were forwarded to Messrs. Bolckow, Vaughan & Co. A sample from this consignment analysed in the Scientific Department of the Imperial Institute furnished the following results :—

Calorific value, 6,237 calories.
Fixed carbon, 52·83 per cent.
Volatile matter, 25·94 per cent.
Sulphur, ·168 per cent.
Phosphorus, ·039 per cent.

These results again are in substantial agreement with those obtained by Messrs. Bolckow, Vaughan & Co. from Mr. R. Robinson, and referred to in their letter of 28th July 1898. This sample of Sanctoria coal is, however, inferior to the two samples described in my "Report on the Coal Supply of India, 1898," which were sent to the Imperial Institute as representative of the coal of this colliery. The analysis of these two samples gave the following results :—

Serial Number.	Fixed carbon.	Volatile matter.	Sulphur.	Ash.
1163	49·4	39·3	1·63	11·29
1168	49·32	39·94	1·53	10·74

It therefore appears that the consignment of coal sent to Messrs. Bolckow, Vaughan & Co., whilst containing a smaller proportion of sulphur, is much richer in mineral constituents (ash) than either of the two samples referred to in my Coal Report, there being, in fact, nearly twice as much ash in the coal consigned to Middlesborough, which, moreover, is stated to yield an unsuitable coke. Consequently I agree with Messrs. Bolckow, Vaughan & Co. that this sample of Sanctoria coal is unsuitable for smelting purposes.

We may, therefore, conclude that if the sample of Kanjaimalai ore is, as Mr. Middlemiss asserts, an average specimen of this deposit, this ore cannot be seriously regarded as suitable for smelting, even after treatment by the magnetic separator. Similarly, if the sample of Sanctoria coal sent to Middlesborough is the only coal available for use in the blast furnace, then iron smelting can hardly succeed in Madras.

I am, however, of opinion that neither of these two points has been established. As regards the ore Mr. Middlemiss remarks :—

"Only occasionally, in small pockets or as veins or local accretions (not more than a few inches across), do we sometimes find masses of pure or almost pure magnetite. But it would not be fair to include these in any estimate of the general richness of the beds. It is doubtless due to some such specimens as these having been gathered that some of the analyses of the Kanjaimalai ore carried out at the Imperial Institute gave such abnormally rich percentages of iron (about 70 per cent.)."

Now the specimens of ore referred to by Mr. Middlemiss as having been analysed at the Imperial Institute were selected by Mr. T. H. Holland as typical portions of the deposits. Four out of the six specimens are undoubtedly excellent samples of magnetite, which would repay smelting, whilst only two were of the inferior quality regarded by Mr. Middlemiss as representative. It is evident that, before any conclusion can be arrived at as to the value of the Kanjaimalai deposit, it must be systematically sampled and analysed. I agree with Mr. Jeremiah Head's recommendations on this head.

As to the coal. I have no information with reference to the selection of the sample sent to Middlesborough. As I have pointed out, it is inferior to the sample of Sanctoria coal specially selected for analysis at the Imperial Institute by the Reporter on Economic Products to the Government of India. Of the 53 samples of coal derived from the various Bengal collieries and described in my report, a number would probably be suitable in composition and coking power for use in smelting iron ores.

The fuel question, therefore, requires further investigation before any decision as to the suitability of Bengal coal can be arrived at.

10th November 1898.

WYNDHAM R. DUNSTAN,
Director of the Scientific Department of the Imperial Institute.

No. 50—43-4, dated Calcutta, the 5th January 1899.

Endorsed by the Department of Revenue and Agriculture.

Copy forwarded to the Public Works Department for information, in continuation of endorsement No. 3493—43-3, dated 22nd December 1898.

25 FEB 99
REVENUE DEPARTMENT

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